Education 4.0 and Teaching in Management Courses: What Can We Learn from the Educational Designer?

Educação 4.0 e a Docência em Cursos de Gestão: O Que Podemos Aprender com o Designer Educacional?

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ABSTRACT

To think about teaching and learning process in Education 4.0 is a challenge, given the growing presence of digital information and communication technologies (DICTs) in classrooms. Educators find themselves compelled to adopt technologies without it being part of a structured process or in the face of the absence or inefficiency of continuing improvement programs that prioritize the technological aspect over the educational one. Thus, this paper provides an experiential account of the "Uncomplicated Educational Design" course, offered with the aim of assisting educators in management courses in the creation, development, and evaluation of in-person courses with the support of Moodle. Participants found the course favourable, engaging, and relevant, suggesting adjustments in the time allocated for activities due to the complexity involved. From this context, as a practical contribution, the proposal emerged to create a Standard Design, a structured model for the virtual environment. The experiences reported have implications for those involved in the process of continuous teacher improvement, highlighting that incorporating knowledge of educational design, with a focus on the ADDIE model, contributed to increased confidence in the adoption of DICTs, with positive effects on teaching practice.

Keywords: Education 4.0, Digital Information and Communication Technologies, Continuing Teaching Improvement, Educational Design, Moodle.

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RESUMO

Pensar o processo de ensino e aprendizagem na Educação 4.0 é um desafio, dada a presença crescente das tecnologias digitais de informação e comunicação (TDICs) nas salas de aula. Docentes se veem compelidos a adotar tecnologias sem que isso faça parte de um processo estruturado ou frente a inexistência ou ineficiência de programas de aprimoramento continuado que priorizam o aspecto tecnológico, mas não o educacional. Assim, este trabalho traz um relato de experiência sobre o curso "*Design* Educacional Descomplicado", ofertado com o objetivo de auxiliar docentes dos cursos de gestão, na criação, desenvolvimento e avaliação de disciplinas presenciais com o apoio do Moodle. Os participantes consideraram o curso favorável, envolvente e relevante, e sugeriram ajustes no tempo destinado à realização das atividades, devido à complexidade envolvida. Desse contexto, como contribuição prática, surgiu a proposta de construção de um *Design* Padrão, um modelo estruturado de ambiente virtual. As experiências relatadas trazem implicações para os envolvidos no processo de aprimoramento continuado docente, evidenciando que ao incorporar os conhecimentos sobre *design* educacional, com foco no modelo AD-DIE, o processo contribuiu para aumentar a confiança na adoção de TDICs, com efeitos positivos sobre a prática docente.

Palavras-chave: Educação 4.0, Tecnologias Digitais de Informação e Comunicação, Aprimoramento Docente Continuado, *Design* Educacional, Moodle.

Introduction

Transformations in the economic, social, political, cultural, technological order, among others, trigger a series of actions to adjust current practices to meet new demands. In the educational context, this dynamic is no different, so much so that some authors name the current moment as Education 4.0, largely influenced by the development of industry and technological advancements (Mahmud; Freeman; Bakar, 2022; Miranda et al., 2021; Ramírez-Montoya et al., 2021).

Moreover, it is imperative to also consider the impact of the Covid-19 pandemic on education, leading to the adoption of emergency measures by educational institutions, from early childhood education to higher education, with changes in their planning, pedagogical practices, learning methods, evaluation strategies, and forms of interaction between teachers and students (Bonfield et al., 2020; González-Pérez; Ramírez-Montoya, 2022; Loose; Ryan, 2020; Mahmud; Freeman; Bakar, 2022; Miranda et al., 2021).

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Thus, teachers are being challenged to reinvent themselves and act as agents of change, particularly considering the demands of Generation Z (born between 1997 and 2013), considered digital natives (Ramírez-Montoya et al., 2021). Due to the profile of this new student entering classrooms, it is essential that the teaching and learning process considers the presence and impact caused by emerging technologies (Mahmud; Freeman; Bakar, 2022). As stated by Ramírez-Montoya et al. (2021), the introduction of technologies in education results in transformations in the roles played by teachers; therefore, educators must demonstrate a willingness to continually improve their teaching approaches.

This study is situated within the context of providing an experiential account of the Uncomplicated Educational Design course. The course was specifically designed for faculty members involved in management programs across four educational institutes at the University of Sao Paulo. Its primary objective is to support educators in the conception, development, and assessment of in-person courses, leveraging the instructional capabilities of the Moodle platform.

This report seeks to shed light on the necessary reflection on the connection between teaching practice and the advancement of technologies and how each educational institution, in the case of this work, at a higher level, can act to train its staff to meet the demands of an increasingly connected and digital world. The emphasis lies not merely on equipping educators to use each new technology that emerges but rather on preparing them to choose the one that is most appropriate to achieve the intended learning objective, considering the students' profile and the context of the educational institution. Works like this are important as they provoke new ways of thinking about the process of continuous teaching improvement in the face of the inclusion of Digital Information and Communication Technologies (DICTs) (Kaur; Leong; Attard, 2022).

To provide the reader with a better understanding of the reported experience and to comprehend why certain decisions were made, the fundamental concepts of this work will be presented in the following sections.

EDUCATION 4.0 AND DIGITAL LITERACY

Quality education is the 4th Sustainable Development Goal (SDG), established in 2015 and assumed as part of the 2030 Agenda, which is a global action

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plan adopted by the United Nations (UN) that brings together 17 goals. The agenda is a commitment made by 193 UN member countries, including Brazil, and which was embraced by the University of Sao Paulo. The achievement of the 4th goal is crucial for promoting, among other aspects, improvements in economic and social realms (United Nation, 2015).

In order to achieve Goal 4, DICTs play an important role as they contribute to improving quality and access to education by offering new ways of teaching and learning, interactive resources, and tools for assessment and feedback (Li et al., 2019). Its significance in attaining this objective is underscored by its inclusion as one of the indicators employed by the United Nations, specifically measuring the proportion of individuals possessing the skills to effectively utilize Digital Information and Communication Technologies (DICTs) (Ipea, 2022).

