REDESIGNING THE INITIAL TEACHERS' EDUCATION PRACTICES: PROJECT TEL@FTE-LAB

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Abstract

The TEL@FTELab Project was set up assuming that technology enhanced teacher education programs may represent a relevant added value to the quality of prospective teachers' training and therefore of their teaching practices. The project aims to find answers to the question: How does technology in learning spaces offer opportunities to provide innovative ways of designing teacher education for the future.? The project takes the idea that the future will blur the boundaries between living, learning and working. and this will result in the creation of flexible multiuse spaces that can accommodate different activities and serve different learning purposes.

Introduction

The world faces a variety of critical problems and risks namely those related to climate change, sustainability of the planet and social inequality – problems so complex that they exceed the capacity of individual cognition. Education and training have a key role in contributing to create conditions to mitigate the risk of ill formulation of problems as well as to deficient identification of solutions (Matos, Pedro, & Pedro, 2017a). Per Matos, Pedro and Pedro, 2017b, p.7918, "There is an increasingly deep ingenuity gap between the huge practical challenges posed to societies and the rather limited problem-solving skills promoted by the prevailing practices in education."

Project TEL@FTELab (funded by the National Science and Technology Foundation) assumes that there is a need to improve both the competencies for life and work for teachers as well as quality of pupils' learning. Technology enhanced teacher education programs could represent a rather relevant answer to the predictable lack of ability to deal with problems and situations that it is impossible to preview (OECD, 2011). The quality of prospective teachers' education will pass inherently through the competence of teachers to engage students in addressing a variety of inter related problems and issues escaping the strict path of the traditional school disciplines (e.g., mathematics, physics). Thus, the project aims to find answers to the following question: How does digital technology in learning spaces offer opportunities to provide innovative ways of designing teacher education for the future, and to provide research-based resources for teacher education in the areas of Biology, Informatics, Mathematics and Physics? The project also takes the idea that the future will blur the boundaries between living, working and learning and this will result in the creation of flexible multiuse spaces that accommodate different activities and serve different purposes. This leads to the need for rethinking educational spaces and didactic approaches involving a wide range of stakeholders.

TEL@FTELab project articulates the piloting of real experiments in initial teacher education courses and its analysis with the development of a 21st century teacher skills framework. In the empirical field of the project, the implementation of learning scenarios is carried out within courses of the Master Programme on Teaching of the Institute of Education of the University of Lisbon (ULisboa). The initial teacher education programme at ULisboa follows a set of principles that include the requirement of solid knowledge (a) of the subject to be taught, (b) of general topics about education and (c) of specific didactics. It intends to allow the future teacher to develop the ability to cultivate a reflective practice. The introduction to professional practice (within the two years Master Program) is carried throughout the four semesters offering direct contact of the students with the school system and the opportunity to examine, reflect and intervene in real school situations. The competence of the student teacher is shown within the Master programme through the teaching practice on a supervised content unit in a secondary school class under the supervision of a teacher of ULisboa and a local in-service teacher from that school. In cooperation with the local teacher, the student chooses a teaching unit and implements it in a class. A written report of the implementation of the teaching unit by the student is produced and evaluated by a scientific committee. This model of initial teacher education assumes that the early contact of the student teacher with real pupils, under real situations in real schools represents a relevant dimension of inquiry and reflection on professional practice, contributing to integrate students' pedagogic, didactic and content knowledge.

Theorical Background

Although technology is now widely available and cheaper than ever, the scarce use of digital technologies in learning activities in the school context makes clear the resistances that both the education system and the teachers reveal in changing their teaching practices in daily work (Brás, Miranda, & Marôco, 2015). A few years ago, the European report about ICT in Education (European Commission, 2013) analysed the situation in 27 countries. Although it points to significant improvements achieved in schools' ICT infrastructures, there is a set of key conditions still to meet. For example, it is pointed out that (a) the connectivity in the classrooms in most schools is not satisfactory, (b) in general the teachers don't have enough ICT competences and confidence to support engaging teaching and in-depth learning, and (c) students' assessment models need to be reviewed and updated. On the other hand, even if the teachers' competences and attitudes towards the use of ICT in teaching are recurrently recognised as being at the heart of modernization of classroom practices, much professional training is still inadequate, particularly in respect to innovation and teachers' technology supported pedagogical practices. A variety of research articles as well as national and international reports (Barton & Haydn, 2006; BECTA, 2004; Matos, 2004; OECD, 2009) underline that: (a) ICT are not used regularly and systematically in teacher education, (b) ICT-related continuous professional development does not match the demand, and (c) there is still lacking congregate relevant information concerning how teacher education institutions prepare teachers to face today and tomorrow's classrooms.

