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Project-Based Learning in Initial Teacher Education: The Practice of Three Higher Education Institutions in Portugal

TIAGO TEMPERA*¹ AND LUÍS TIHOCA²

Future teachers first come into contact with diversified teaching strategies, such as Project-Based Learning, in initial teacher education programmes. Such strategies contrast with the type of methods that they experienced throughout their own schooling, which are essentially teacher centred. The present research aims to understand how Project-Based Learning is being integrated into the curriculum of primary school teachers' initial teacher education programmes. The participants were three higher education institutions located in different regions of Portugal, all of which offer initial teacher education programmes for primary school teachers that include Project-Based Learning at some point. The data were collected through document analysis of the programmes' curricula, as well as through semi-structured interviews with the programme coordinators in each institution. The results show that the institutions value Project-Based Learning and make an effort to include it in their programmes, whether in theoretical, didactical or practical terms. However, they encounter some difficulties in promoting more significant experiences that would enable the students to feel confident to use this strategy in their Supervised Teaching Practice internships.

Keywords: active learning, initial teacher education, project-based learning, teaching strategies

1 *Corresponding Author. PhD student of Teacher Education in Instituto de Educação, University of Lisbon, Portugal; tiagot@eselx.ipl.pt.

2 Institute of Education, University of Lisbon; Portugal.

Projektno učenje v začetnem izobraževanju učiteljev: praksa treh visokošolskih zavodov na Portugalskem

TIAGO TEMPERA IN LUÍS TINOCA

≈ Bodoči učitelji prvič pridejo v stik z raznolikimi strategijami poučevanja, kot je na primer projektno učenje, v programih začetnega izobraževanja učiteljev. Takšne strategije so v nasprotju z vrsto metod, ki so jih izkusili med svojim šolanjem, ki so bile pretežno osredinjene na učitelja. Ta raziskava skuša razumeti, kako je projektno učenje vključeno v učni načrt programa začetnega izobraževanja osnovnošolskih učiteljev. Udeležence predstavljajo trije visokošolski zavodi iz različnih portugalskih regij, pri čemer vsi ponujajo programe začetnega izobraževanja osnovnošolskih učiteljev, ki na neki točki vključujejo projektno učenje. Podatki so bili zbrani z analizo dokumentov učnih načrtov, prav tako s polstrukturiranimi intervjuji s koordinatorji programov na vsaki izmed omenjenih ustanov. Rezultati kažejo, da zavodi cenijo projektno učenje in se ga trudijo vključiti v svoje programe, pa naj bo to v teoretičnem, didaktičnem ali v praktičnem smislu. Srečujejo pa se z nekaterimi težavami pri spodbujanju pomenljivih izkušenj, ki bi pri študentih stimulirale samozavestno rabo te strategije pri njihovem nadzorovanem pedagoškem usposabljanju.

Ključne besede: aktivno učenje, začetno izobraževanje učiteljev, projektno učenje, učne strategije

Introduction

Throughout their lives, teachers face a continuous process of personal and professional growth that is not restricted to learning knowledge and skills (Menezes & Ponte, 2006). As part of their strong criticism of traditionalist school practices, Ball and Cohen (1999) claim that teacher education programmes should prepare future teachers for challenging and reflective work with a practice-based curriculum. They also argue that teachers should learn from their teaching practices, particularly concerning how to evaluate the different situations they face and how to use their didactical knowledge to improve their educational practices. Regarding research, Kostianen et al. (2018) state that there have been few studies focusing on new educational approaches in teacher education, or how these approaches are experienced by future teachers.

According to Biesta (2011), there are several factors to consider in the education of teachers, especially the enhancement of educational wisdom rather than the common development of knowledge and skills. Reinforcing this idea, Darling-Hammond and Baratz-Snowden (2007) state that the teacher education curriculum should not be limited to the acquisition of knowledge, but should also allow students to seek and apply new strategies in situations where models are not enough. Braga (2001) considers that Initial Teacher Education (ITE) in Portugal is typically poor due to the emphasis given to the content to be taught, and claims that higher education professors should promote activities that contribute to students' engagement in their own learning process, so that they can develop curriculum management skills.

Several authors (Almeida, 2015; Ball & Cohen, 1999; Leite & Ramos, 2010; Rangel & Gonçalves, 2011) criticise traditionalist and transmissive teaching approaches, which are essentially teacher centred, and defend teaching methods based on socio-constructivist and interdisciplinary principles that encourage students to be more actively engaged in the learning process. One of the major concerns mentioned by Tascı (2015) is that during the students' own schooling, there is a great difficulty in internalising knowledge and being able to establish relationships between theoretical knowledge and real life. Based on his empirical research, Hattie (2008) states that learning occurs when there is the explicit goal of learning, when it is challenging and when everyone is involved in the process.