The adoption of DICTs has over time propelled advancements across various domains, including those leading to changes in the industry, culminating in the Fourth Industrial Revolution or Industry 4.0. This revolution is transforming, among others, the job market and demanding new skills from professionals to fill the vacancies that are emerging, not to mention those that have not yet been created (González-Pérez; Ramírez-Montoya, 2022). As a result, there is a need for profound education reforms in education to face these new demands, culminating in the emergence of Education 4.0, which has as its distinctive characteristics, among others, innovative pedagogical practices, teachers occupying the role of mentor, active learning spaces and processes accompanied by intensive use of technologies that enable the personalization of the student's learning process (Miranda et al., 2021; Ramírez-Montoya et al., 2021; Villar; Herrero; Álvarez-López, 2022). In this way, have evolved from being a mere support tool in the classroom to an inseparable part of current pedagogical processes (Garzón-Artacho et al., 2021), which is no different at the University of Sao Paulo.

Despite being recognized as important, the adoption of DICTs is often done at a whim, for example, to face market pressures. Thus, some Higher Education Institutions (HEIs) find themselves forced to incorporate technologies to make their business model scalable and, consequently, more profitable. Or due to an emergency situation, such as the one that occurred during the Covid-19 pandemic. At the time, several educational institutions, public and private, had to adjust to

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offering remote education (Hodges et al., 2020). And, as a result, they achieved it, some more quickly than others, all thanks to the investments that were being made as a result of the digital transformation process in education (Dorfsman; Horenczyk, 2021).

It is noteworthy that emergency teaching is different from a well-planned and pedagogically effective process that meets the needs of students (Bonfield et al., 2020). Furthermore, it also causes confusion and questions regarding the quality of online courses in a hasty movement of evaluating them as the same side of a coin (Hodges et al., 2020). However, the impact of the pandemic on education is undeniable, going beyond a temporary change in instructional delivery, to drive a no-return movement to disrupt educational systems (Dorfsman; Horenczyk, 2021) that guarantees the principles of accessibility, quality, and improvement in a changing context (Villar; Herrero; Álvarez-López, 2022).

At the center of this discussion is the teacher, since "to date, there is no primer for how to plan, teach or deliver Education 4.0" (Bonfield et al., 2020, p. 225). Thus, what ends up happening is the transfer of in-person classes to the online context, merely changing the medium without recognizing that this shift requires a rethinking of the teaching and learning process (Hodges et al., 2020).

Therefore, it is necessary to bring the issue of digital literacy into the discussion when preparing teachers for this new phase of education. Digital literacy indicates an individual's ability to use digital content and virtual environments in the educational environment (Li; Yu, 2022), through the consumption, creation, and communication of digital products. For Dewi, Pahriah and Purmadi (2021), there are three different levels of digital literacy: (a) digital skills that include concepts, skills and behaviors; (b) use of digital to improve digital skills in particular contexts; and (c) creativity and innovation in the digital world in order to promote transformations.

The Covid-19 pandemic has highlighted a scenario in which teachers must have adequate digital knowledge to implement current and innovative educational models (Li; Yu, 2022; Sánchez-Cruzado; Santiago Campión; Sánchez-Compaña, 2021). After all, the level of digital literacy achieved by a teacher is related to better teaching and learning results in digital media (Dorfsman; Horenczyk, 2021)and this paradigm shift must be combined with new methodologies and learning strategies (Sánchez-Cruzado; Santiago-Campión; Sánchez-Compaña, 2021).

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In the case of USP, initiatives aimed at enhancing the digital literacy of the teaching staff had already been implemented through the Learning and Teaching Laboratory (in Portuguese, Laboratório de Aprendizagem e Ensino - LAE), which is a space dedicated, among others, to the development of experiences and methodologies of teaching and learning, through the application of DICTs aimed at Economics, Administration, Accounting and Actuarial courses.

At LAE it is believed that both the HEI and teachers must be aware that the development of digital skills is no longer an option, but a necessity of Education 4.0 and that teacher improvement programs (Sánchez-Cruzado; Santiago-Campión; Sánchez-Compaña, 2021)to achieve these improvements are urgent (Dewi; Pahriah; Purmadi, 2021), as the better the development of teachers' digital literacy, the more competent they will be in their pedagogical practice (Li; Yu, 2022).

THE INTERTWINING BETWEEN TEACHER TRAINING AND DIGITAL LITERACY

The teachers of management courses at the HEI studied do not deal with a singular reality, which means they must overcome different barriers to boost innovation in education. To move from traditional teaching to innovative practices supported by DICTs, it is necessary for teachers to undergo a continuous improvement program so that they can develop digital literacy (González-Pérez; Ramírez-Montoya, 2022).

After all, in traditional teaching, it is assumed that the human being is capable of storing information, and the teacher is the central element, the holder of knowledge, who imparts data and information to students, typically through lectures. It falls upon the learner, in a passive manner, to memorize the outcomes of the process and reproduce knowledge in an evaluation (Santos; Bonato; Lunardi, 2022), in contrast to what is expected in Education 4.0.

Although USP has support teams in teaching units to assist teachers in the process of adopting DICTs in their pedagogical practice, these teams are lean and usually offer support to a small group of interested teachers, as is the case with LAE. However, the pandemic brought a challenge that no one was prepared for. Therefore, the teams were unable to provide the same level of support to all teachers, which led many of them to improvise quick solutions, although not suitable for the format in some cases.

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It is worth noting that the effectiveness of integrating DICTs into education is directly linked to the teacher's preparation and the support they receive, as this influences their confidence in implementation. Therefore, it is essential that teachers have access to continuous development programs and receive adequate support from the technical-pedagogical team to gain confidence and adopt DICTs (Mahmud; Freeman; Bakar, 2022).

This gains greater relevance considering the constant technological evolution, which occurs at an increasingly accelerated pace. Furthermore, a wide range of educational programs, software, and digital online learning platforms, such as Moodle (Modular Object-Oriented Dynamic Learning Environment), are being developed, improved, and introduced, not only in distance learning courses but, also, in face-to-face courses, creating formats in which it is difficult to distinguish the limits of each educational modality (Mahmud; Freeman; Bakar, 2022).

It is worth noting that this situation has raised concern among teachers, who face pressure to adapt to a context that is unusual for them and for which they have no prior training. Therefore, they are used to accessing technologies only when necessary and not in a routine and natural way as young people do (Garzón-Artacho et al., 2021). However, as Fraile, Peñalva-Vélez and Lacambra (2018) put it, as teachers act as architects of the teaching and learning process, being digitally literate means being able to adequately integrate DICTs as part of their pedagogical practice, contributing to transforming the education.

