

Teacher training in innovative practices in higher education, using a MOOC

Preliminary Study

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Abstract — In this work we present a project that aims to develop a Massive Online Open Course (MOOC) for teacher training, promoting innovative pedagogical practices in higher education. The methodology adopted was Educational Design Research, which is presented in its fundamental characteristics. Focus is given to the preliminary literature review that served as theoretical framework for the project and helped in making the first development decisions. There are several recommendations and studies that argue the importance of using digital technologies in pedagogical activities, as well as using teaching and learning strategies centered on students - who increasingly use them in their learning. Some frameworks were also identified as guidelines for teacher training with digital technologies. The current pandemic context, which forced distance learning, reinforced the topicality of the theme, positioning MOOCs as good solutions for promoting innovative pedagogical practices in teacher training.

Keywords – teacher training; higher education; MOOC; online distance learning, inovative pedagogical practices.

I. INTRODUCTION

The dynamics of teaching and learning in higher education have been changing over the past 20 years, with advancements in research on learning, the continuous integration of digital technologies and the redesign of pedagogical approaches. Students no longer tend to be passive consumers nor are teachers mere transmitters of information. Teachers are more and more seen as facilitators of student-centred teaching, and this assumes an active role in building their knowledge. The quality of education is reflected in a structure of courses that must be aligned with innovative pedagogical strategies to seek active and experiential learning [1].

Teacher training in innovative pedagogical practices is a need identified in the literature and in reports of educational policy recommendations for many years [2-5]. The need to increase the qualification of teachers and offer opportunities for lifelong learning is also a goal of Education, described in the 13 Sustainable Development Goals of the 2030 Agenda [6].

The current pandemic situation caused by Covid-19 has led to the implementation of temporary distance learning solutions around the world, and the lack of preparation of teachers for these practices has been identified as a problem [7]. This highlighted the need to accelerate the process, to prepare teachers not only for exceptional situations, but for teaching that is appropriate to the current student population, which uses

digital technologies proficiently (sometimes uncritically) to interact, learn and work [8]. The need for change is evident, but changes in education imply changes in instructional materials (curricula, technologies), in teaching approaches (new pedagogies) and in the attitudes of those involved. Teachers are essential for the effective implementation of change, but to do so, they have to develop skills to improve the quality of work according to new trends and guidelines, in terms of curriculum, pedagogy and assessment.

In this context, the research team proposes the development of a Massive Online Open Course (MOOC) to train teachers to promote innovative pedagogical practices, in contexts of distance learning, in higher education. The project's development methodology is briefly explained. Then, the preliminary study presents results of a literature review for the theoretical framework of the project.

II. METHODOLOGY

This study aims to answer the question: What functionalities and resources should a MOOC have for efficient teacher training in innovative pedagogical and didactic approaches?

From this research question two types of response are expected: 1) a technical contribution – the design and validation of principles to support the creation of a MOOC that can be applied in teacher training interventions in innovative pedagogical and didactic practices; 2) an educational contribution – to ascertain the impact of the MOOC on the training of teachers in innovative pedagogical-didactic practices, with a group of teachers.

The study adopts Educational Design Research (EDR) methodology, which combines scientific research and technological development, to draw conclusions about the technology developed and the impact of its use in educational contexts. The development process is iterative, composed of cycles of analysis, design, evaluation and redesign, until the achievement of a satisfactory approximation of the ideal intervention. Scientific knowledge influences development, which is then tested in the field, bringing empirical data to improve products and validate knowledge [9]. In EDR, objectives are defined in terms of the results that the researcher seeks [10] and can be associated with different phases of the research. Thus, the objectives of this study are:

- Define and create teacher training content in innovative pedagogical-didactic practices;
- Plan, specify and provide a MOOC that contains training modules with digital resources for teacher training in innovative pedagogical-didactic practices;
- Conduct a pilot study with a group of participating teachers who use the MOOC in their training;
- Evaluate the MOOC in its functionalities and available resources and its impact on the training of teachers in innovative pedagogical-didactic practices.

The operationalization of EDR is generally organized in three stages: preliminary study, development and evaluation. In the different phases of EDR, a combination of qualitative and quantitative data collection and analysis techniques is used [10]. For this research, the model was adapted as follows:

1) Preliminary study: comprising a literature review for establishing the theoretical framework, state of the art research in MOOCs and existing resources for teacher training in innovative pedagogical practices, a survey of teachers' needs and specifications for the development of MOOC resources and content;

2) MOOC iterative development: consisting of three cycles of analysis, design and evaluation with users. In the 1st Cycle, based on the analysis of the preliminary study, the first module is developed, which is evaluated by experts from the fields of education and User Interface/User Experience; in the 2nd cycle, based on the evaluation of the experts, corrections and improvements are made to the module and the rest of the MOOC is developed. A second assessment is made with potential users (focus group of teachers). In the 3rd Cycle, corrections and improvements are implemented and the first edition of the MOOC takes place, in a pilot study with a group of participant teachers. Data collected from this cycle is used for the final evaluation.