Teacher education involves both initial teacher education as well as in-service teachers' continuous professional development. However, most of the efforts and programs for technology adoption in schools have mainly focused on basic and secondary education. It seems that it is assumed that university departments of education and graduate schools of education are not seen as stakeholders in the process of developing innovative teaching and learning practices (Wang, 2002). There is evidence that the efforts made to integrate and use digital technologies in teachers' training curriculum in higher education are insufficient (Kay, 2006; Matos & Pedro, 2008; Sutton, 2011; Swain, 2006). For example, Sutton identified the tendencies in the national policies regarding ICT in teacher education in 14 European countries. The conclusions are far from satisfactory. In a large set of countries, the use of digital technologies is not mandatory in the initial teacher education programs. In Portugal, as in many other countries, it is in some way surprising that the law that defines the Professional Qualification for Teaching (DL nº 79/2014) does not address ICT competences in any of the core professional components which are (i) scientific teaching area, (ii) general education area, (iii) specific didactics, (iv) cultural, social and ethical knowledge and (v) professional practice. Thus, consistent research-based recommendations that indicate that initial teacher education programs play a central role in shaping teachers' attitudes towards ICT and innovation are totally ignored: pre-service teachers who have acquired higher level of technological skills possess a stronger sense of efficacy with respect to computer use and are more willing to use technology in classrooms (Brown & Warschauer, 2006; Hammond et al., 2009; Paraskeva, Bouta, & Papagianna, 2008).

Meaningful use of digital technologies in the classroom, with impact on students' learning, requires teachers to take advantage of technological affordances with proper and powerful pedagogical approaches both for the specific subject matter to be taught as well as for the development of cross-discipline skills and societal competencies. But a frequent problem found in pre-service programmes in higher education is that the students do not have enough immersion in the use of digital technologies. Many teacher education institutions offer isolated ICT-related courses in which technical skills are to be promoted (Brown & Warschauer, 2006; Mishra & Koehler, 2006), but this happens in a rather non-contextualized form.

As a theoretical background, the project is using an integrative and contextualized form of addressing teachers' technological knowledge - the TPACK Model (Technological Pedagogical Content Knowledge) (Koehler, Mishra, & Cain, 2013; Wenger, McDermott, & Snyder, 2002). The TPACK framework emphasizes the complex interplay of three bodies of knowledge: content, pedagogy and technology (see Figure1).