Thus, the leading role of DICTs emerges as an important element for breaking with traditional models, placing teaching improvement and the potential of digital technology at the center of discussions (Villar; Herrero; Álvarez-López, 2022). According to the TALIS survey (Teaching and Learning International Survey), coordinated by the OECD (2019), just over half of teachers in member countries received some type of training in the use of DICTs in the process of teaching and learning. This reinforces the need to prepare teachers to face future challenges. Li et al. (2019) corroborate by highlighting the importance of teachers having to go through a training process that includes new methodological skills and pedagogical strategies that allow them to integrate these digital tools into their regular teaching.

As it can be observed, the development of digital competence holds an unquestionably important position in the LAE, given that in the context of Educa-

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tion 4.0, it is essential to possess new technical and cognitive competencies to face the challenges of the knowledge society. In this context, digital competence becomes a protagonist in all aspects of lifelong learning (Cervera; Martínez; Mon, 2016). Fraile, Peñalva-Vélez, and Mendióroz-Lacambra (2018) corroborate this by understanding the teacher's digital competence as their ability to use DICTs in their pedagogical practice but doing so with an awareness of their implications for students' learning strategies and digital training. Li et al (2019) list as skills, from digital skills, information literacy, communication using DICTs, and the ability to solve problems situated in digital environments, crucial for today's professionals, which includes students and the new demands of the world of work that they will have to deal with.

The LAE understands that the development of digital competence can be carried out in multiple ways, that is, it is possible to make use of strategies such as observation of teaching models and peer evaluation, as well as the practice of creating digital content and tests in classroom teaching. However, for these strategies to work, the perceived usefulness of DICTs, a concept from the Technology Acceptance Model (TAM), is a crucial factor in the success of any teacher improvement program (Li et al., 2019). After all, the basis for effective teaching with DICTs is not only in its adoption, but also emerges from the effective interaction between content, pedagogy, and knowledge of technologies, which has a positive effect on student performance, since access to technologies outside The school context does not guarantee that students satisfactorily develop their digital competence (Cervera; Martínez; Mon, 2016; Fraile; Peñalva-Vélez; Lacambra, 2018) and, therefore, it is important to invest in continuous improvement programs for teachers, with highlighting those that deal with educational design (He; Ma; Zhang, 2023a).

CROSSING PATHS: EDUCATIONAL DESIGN AND TEACHING

The offering of distance, hybrid or in-person courses supported by technologies, even before the COVID-19 pandemic, had already led HEIs to invest in technical, human, and management infrastructure to offer courses that met students' desires. (Mahmud; Freeman; Bakar, 2022), a phenomenon also observed at USP. In this case, an essential part of this infrastructure includes the formation of multidis-

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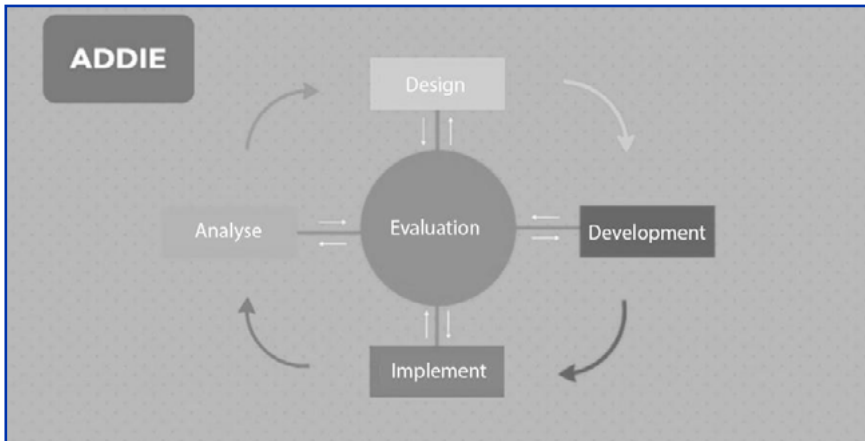
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ciplinary teams, which may include professionals such as graphic designers, web designers, programmers, illustrators, proofreaders, tutors, sound editors, content writers, and others. (Kenski, 2015). Among the members of these teams, playing a central role and acting as a conductor, is the educational designer (ED), whose role consists of applying a methodology rooted in theories and instructional models to design and develop content, experiences, and other solutions aimed at to support the acquisition of new knowledge or skills (Filatro, 2008).

Thus, EDs are responsible, among others, for creating the course design and developing, directly or indirectly, all instructional materials, including presentation materials, participant guides, videos, learning objects, among others. Additionally, they generally take responsibility for evaluating courses/subjects to verify that what was learned, and the proposed solution led to a measurable change in behavior (Kenski, 2015). In other words, when carrying out educational design, we take care, among others, of analyzing and selecting the most appropriate strategies, methodologies, and technologies to maximize the learning experience (Patel et al., 2018).

In short, by sharing their knowledge, the educational designer helps the teacher create a more efficient and engaging learning experience using DICTs. With this, it is expected that this teacher will be able, among others, to create a more effective educational design; to make use of DICTs, but making choices appropriate to the nature of the subject and the learning objectives; to implement a student-centered approach; and implement formative and summative evaluation that assess not only understanding of the content, but also the skills and competencies acquired during the learning process.

In this context arises the model of design educational called ADDIE, Figure 1, an acronym for Analyze, Design, Develop, Implement, and Evaluate. Although there are several educational design models, the ADDIE model is one of the most widely used (Li et al., 2019; Phillips et al., 2019; Siew; Chin, 2018), and its foundations date back to World War II, when the US military developed strategies to quickly train people to perform complex technical tasks (Filatro, 2008; Filatro; Cairo, 2015; Kenski, 2015). For Patel et al. (2018), in essence, the ADDIE model is an approach centered on the student and not on the teacher.

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Figure 1. Design course module.

ADDIE Model Steps

The analysis stage is the moment in which the teacher must identify the educational problem, based on the gap between the current state and the desired one, also known as needs analysis (Siew; Chin, 2018). Furthermore, at this point the objectives of instruction are also defined, the profile of the students is characterized and restrictions are lifted (Phillips et al., 2019).