Emphasising the importance of the interdisciplinary nature of knowledge, Leite and Arez (2011) support a project approach in the initiation to professional practice of future teachers, as it favours an orientation towards an active teaching professionalism, preparation for decision-making in diversified

and non-typical situations, integration of knowledge from different areas, and the learning styles that are characteristic of new generations. Reinforcing this idea, Rangel and Gonçalves (2011) defend Project-Based Learning (PjBL) as a central focus in ITE curricula, highlighting its effectiveness in contrast to direct, transmissive and expository teaching.

In Portugal, initial primary school teacher education has two components: a degree in Basic Education lasting three years, constituted as the common core for prospective teachers who want to work with children from 0 to 12 years of age, followed by a master's degree for Primary School Teachers (or its variants: Preschool and 1st cycle of education – 0 to 9 years of age; 1st and 2nd cycles of education – 6 to 12 years of age), lasting two years, with a strong focus on didactics components and Supervised Teaching Practice. Supervised Teaching Practice internships are carried out at different times during the undergraduate and master's degrees. During these internships, future teachers are integrated into classrooms of more experienced teachers (called cooperating teachers), working together in planning activities, but always with the support of the higher education institutions' professors. This process follows the model recommended by Decree-Law No. 43/2007, under the joint responsibility of the Ministry of Education and the Ministry of Science, Technology and Higher Education, which includes guidelines first for students' scientific education and later for didactics education.

Since the implementation of the Bologna Process in 2007, which brought about significant changes in the structure and conceptualisation of ITE, there has been a conceptual change in the way of looking at the teaching and learning process (Almeida, 2015), resulting in traditionalist or transmissive methods being considered non-preferred approaches for teaching (Leite & Ramos, 2010).

Project-Based Learning

Silva (2005) contextualises Project-Based Learning (PjBL) historically, pointing out that the proposal to organise the teaching process around central nuclei of content, thus making learning more meaningful and effective, has a long tradition in education, dating back to the beginning of the twentieth century and being connected, in the United States, to names like Dewey and Kilpatrick. This perspective was also adopted in Europe, which followed an education for life perspective and detached itself from a compartmentalised teaching model disconnected from pupils' interests.

We can consider PjBL as a teaching strategy that presupposes the involvement of all participants, with the purpose of solving real-life and authentic

problems that are in the common interest of those who are participating in the project (Leite et al., 1989). Vasconcelos (2011) adds that project work contributes to giving meaning to learning by engaging participants in problem solving, decision making and the search for answers. This process allows the development of essential lifelong learning competences, such as the collection and processing of data, the social learning of group work, decision making, and the spirit of initiative and creativity.

In this sense, Leite and Arez (2011) defend the inclusion of project work practices in ITE, providing student teachers with intervention skills in an integrated manner by developing projects in formal and non-formal educational contexts. In this way, student teachers are prepared to strategically intervene in educational contexts, and are able to involve children in the design, implementation and evaluation of collective projects. Putting student teachers in practical contact with this strategy allows them to become responsible for their own educational path through experiences and knowledge beyond those acquired academically, thus promoting a greater isomorphism between training and teaching, as defended by Estrela (2001).

Although PjBL may not be entirely new in education, Silva (2011) reinforces the idea that it remains innovative, mainly due to its continued limited use in schools and the need to further implement project work in preschool and basic education. In didactical terms, Vasconcelos et al. (2012) propose four sequential phases for pupils to follow when working on projects: (i) *the problem definition phase*, in which the problem is formulated and the questions to be investigated are defined; (ii) *the planning and development phase*, in which the possible path of the project's development is foreseen, taking into account the defined objectives; (iii) *the execution phase*, in which the research process and activities that enrich and lead to the defined problem's answers are developed; and (iv) *the dissemination and evaluation phase*, in which the results are presented, as well as an evaluation of the entire process and a consequent survey of new issues that could lead to a new project. Silva (2005) considers that all phases of a project contribute to the continuous construction of knowledge, involving conception and decision making (starting from the initial idea or problem), as well as the planning, implementation, and the evaluation of the process. Rangel and Gonçalves (2011) add that the application of this strategy in educational contexts favours motivated, participatory, shared, cooperative and integrated education. In addition to these socio-affective aspects, Hayes (2010) defends curricular integration as a characteristic of project work in which the use of different curricular areas allows the incorporation and interconnection of a large number of sources, concepts and paths. Furthermore, Darling-Hammond

(2006) assumes that a successful teacher education programme includes coherence and integration between all areas of the programme, as opposed to a collection of courses with no apparent connection.