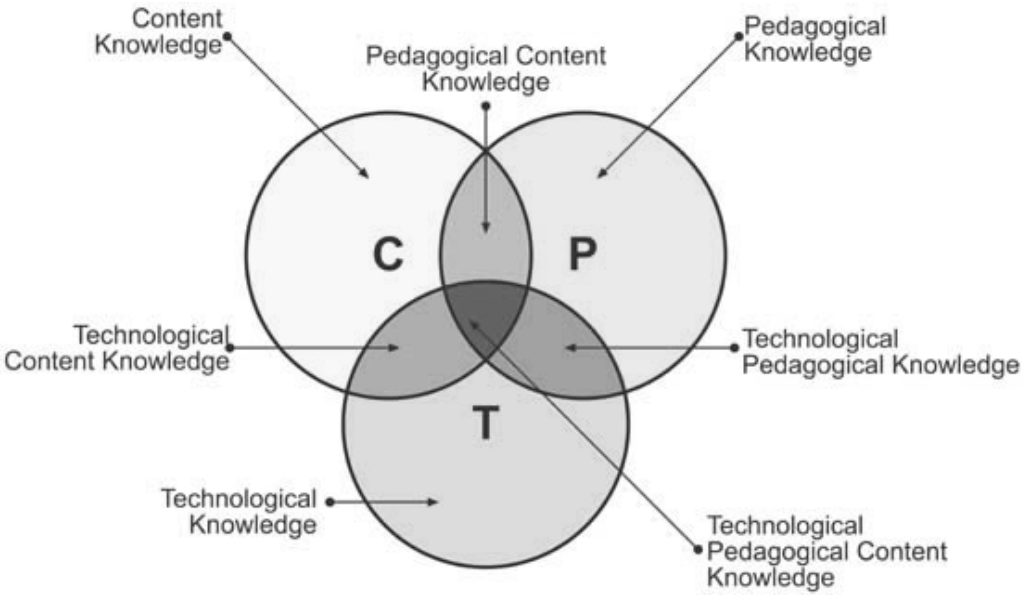

Figure 1: TPACK Model (Koehler, Mishra, & Cain, 2013).

The TEL@FTELab project assumes that quality teaching requires developing a clear understanding of the complex relationships between the three elements of the TPACK Model, its affordances, its constraints and its interactions. The model implicitly criticizes simplistic approaches for developing teacher knowledge, but we go a step forward assuming in the project the intentionality of preserving the complexity of initial teacher education (Matos et al., 2017a). The project also uses the TPACK Model as a form to assist us in developing better learning environments and for supporting a design-based approach for teaching future teachers to use digital technologies to create engaging classrooms (Pedro, Matos, & Pedro, 2014).

Additionally, we also consider that teachers' professional development requires to be continuously considered beyond the initial training they get in higher education, in continuing training sessions. Therefore, it is the responsibility of higher education institutions that run teacher education programmes to provide actions that address training in several areas.

Project TEL@FTE-Lab

The key idea of the project TEL@FTELab (see Figure 2) is that technology enhanced teacher education programs could represent an added value to the quality of prospective teachers' training. It is assumed that immersive use of digital technologies is associated to changes in the way people relate to knowledge. This is true for the way people conceptualize communication and its value in everyday practices as well as for new forms of addressing science and humanities in general. At ULisboa, an effort is being made to study the way we can prepare future teachers in areas such as Biology, Informatics, Mathematics and Physics to act according to the profile of new generations of pupils that will be responsible to create new realities in the future.

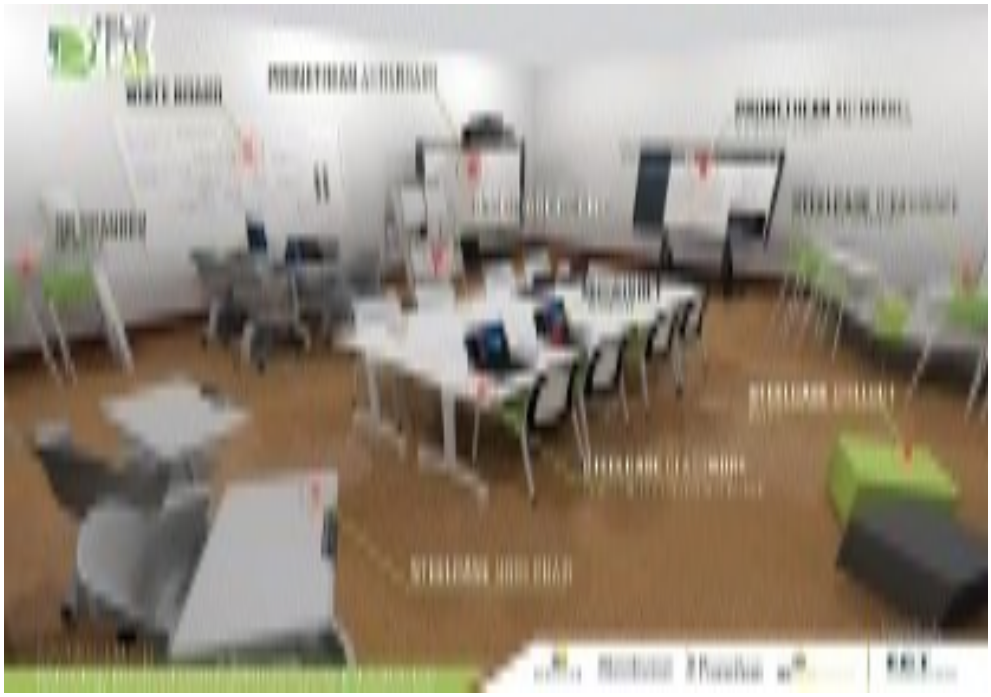

Figure 2. Future Teacher Education Lab at the University of Lisbon.