The design stage, in turn, is the time to plan and carry out the design of the didactic situation itself (Filatro, 2008). Tasks at this stage include setting the learning objectives for the course, as well as deciding how the materials will be created and designed (e.g., describe what content will be covered, and in what sequence, define what activities will be carried out, selecting the most appropriate media and tools, all of this expressed in a document called the Educational Design Matrix (Phillips et al., 2019). In addition to this document, at this stage the teacher can also make use of the storyboard which is the visual representation of a digital learning resource, that is, a prototype that allows you to view the content, sequence of screens and includes textual, visual, and auditory languages (Santos, 2015).

Next, we have the stage of development that begins from the documents developed in the previous stage and assumes the creation of content in varied formats

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such as text, audio, video, static/animated infographics, etc., including internal or outsourced development, copyright release for third party materials among others (Phillips et al., 2019). It is important that emerging technologies and pedagogical procedures are used to provide innovative solutions (Miranda et al., 2021).

It is worth noting that digital teaching material works as a tool that can attract and arouse the interest of students, because, when well designed, is able to juxtapose a concise presentation of the content to create a meaningful combined learning experience. Thus, with the possibility of customizing the teaching material available online, educators join the movement to create and provide a face-to-face learning experience with the support of this type of resource (Mahmud; Freeman; Bakar, 2022).

Following is the stage of implementation that is marked by the loading of curricular components in a virtual learning environment (VLE) (Filatro, 2008). It is worth noting that, with the advancement of DICTs, the integrated resources of these environments, with emphasis on Moodle, which is the environment used at USP, bring potential benefits to students and teachers, and this includes greater availability, immediate feedback, improved communication, and development of digital skills (Mahmud; Freeman; Bakar, 2022), crucial to developing the necessary skills in the world outside the boundaries of the university.

After loading the course, usability tests will begin to identify, for example, whether the videos are being played, whether the navigation works, whether external resources are available. Feedback from the usability testing phase is essential to correct navigation errors and improve the user experience. Only in this way is it possible to carry out the actual delivery of the course, as well as the prior training of those involved or briefing of the student support team, which in the case of USP, would be the subject monitors (Phillips et al., 2019).

Finally, there is the evaluation stage that, despite appearing at the end, is not a terminal stage, but works iteratively with the other stages, as from there data is collected to identify areas that require improvements/adjustments (Patel et al., 2018) so to improve instructional effectiveness (Siew; Chin, 2018), that is, it is time to evaluate whether the proposal was successful or not (Phillips et al., 2019).

Regarding the types of assessment, it is possible to perform formative and summative. The first is a core and ongoing component of the ADDIE model, in which

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the results of each stage are evaluated to further refine the training program. This type of evaluation allows for quick feedback on the effectiveness of current instructional strategies, allowing you to improve the course as you deliver it. The second, summative, objective is to evaluate the general effects of the training program, that is, to evaluate its effectiveness, and it is not possible to adjust during the offer, leaving it for a new edition of the course. Summative evaluation provides information about the performance of teachers/monitors, the level of effectiveness of the proposed activities, strengths, and weaknesses of the course proposal, among others (Chen et al., 2022).

Still regarding the educational design model, there are three types (fixed, open, and contextualized) that affect the characteristics of the proposed educational solutions. For Filatro (2008) and Filatro and Cairo (2015), fixed educational design can be understood as one in which the analysis, design, and development stages are separated from the implementation stage, that is, the focus is on the construction of structured content, standardized media, and feedback, eliminating, in most cases, the synchronous presence of a teacher. Open educational design, on the other hand, presupposes a greater focus on the learning process than on educational products. Thus, materials are developed and/or improved during the learning process. Finally, there is contextualized educational design that seeks a solution in which there is a balance between automation (fixed) and personalization (contextualized), making use of tools that allow the adaptation of previously programmed resources.

As you can see so far, with the advancement of DICTs, there is enormous potential for educators to develop digital resources to encourage students to become more actively involved in their learning process (Mahmud; Freeman; Bakar, 2022).

Thus, this experience report presents, in the context of Education 4.0, the Uncomplicated Educational Design course offered to assist teachers of the management courses of the CAEG-USP consortium in the creation, development, and evaluation of disciplines offered with the support of Moodle. Specifically: (I) describe the experience with the application of the ADDIE model in the training process; (II) evaluate the reaction of the faculty that participated in the course, the knowledge built, and the change of practice during and after the course; (III) identify the main

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barriers and facilitators for a future re-offer of the course, using formative and summative evaluation data.

Materials and Methods

In this work, we used the experience report on the academic experience in the Uncomplicated Educational Design improvement course, since it is believed that the systematization of this type of knowledge is relevant, as it contributes to social transformation, considering that scientific knowledge produced has the potential to contribute to the improvement of the subjects, in the case of this study, teachers (Mussi; Flores; Almeida, 2021).

HAND IN HAND: ACTORS INVOLVED IN THE PROPOSAL

In view of the context presented, HEIs are implementing initiatives to support and encourage educators and researchers to adopt educational innovation initiatives and projects, designing and developing new practices, methodologies, and applied technologies (Miranda et al., 2021).

One of these initiatives is the CAEG project (Consórcios Acadêmicos para a Excelência do Ensino de Graduação, in english, Academic Consortia for Undergraduate Teaching Excellence) which was proposed by the Pró-Reitoria de Graduação (Pro-Rectory of Undergraduate Studies - PRG) at the University of Sao Paulo with the aim of associating its educational institutions in innovative teaching and learning activities. It should be noted that this call for proposals, launched in 2020, coinciding with the critical period of the Covid-19 pandemic, aimed to promote initiatives aimed at reconfiguring the teaching paradigm, addressing elements and approaches that can be incorporated into higher education strategies in a post-pandemic horizon.

The title of the project is "Caminhos para a Disrupção no Processo de Ensino e Aprendizagem em Cursos de Graduação em Gestão" (in english, Pathways for Disruption in the Teaching and Learning Process in Undergraduate Management Courses) and the consortium had the collaboration of 42 people, including teachers, staff, and students from Administration, Economics, Accounting, and Actuarial

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Sciences at FEA (Faculty of Economics, Administration, Accounting and Actuarial Science), Administration, Accounting and Economics at FEARP (Faculty of Economics, Administration and Accounting of Ribeirão Preto), Marketing, Leisure and Tourism at EACH (School of Arts, Sciences and Humanities) and Administration and Economics from ESALQ (Escola Superior de Agricultura "Luiz de Queiróz") and was developed by LAE, also from FEA.