3) Final evaluation: final study to evaluate the intervention, the MOOC and its resources, and the impact of its use, contributions to the theory and suggestions for future studies. The evaluation is based on: statistical data collected from the MOOC (access, records, profiles, participations); content shared by users, participation and evaluation of trainees; impact of using the MOOC (questionnaire to users).

III. PRELIMINARY STUDY

As a preliminary study, a theoretical framework was established, including a literature review on teacher training in innovative pedagogical practices, educational policy recommendations and reports, training models, and the use of MOOCs as a solution for distance learning. Due to its relevance to the development of the project, distance education forced by the pandemic Covid-19 is also part of the reflection of this theoretical framework. Teacher training in innovative pedagogical practices involving technologies is an increasingly mentioned subject in the literature, with recommendations for implementing changes in educational policies. In 2011, UNESCO recommended the introduction of digital technologies in education, due to the pedagogical opportunities, the potential enrichment of learning experiences and the impact

their use may have on students, emphasizing the need to offer appropriate training to teachers [2]. The New Media Consortium has been reiterating this need in its reports on technologies in education, exposing digital literacy as a high priority in Higher Education [3], insisting on the need for investment in the development of skills in the teaching profession, which includes changes in teaching practices and digital fluency [4][5]. Moreover, a recent 2020 report focuses on online education as a trend in higher education, as it is a scalable way to offer courses to an increasingly less traditional population. As such, teachers must be prepared to teach online, blended and in person [6]. The United Nations has defined quality education (SDG4) as one of the 13 Sustainable Development Goals of the 2030 Agenda, with the aim of ensuring inclusive, equitable and quality education, and promoting opportunities for lifelong learning for all. This objective has several goals, of which the need to improve the qualification of teachers, in order to increase technical and professional skills [11]. Portugal defined the SDG4 as a strategic priority for the country, within which it has been developing projects, such as the e.2030 National Digital Skills Initiative, which reiterates the need for training of trainers and teachers of Higher Education Institutions, the revision of teaching processes, the development of digital teaching resources and their integration in the pedagogical processes (Portugal INCoDe.2030). The European Key Competences for Lifelong Learning also states that educational staff should be guided to create practices with digital technologies in teaching and professional development and that new forms of mobile and digital learning should be explored in more flexible environments [12]. The action plan for digital education refers to the need to stimulate innovative digital and pedagogical practices to promote better use of digital technologies in teaching and learning. Teachers need environments, devices, training, curricular programs and educational materials suitable for digitally supported teaching models [13].

The pandemic caused by COVID-19 has led to closing schools and universities and the implementation of distance learning solutions to reduce contamination. There are several recommendations for the implementation of Emergency Remote Learning [11], internationally [14] and nationally [15] and studies on the initiative "Suspending classes without stopping learning" in China, which include providing Internet access and educational resources for students, teacher training and regional curriculum adaptations. Despite the effort, some problems were identified in this initiative, such as the difficulty for teachers to use online education, ending up copying content offline, without adaptation, a problem attributed to lack of prior training [7]. In Portugal, in a questionnaire on the impact of the pandemic in higher education with 860 students, 65% said teachers were unprepared for online teaching, and 60% that online classes were less interesting [16]. The experience of distance learning in Portugal created serious doubts about its effectiveness in the learning results of students of different ages and levels of education, particularly, the youngest, students with less digital literacy or students with special needs. Also, teachers were disoriented with the changes inherent to the

teaching-learning process and overwhelmed with the amount of information they had to manage. They complained about the lack of training for this new teaching approach [17]. Distance learning implemented during the pandemic must be taken as emergency measures. Teachers sought quick temporary solutions focused on technology but which raise pedagogical issues and prompt worldwide discussion. This crisis may initiate the change in teaching and learning processes, reducing barriers and accelerating the development and integration of innovative pedagogical practices using digital technology [8]. Thus, educators will need guidelines for pedagogical, technical and creative use of tools to stimulate their students' learning.

The training of teachers in the use of digital technologies is often inadequate, because it does not adapt to the areas and contexts of learning [18]. In initial training courses, there are usually short sessions, with a technical focus, without opportunities for experimenting technologies in concrete pedagogical situations [19]. In addition to instrumental knowledge, it is necessary to understand the pedagogical potential of technologies, to know how to use them to achieve certain educational goals, not only to use them as a means to transmit information, but as a tool for students to express, communicate, create [20]. It is also necessary to distinguish the limitations of initial training and continuous training. In initial training, students are more confident in the use of technologies, but they do not yet have the pedagogical and didactic experience to know how to use them at the curricular level. On the other hand, in continuous training, when they already teach and have a pedagogical perspective, they lack the availability, time and motivation to change their practices in order to integrate digital technologies [21]. Two qualitative studies provide clues about the needs of teacher educators in innovative practices with digital technologies. Fonseca conducted interviews with 20 teachers from two higher education institutions, concluding that they are reticent in the use of technologies in the classroom, so they also have difficulty in encouraging students, future teachers, in their use for educational purposes [22]. In 2019, a study was carried out in Portugal to understand the perception of teachers and trainers provided by the training centers of school associations as to the results of continuous training in ICT use. The researchers analysed ICT training plans and conducted interviews with trainers and teachers. The interviewed trainers indicated the prevalence of courses in basic ICT skills. One identified problem is the heterogeneity of the trainees' skills, which makes planning difficult and leads to changes when the training is already in place. On the other hand, as the area of technology is continuously evolving, trainers feel that they must always be updating knowledge. Trainers plan lessons according to their own experiences and needs, but also consulting theoretical frameworks to underpin their choices [23].