Beyond the academic research team, project TEL@FTELab includes five commercial partners acting as key participants in two fundamental tasks: the design and setup of the Future Teacher Education Lab (FTELab) and the implementation of strategies for the dissemination and mainstreaming of the results of the project. The project defines the following research questions:

1. What is distinctive about teacher education in technology enhanced learning spaces and how might it change teachers' views about the future of schooling?
2. What key competences should be part of teachers' repertoire for the future school?
3. How does technology enhanced teacher education can improve the quality of Initial Teacher Education programs?

The project is organized in three phases:

Phase I was concerned with the design and setup of FTELab and training modules of design of learning scenarios and the development of a first draft of a three dimension 21st century teacher skills framework (3D-21TSF).

Phase II consists of piloting the modules and the learning scenarios, in two consecutive cycles of implementation, within the Master Programs on Teaching. Each cycle of piloting includes the co-design of learning scenarios involving teacher educators and students and its experimentation in real secondary school classes.

Phase III takes the data collected and analysed and produces a set of video cases, training modules and learning scenarios that together with the 3D 21st century teacher skills framework compose the Teacher Education Toolkit delivered at the end of the project.

Thus, the research problem of the project is addressed through the articulation of piloting of experiments in initial teacher education courses together with an analysis and development of theoretical accounts combining the empirical field (through a two steps piloting with student teachers) with the theoretical field, which draws on Activity Theory and Situated Learning perspectives.

Implementation of TEL@FTELab Project

The project goes through a desk research in continuity with previous work of members of the research team in the domain of 21st century teachers' skills, study of communities of practice and design of learning scenarios using digital technologies, and the iterative participatory co-design (by the teacher educator and student), implementation and analysis of a set of learning scenarios with pupils in schools.

It has adopted a design-based research approach blending empirical educational research with theory-driven design of learning environments, as it proves to be a relevant methodology for understanding how, when, and why educational innovations work in practice (Anderson & Shattuck, 2012). Design is also central in the effort to foster learning, create usable knowledge, and advance theories of learning and teaching in a complex setting such as initial teacher education courses exploring possibilities to novel learning and teaching environments and increasing human capacity for subsequent innovation in education (Matos et al., 2017b).

Evidence on how student teachers learn in a technology enriched learning space is being produced through data collection and analysis and will inform the dimensions and indicators of the 21st century teachers' skills framework. Two kinds of instruments are being used: questionnaires (based on: the TPACK Model and ICT competences) to provide data on acceptance of technology and a focus group interview protocol (to get access to participants' views and understandings). The results of the analysis both feed the revision of the modules and learning scenarios for the next cycle of piloting and provide evidence to get answers to the research problem, the impact of technology enhanced learning spaces in teacher education.

During the last semester of the three years project, data will be collected (subject to social network analysis procedures) from the platform setup for the teacher educators' community of practice, to understand specific forms and strategies for cultivating the community. The project adopts the powerful idea of learning scenario as a key structuring resource for teacher education and produces a set of video cases for dissemination and training as part of the Initial Teacher Education Toolkit (http://ftelab.ie.ulisboa.pt/tel/gbook).The learning scenarios are structured through trajectories using interactive tools. Those trajectories are constituted by activity proposals to explore, in a stimulating and challenging form, key ideas in teaching of the disciplinary areas of piloting. Currently, the project is the 2nd cycle of piloting the learning scenarios – in BIMP area – having as a result a set of learning scenarios available for use for all academic community. It's expected that the project

outcomes will show how digital technologies can create an open culture that transforms the teacher.

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