The LAE brings as a philosophy to guide their actions the understanding that learning is person-centered, which means that the focus of teaching is not just on the teacher or the content, but on the needs and interests of students, encouraging them to actively participate in the learning process.

The integration strategy and interdisciplinarity perspective were developed considering four aspects, being (a) participation of teachers involved in the project in the continuous improvement program, offered by FEA/USP; (b) creation of an Interunit Committee to develop teaching-learning processes in management; (c) creation of a Community of Practice in Pedagogical Innovations in the area of Management, which aims to create and develop a sustainable community of practice, embodied in pedagogical innovations, with a focus on active methodologies and hybrid strategy (blended learning); and (d) development of experiences for offering joint or shared subjects.

ABOUT THE UNCOMPLICATED EDUCATIONAL DESIGN COURSE

The course was offered to teachers as part of the CAEG project's continued improvement program. Therefore, to register it was necessary: (i) to be a teacher at educational institutes participating in the consortium, despite the interest of people from other institutes or external audiences; (ii) to have a discipline plan developed; (iii) to have a subject in the University's Moodle (E-Disciplines); and (iv) to be available to work in this environment, as the course would have several practical activities. The course had 24 registrations, due to its hands-on nature, and 20 participants carried out the final activity and completed the course. The offer took place from September 23rd to November 4th, 2021, with weekly online meetings and a 30-hour workload.

In addition to being a course that addressed educational design, with emphasis on the ADDIE model, each of the stages of the model in question was also used in the course development process, as described below.

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ANALYSIS

Composed of 5 members, the course development team raised, within the scope of the CAEG project, what would be the instructional problem to be solved and the performance expectations after completing the modules. It was identified that educators needed to enhance their digital literacy to meet the advancements of ICTs and the challenges brought by the Covid-19 pandemic, including the need to offer emergency remote classes with the support of Moodle.
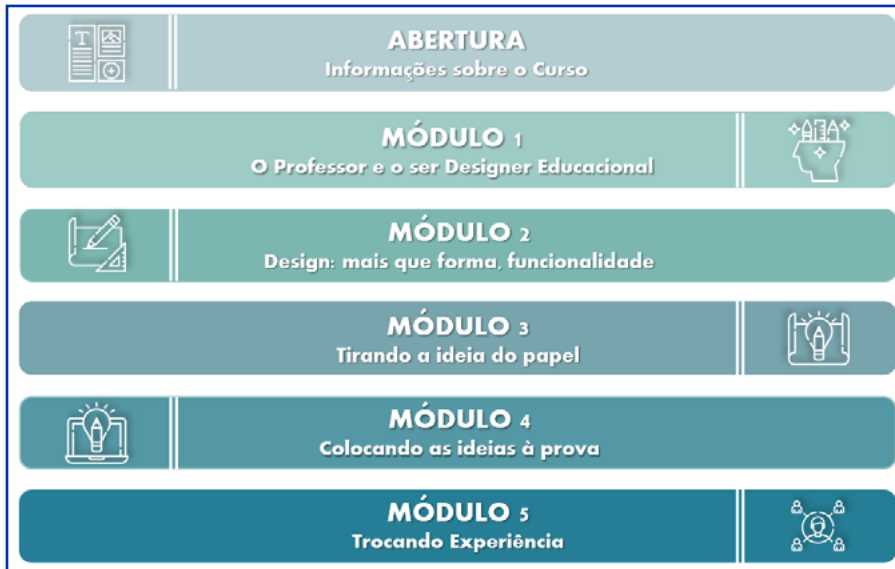
Diagnostic evaluation through preliminary discussions with Course Coordinators were necessary to understand the profile of the target audience and their experiences in relation to active learning methods and the adoption of DICTs in their classes. These discussions revealed several needs such as lack of experience with Moodle, insecurity in handling technologies, lack of knowledge of how online classes are made possible, limited time to adapt, and changes in the role of the teacher and student. This data was very important and served as a basis for defining the objectives of the instruction and the type of design that would be used, which, in the case of this proposal, was contextualized.

The course objectives blended the theory and practice of educational design concepts and their application in Moodle. Furthermore, the meetings provided for the exchange of experiences between peers with the purpose of improving teaching practice. Therefore, the course sought to: (I) employ the phases of the ADDIE model, using them in the process of designing a face-to-face, distance or hybrid course with the support of Moodle; and (II) choose the resources available in Moodle and external resources, using them according to their technical and pedagogical potential to improve the teaching and learning process.

Design

The design phase was the time to define learning objectives, develop exercises and educational content, plan classes and select media, all of this expressed in the educational design matrix that served as a model for building the course. Regarding the structure, the course was organized into 5 modules, as can be seen in Figure 2.

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Figure 2. Course modules.

In each module, the learning objectives and the activities proposed to achieve them were defined, which should be carried out at three different moments: (1) synchronous pre-meeting (preparatory activity); (2) during the meeting; and (3) after the meeting. The preparatory activities were presented in a variety of formats (text, interactive video, images, infographic, among others.) and aimed to provide the theoretical basis for the content to be worked on in the synchronous meeting held via Zoom. The activities during the meeting were hands-on, that is, they aimed to apply the knowledge built about Educational Design and the ADDIE model. The activities after the meeting were also hands-on and were part of the project in which the teacher would have to materialize the home page of his discipline in Moodle (test environment), as well as a complete class applying each of the steps of the ADDIE model.

A hands-on strategy was employed to provide participants with opportunities to autonomously create and innovate their materials during the course period. For this, support for teachers was an important stage of learning, and therefore, non-mandatory individual sessions were created, at alternative times to the synchronous meetings.

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As you can see, the concept of a flipped classroom was adopted, which already represents a change in the traditional way of understanding a class. This is a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the group space is transformed into a dynamic, interactive, and creative learning environment in which the educator guides students. students how to apply concepts and actively participate in discussions and practices (Hao; Lan, 2023; Santos; Bonato; Lunardi, 2022). Thus, in the course, the student studies the content before class and carries out the activities during the synchronous meeting, and this causes him to abandon the passive posture of listener and assume the role protagonist of their learning process.