Some national and international frameworks have been developed in an effort to structure teacher training for the use of digital technologies in an educational context. TPACK, for example, is an established model proposed by Mishra and Koehler [24]. The name derives from Technological Pedagogical Content Knowledge and considers that these three

types of knowledge intersect and combine in various ways, to portray the complex and multifaceted knowledge that teachers must gather and integrate in their teaching practices. The Technological Plan for Education in Portugal, launched the "ICT Skills" project in 2008, with the purpose of preparing educational agents for technological innovation in pedagogical practices and student learning. The project resulted in a Framework of ICT skills for teachers, together with a modular training and certification system, adjustable to the curricular areas, levels of proficiency, rhythms, needs and interests of teachers and schools [19]. The document describes skills that teachers must develop, at three levels: 1 - digital skills (use as an instrument); 2 - pedagogical skills with ICT (integration in teaching and learning strategies); 3 - advanced skills / Higher Education (to innovate, experience, reflect and share educational practices). The European Union, through the Joint Research Center, published the European Framework for the Digital Competence of Educators (DigCompEdu), as a guideline for the implementation of programs for teachers from pre-school to higher education, for training skills necessary for the effective use of digital technologies in teaching and learning [25]. DigCompEdu does not focus on technical skills, but on ways to innovate in education and training. The document identifies six areas, with a total of 22 skills to be developed. Briefly and as examples: 1) use technologies for professional development and communication with colleagues, students and parents; 2) identify, select, create, modify and share digital resources for learning; 3) organize the use of technologies in teaching, guiding students and promoting collaborative learning; 4) use digital strategies to improve assessment; 5) use technologies in student-centred teaching strategies, allowing for inclusion, personalization and differentiation of learning; 6) improve students' digital skills.

MOOCs emerged, taking advantage of digital technologies and web access, to improve higher education and reach a larger number of students [26,27]. MOOCs are a controversial teaching and learning solution, which had a very large initial growth in 2012, with great investment from reputable companies and universities that believed that this type of training would revolutionize education. In 2013, data on the use of MOOCs showed that 97% of students did not complete the courses and discredited the technology, with experts, researchers and companies considering its end [28]. However, currently the number of open online courses continues to grow, as well as the number of users looking for them [1]. Research and experience drawn from the implementation of this technology suggests that MOOCs are not ideal as substitutes for higher education, but can be quite useful as opportunities for further learning, to improve knowledge and specific competences [27, 28], as is the case with the present project. MOOCs can be an important means of promoting digital inclusion and access to education [27]. A MOOC can respond to teachers' training needs, conveying information, ideas and concepts, reinventing pedagogical processes and practices, and improving digital competence, such as the ability to use digital technologies, tools and resources in teaching [24, 27]. MOOCs are a convenient choice for higher education teachers looking

for ICT training, as they pose flexible, learning-centered training possibilities to meet their needs.

IV. CONCLUSIONS AND FUTURE WORK

This were the results of an exploratory study that allowed us to verify the relevance of creating a MOOC for teacher training in higher education, on innovative pedagogical practices using distance learning. Based on the theoretical framework, we started to define the project's specifications.

The option for a MOOC is grounded in the accessibility, flexibility, scalability and visibility that this type of training offers. These characteristics are advantageous for teachers, providing an accessible training solution that adapts to their physical location and other conditions, but also for researchers, due to the amount of data which can be collected, allowing the project to evolve and endure. Using digital technologies, this training will reinforce and link scientific, pedagogical and technological knowledge, to foster active and constructivist pedagogical practices, as well as flexible and inclusive teaching [24].

In this MOOC, different pedagogical strategies and practices will be explored (e.g., challenge-based learning, flipped classroom, formative assessment, peer teaching, video-based teaching, project/problem/challenge-based learning), while presenting technological solutions, suitable for different scientific areas and contexts [4].

The training content to be developed includes reflecting on the role of the teacher in 2030 and exploring topics such as: planning, class design and evaluation, using technologies; manifold forms of communication and collaboration, namely with web 2.0 tools and social networks; the creation and use of digital resources for teaching; the design of virtual classes, with synchronous and asynchronous mechanisms.

For teachers, this training should involve changes, the renewal or updating of practices, in terms of planning, resources, evaluation, communication and interaction, and the students' adoption of more active, flexible and focused learning principles [1].

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