In table 1 it is possible to observe each of the modules, as well as the learning objectives and proposed activities.

Table 1. Modules and learning objectives.

Modules	Learning Objectives
(0) Course information	It presents the course and the methods that would be applied through the Moodle Book tool. In the course, the choice of varied tools was one of the learning strategies, as the focus would be to present creative solutions, through the adoption of known and easy-to-use tools.
(1) The Teacher and the Educational Designer	1. Understanding who a Learning Experience Designer is and what they do, identifying how their knowledge can assist in the design process of a distance, hybrid, or in-person course with the support of a VLE. 2. Familiarizing oneself with each stage of the ADDIE Model, correlating them with the teacher's professional practice. 3. Identifying the context, based on the concepts addressed in the analysis stage, determining the learning need or problem to be addressed with the course.
(2) Design: more than form, functionality	1. Apply the concepts covered in the analysis stage, creating the necessary documents that will feed the following stages of the ADDIE model.
(3) Getting the idea off paper	1. Use all the decisions made in the previous steps, developing the virtual learning environment for the subject. 2. Know the course configuration options available in Moodle, relating them to the impact of your choices on the student's learning experience.

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(4) Putting ideas to the test	1. Test (implement) the proposed discipline, examining the user experience.
	2. Compare the different types of evaluation (formative and summative), selecting them according to the learning objective to be achieved by the student.
(5) Exchanging experiences	1. Evaluate the design of colleagues judging whether they are in line with the assumptions of the ADDIE model.
	2. Using the evaluation instrument used, investigate how the student's learning experience in the subject was, selecting from the feedback received aspects that are relevant and that should be changed in the initial proposal.

Source: Own authorship, 2023.

In module 1, as shown in Figure 3, the first stage of the ADDIE model, analysis, was addressed. The focus of the proposed activities, during the meeting and after the meeting, was on understanding the educational problem and projecting a solution aligned with the profile of the management course student. Thus, the activity aimed at building the project included the production of a text in response to aspects of the discipline to be developed by the teacher: name, number of credits, target audience, discipline and learning objectives, content and skills, potential and institutional constraints, and the chosen educational design model. Additional materials were made available to support the development of the task steps.

Figure 3. Opening screen for Module 1 of the course.

Source: Own authorship, 2023.

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In the second module of the course, stage 2 of the ADDIE model, design, was covered. In it, the teacher participating in the course had the project-related task of developing the Educational Design Matrix for the discipline to be developed in Moodle and creating a Storyboard with the prototype of the discipline's environment in the VLE. The proposal needed to include, at a minimum, the main screen, and a learning unit.

In the third module, the proposal was to employ all the decisions made in the previous stages and develop the VLE of the discipline, considering the resources and tools available in Moodle and external ones. The synchronous meeting proposed reflection, among others, on the concepts of Multimedia Content Design, Interface Design, and Interaction Design, in addition to providing a moment of practice in Moodle in small groups, with personalized assistance from experts, so that they could apply the principles presented. With this, it was possible to base the post-meeting activity, whose objective was, based on the documents constructed in the previous stage, to adapt and/or produce educational resources, in addition to parameterizing the discipline environment.

The fourth module was dedicated to closing the sequence of steps of the ADDIE model. Thus, the implementation and evaluation stages were addressed, in which teachers were able to reflect on the usability and evaluation of the course and students. The main activity of this module was to finalize the discipline environment so that it could be made available for evaluation by their peers, an activity planned for module 5.

And, finally, we have module 5, which aims to create a moment of experimentation with the course environment developed by the teacher through a peer assessment activity. The main objective was that, with the feedback received from colleagues – prepared using a rubric –, they could revisit their proposals and adjust them, thus allowing the learning process to be finalized.

Development

The course's VLE structure was planned and developed, respecting the principles of contextualized educational design, so, while part of the course was previously designed, there was still room for changes to be made throughout the process based on the feedback received.

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In the course's Moodle, we tried to adopt a more minimalist design that was easy to reproduce with non-professional tools so as not to intimidate the participating teachers. Furthermore, many open-source resources were presented and explored so that teachers would not violate copyright law, which is linked to the criminal conduct of infringing an author's rights, even if unintentionally.

It is also worth highlighting that the environment was created to show new ways of using Moodle tools and how to incorporate external tools, considering the learning paths that the teacher intends to propose in response to the needs of their students.

As part of the content developed for the course, a series on Educational Design was created by LAE to present the main concepts on the topic. The series was divided into six animated videos with the following themes: (I) Introduction to Educational Design; (II) ADDIE Model: Analysis; (III) ADDIE Model: Design; (IV) ADDIE Model: Development; (IV) ADDIE Model: Implementation; and (VI) ADDIE Model: Evaluation (Figure 4). It is worth noting that the first video presented the main concepts, highlighting other educational design models in addition to ADDIE so that teachers could understand what motivated their choice.

Figure 4. Educational Design Series, developed by LAE.

Source: Own authorship, 2023.

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Implementation

In the implementation stage, the modules were loaded for usability testing and necessary adjustments were implemented to improve the user experience. For example, the H5P tool for videos was used in the course and it was necessary to carry out several tests to verify the behavior of the questions that appeared throughout the video on different electronic devices. After the tests were completed, the modules were ready to be made available, but as the course opted for contextualized educational design, they were released 1 by 1, thus, a new module was only released the day following the synchronous face-to-face meeting for that, when necessary, adjustments and/or complements could be made.

Evaluation

In the course evaluation process, quantitative and qualitative methods of formative and summative evaluation were used. Formative evaluation consisted of qualitative feedback received by teachers at the end of each synchronous meeting. The summative evaluation consisted of quantitative and qualitative data and was guided by the Kirkpatrick model, which is composed of 4 levels of evaluation: (1) reaction: how much the teacher considers the course to be favorable, engaging, and relevant to practice; (2) learning: degree to which teachers feel that they have acquired knowledge, skills, attitudes, confidence, and commitment based on their participation in the course; (3) behavior: degree to which teachers are able to apply what they learned during the course when preparing their classes with the support of Moodle; and (4) results: degree to which the desired results are presented to teachers as a result of the course and the support received throughout the process (Kirkpatrick Partners, 2022).

In the last synchronous meeting, a questionnaire was made available to teachers in which they would have to answer closed and open questions that allowed Kirkpatrick levels (1), (2) and (4) to be assessed. For the third level of evaluation, all teachers were invited to participate in a conversation to reflect on the results of the peer evaluation and say how prepared they felt to apply the knowledge developed in the course in their daily lives and, mainly, to what extent they felt comfortable being multipliers of this initiative.

In short, the teachers participating in this course were able to understand that by applying the principles of educational design in their disciplines, made possible

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with the support of Moodle, they can create an interactive and engaging environment that makes students want to be in that space, contributing to achieving the intended learning objectives.

Results

The formative evaluation that took place at the end of each meeting provided important feedback so that adjustments and complements could be made to each module offered. For example, the meetings were recorded and made available as reference material. Some configurations in Moodle, considered by teachers to be complex, had additional materials developed, as is the case with the process of configuring the course environment in the "Tabs format".

Another important moment of feedback was the personalized services provided to teachers. These moments were reserved to support them in the development of project activities. As a result of these moments, the activities planned in module 4 were changed, working with teachers initially in the plenary session and then in small groups, divided based on the degree of mastery of technologies so that they could carry out exchanges between themselves, creating an atmosphere conducive to exchanging ideas, suggestions, clarifying doubts, among others. This was very positive since these moments extended beyond the course and involved teachers from different teaching units and campuses.

Regarding summative evaluation, in the quantitative part, a questionnaire was applied with 23 questions anchored from 1 to 5 points (considering 1 as completely disagree and 5 as completely agree). If we consider the questions that evaluated the reaction (level 1), 12 in total, it is possible to affirm that the teachers considered the course to be favorable, engaging, and relevant to practice. However, one topic deserves to be rethought, which is the issue of time allocated to activities, because in two questions, (1) The time allocated to synchronous activities was adequate to the proposal and (2) The time allocated to asynchronous activities was adequate to the proposal, not all teachers indicated that they completely agreed. In the first, only 80% scored 5, and in the second only 60%, which led us to reflect on adjustments to be made in a future re-offer. Regarding asynchronous moments, the intention is

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to present the course in a more spaced manner, as was done between modules 4 and 5, which had a two-week break, as this would give more time for the teacher to dedicate himself to the course project. Regarding synchronous moments, it is necessary to propose tasks adapted to the different levels of digital literacy of teachers to prevent them from becoming uncomfortable when trying to carry out the proposed activities.

The questions (I) The quality of the content available (videos, texts, images, infographics, among others) met my expectations; and (II) The learning objectives of the course were fully achieved, receiving 5 from all teachers, which indicates that this initiative, as designed, has great potential to assist teachers in the process of developing the digital literacy required in the context of Education 4.0.

Regarding the evaluation of results, level 4, it is possible to observe that the teachers achieved the results they wanted when they started the course. This statement is possible since out of 11 questions that were asked, in 7 of them they gave 5 (totally agree) and in the other 3, 5 was also the majority. For example, in the item "This course gave me the confidence to use more advanced Moodle resources", 90% scored 5, and 10% scored 4. This indicates that there is a high chance that these teachers will continue using the learning built into the course to continue promoting changes in their teaching practice with the support of Moodle.

When analyzing the results of the evaluation at the learning level (level 2), the data also appear to be quite positive, since for all teachers, there was the appropriation of new knowledge or reinforcement of previous knowledge, that is, learning was significant and This occurs when the content available can dialogue, in an appropriate and relevant way, with the student's prior knowledge (Ausubel, 2000).

Finally, we have the evaluation of the change in behavior of teachers (level 3) that occurred through the before and after presentation of the Moodle environment. Figure 5 shows an example of the evolution of one of the teachers participating in the course. The first, moment 1, represents the disciplined environment when he started the course. In this first proposal, the subject content was presented on a single Moodle page (which meant that the student had to scroll a lot of pages to reach the desired information and, at the same time, was intimidated by the excessive volume of content), some images were inserted figuratively rather than conceptually and the focus was on using Moodle as a content repository.

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At moment 2, Figure 5, it is presented the discipline proposal rethought during the course offering. It is possible to see that the teacher understood the environment differently, leaving behind the idea of a content repository, and started to understand the environment as an inviting learning space. Thus, in addition to the care taken with the organization of the content reflected in the navigation menus, in this new proposal, there is an opening text written in a dialogical format to welcome students. The learning objectives were presented so that the student could know what would be learned and how it would be assessed. In this environment, based on the contextualized educational design model, in terms of its usability, it became much more intuitive, which improves human-machine interaction and makes life easier for students when using the available resources.

Finally, as can be observed in moment 3, Figure 5, this teacher continued to challenge themselves, and six months after the initial proposal, is now acting as a multiplier of the learning built during the course. At the time of writing this experiential report, the teacher is currently in the process of testing the pedagogical preparation course for graduate students in management. Upon analyzing the environment, it is evident that the teacher sought to offer a challenging course, for instance, using the Moodle Lesson tool to create an activity where the student is presented with a situation and can choose various paths to resolve it. Throughout the entire process, they make decisions that apply what they learned in the class, accompanied by feedback.

Figure 5. Example of advancement.

Source: Own authorship, 2023.

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In the qualitative part of the summative evaluation, focusing on the internal scenario and the implementation process, teachers were invited, at first, to inform what they liked most in the course and the return was very positive, as it is possible to observe in the speech of one of the participants.

> I learned that discipline is not only about your planning and selection of good materials, for example. I learned the importance of the course format, the visual issue, the use of resources to facilitate the exchange with students, and how the discipline page can "tie" the entire discipline. Understanding that Moodle goes far beyond a repository is a complete support for teaching activities. And the main thing, I lost the fear of using this tool that can support the teaching and learning process (Teacher 8).

In this feedback it is possible to observe that the course touched this teacher and that he feels able to perform his classes with the support of Moodle in a different way, now taking advantage of the platform's potentialities.

With regard to what should be changed in the course, a few pointed out suggestions, but, as expected, once again the question of time appeared: "Leave more time for asynchronous activities" (Teacher 1); "The total number of hours could be extended, to have more time for practice" (Teacher 3); "A little more time for development instruments" (Teacher 5); "The execution time of synchronous activities" (Teacher 7); and "I think I should have invested more time in the educational design matrix" (Teacher 8).

Discussion

This experience report provides an example of how knowledge about educational design can be applied in the development of a distance, hybrid, or in-person course with the support of a VLE and, mainly, how it can be used to develop digital literacy in teachers (Cervera; Martínez; Mon, 2016; Fraile; Peñalva-Vélez; Lacambra, 2018) so important in the context of Education 4.0 (Mahmud; Freeman; Bakar, 2022; Miranda et al., 2021; Ramírez-Montoya et al., 2021).

Through an iterative process, we applied the ADDIE model to develop the Uncomplicated Educational Design course. Using Moodle, the 5 modules were implemented and made available to CAEG member teachers. The evaluation results

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indicate that the application of the ADDIE model (Filatro, 2008; Filatro; Cairo, 2015; Kenski, 2015). It was successful and allowed to develop/improve the level of digital literacy of teachers. In addition, the course also met the stated learning objectives (Mahmud; Freeman; Bakar, 2022).

The participation in this course has provided valuable insights and lessons that will be assimilated and integrated into the subsequent iteration of the program (Patel et al., 2018). For instance, based on the analysis stage of the ADDIE model (Siew; Chin, 2018), we identified the need to allocate more time to assess the prior knowledge of teachers regarding DICTs (Li et al., 2019). Additionally, adjustments to the information collection instruments need to be made to enhance the effectiveness of the course proposal.

Another crucial point, considering the level of digital literacy among teachers, would be to split this course into two: a basic version and an advanced version. This division would be important not only based on the mastery level of technologies, as digital literacy is not just about knowing how to use technology, but also about understanding how technology impacts our lives and how we can use it effectively and responsibly (Fraile; Peñalva-Vélez; Lacambra, 2018)

During the design process, the clear and measurable definition of learning objectives (Phillips et al., 2019) was crucial and facilitated the focus and assessment of knowledge and skill acquisition by the teachers. Furthermore, as the contextualized educational design model was adopted (Filatro, 2008; Filatro; Cairo, 2015), establishing an efficient process for reviewing the content and format of the modules was possible through weekly meetings among the team, allowing for iterative review during the design and development stages.

The modules that were developed can also be made available to the teaching assistants who currently work alongside teachers in the course offering process, as part of training and learning activities (Patel et al., 2018). It is important that they also acquire this knowledge, as teaching assistance provides an excellent opportunity for these master's and doctoral students, under the guidance of the teacher, to develop their teaching skills in higher education management. This is crucial, considering that these students may soon find themselves in a classroom, tasked with educating individuals within the context of Education 4.0.

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Final Considerations

The development of this project has allowed us to identify that teacher training is a highly challenging task, as the first step involves the need to raise awareness among those involved that teaching is a transformative field, responsible for shaping an individual, capable of altering their life, their environment, and our society (Mussi; Flores; Almeida, 2021). This perspective is supported by educator Paulo Freire, who refers to one of the fundamental knowledge for the critical educational practice of teacher training, expressing that teaching is not about transferring knowledge but creating possibilities for its production or construction (Freire, 2002).

Therefore, reflecting on how students learn is a critical factor because what matters in the process is providing learning connected to reality. When these students experience meaningful learning situations in their lives, guided by their teachers, they find pleasure in the pursuit of knowledge, with a clear understanding that learning does not end when they leave the university. They need to be prepared to face new challenges and lead innovative projects (He; Ma; Zhang, 2023b).

Demo (2011) supports the importance of analyzing the mechanism through which the learning and teaching process occurs, exploring new learning opportunities that are more centered on student activity, more flexible and engaging, and more capable of supporting processes of authorship and autonomy. This aligns with the formative assessment of the ADDIE model, which is characterized by its student-centered approach (Chen et al., 2022).

The article provides a theoretical contribution by building a bridge between the work of the educational designer and management course teachers, suggesting that incorporating the knowledge of this professional can significantly contribute to the improvement of the teaching and learning process, as well as the promotion of more effective and student-centered pedagogical approaches.

Therefore, this experience report account carries positive implications for educators in the management field who wish to incorporate the knowledge that an educational designer has to share (Brown et al., 2020; Kaur; Leong; Attard, 2022). By doing so, it can lead the teacher, among other things, to engage in more efficient planning, keep the student at the center of the process, develop quality content in various formats, embark on a continuous improvement process based on as-

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sessment results, and consciously integrate educational technologies aligned with learning objectives.

In this process, one of the challenges to be overcome is the lack of interest or availability on the part of the teaching staff to participate in the training and courses offered. This obstacle can sometimes arise from a variety of reasons, such as time limitations, lack of knowledge of the potential of educational design or hesitation in adopting new pedagogical practices. Overcoming this barrier requires an ongoing effort to raise awareness, provide effective support, share best practices, and demonstrate, through solid evidence, the tangible benefits of this approach so that faculty feel motivated to explore and adopt innovations. proposed pedagogies. It is also noteworthy that organizational support is crucial to expanding activities related to educational design, whether institutionalizing the area or disseminating its concepts among the teaching staff, as is done in our institution.

Additionally, this report also shows that developing a course, based on an initial assessment of the needs and characteristics of students (Bonfield et al., 2020), with emphasis on the context in which they are inserted, is a critical factor for the development of a well-founded and effective course.

As a result of the course evaluation process and a practical contribution of this study, the team involved, through the LAE, decided to create ready-made but customizable templates so that teachers who did not participate in the CAEG project could rethink their environments. The proposal was not only created to provide students with more visually appealing VLEs, but also to encourage teachers to develop student-centered lessons, focusing on learning objectives rather than teaching objectives, for instance.

In conclusion, the proposed solution to the addressed problem is promising and warrants exploration in future research. One possibility is a longitudinal study to track the performance and skills of participants, aiming to assess whether the teaching ability to apply the ADDIE model in pedagogical practice would, in the long term, lead to improvements in the quality of teaching and learning in the management field. Another suggestion is to conduct controlled experiments with groups of students, allowing for an analysis of the impact of adopting the ADDIE model on engagement, satisfaction, and academic performance. Additionally, it is recommended as a future research suggestion to investigate the reception and effectiveness of the

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proposed Standard Design among students and faculty in the university's Administration courses. Research in this direction is already underway, aiming to deepen our understanding of the acceptance and practical utility of this innovative model. The results of this research can inform future adaptations and improvements, making it more aligned with the specific needs of the academic community.

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