The success of learning through projects does, however, depend on its continuity; it is not as effective if it is merely used for isolated activities, as its approach must be systematic over time (Fernandes et al., 2014). Tamim and Grant (2013) recognise the difficulties of PjBL implementation in the classroom, stating some implications that teachers need to take into account so that the strategy does not end up being disadvantageous for the pupils. The authors claim that teachers need to believe in its effectiveness and be open to constructivist learning approaches. In addition, they must develop learner-centred teaching skills so that they can manage activities resulting from project work in a successful way.

Initial Teacher Education

Estrela (2002) defines ITE as the structured, framed and formal beginning of a personal preparation and development process aimed at professional performance in a school, servicing a historically situated society. It is a complex process that must take into account the different problems that can be solved using the knowledge of different curricular areas. Pantić (2012) claims that teacher preparation should be a collaborative effort and have a continuing development, since fragmented education of teachers does not seem to be the most effective way to enable professionals to work collectively later in schools.

In her research, Braga (2001) criticises ITE for valuing aspects that are not relevant to the quality of personal, professional and social training of individuals by providing purely technical input that fails to contribute to the maturity process at these levels. She therefore argues that teacher education should prepare teachers to reflect on all aspects of the teaching-learning process as active members in the construction of the curriculum, rather than just its execution.

For this purpose, the Organisation for Economic Co-operation and Development (OECD, 2017) also defines learning principles for a quality educational environment that can be taken in account by ITE programmes. These principles place the pupil at the centre of learning, valuing their knowledge and promoting a horizontal connection between areas of knowledge. With these guidelines, the OECD aims to provide a framework and practical tools for those who work in education, enabling them to innovate their learning environment. The seven proposed principles (OECD, 2017) emphasise that learning

environments should “make learning an engagement central; ensure that learning is understood as social; be highly attuned to learners’ emotions; reflect individual differences; be demanding for all while avoiding overload; use broad assessments and feedback; and promote horizontal connectedness” (p. 17).

Kavanagh et al. (2020) defend a teacher education programme based on practice, promoting decision making and critical sense in identifying problems and judging situations. In this regard, Brew and Saunders (2020) also advocate research activities in teacher education, challenging professors themselves to rethink the pedagogies they commonly use. Higher education professors must, therefore, provide meaningful experiences to student teachers in order to realise what should really be learned (Daves & Roberts, 2010). Regarding the knowledge areas integrated in ITE programmes, Darling-Hammond (2006) assumes that a successful teacher education programme demonstrates coherence and integration between all areas of the programme, as opposed to being a collection of courses with no apparent connection.

Favourable conditions to develop meaningful experiences in ITE can be created throughout a programme that structures social processes allowing students to experience the topics covered in practical terms and to develop experiences in the light of theory (Kostiainen et al., 2018). For these authors, a teacher education pedagogy that combines meaningful practical experiences and reflection is essential in order for future teachers to understand the connection between theory and practice. In this regard, Nicu (2015) reinforces the idea that there is a need to develop strong education policies in teacher education and to provide higher education professors with continuous education in order to create an awareness of new teaching-learning methods.

Active learning experiences that have a direct correlation with the professional skills of teachers are considered essential in ITE programmes (Niemi, 2011). According to Pietila and Virkkula (2011), the use of PjBL in teacher education programmes can be beneficial because it improves teaching and learning quality, contributing to a high level of cognitive development and involving students in problem solving and the search for innovative solutions, while also teaching them planning, research and communication processes. Lasauskiene and Rauduvaite (2015) recommend that institutional solutions should be introduced to develop the implementation of PjBL as a teaching strategy in order to improve the skills of higher education professors in terms of peer collaboration and changing attitudes towards different learning methods.

Method

With the present research we aim to understand how PjBL is being integrated into the curriculum of primary school teachers' ITE. The research questions that guide the project and that we address in this paper are: "How is PjBL incorporated in ITE programmes?"; "What is the importance given to PjBL in the ITE curriculum?"; "How long has PjBL been part of primary school teacher education programmes?"; and "Has the strategy to integrate PjBL in ITE changed over time? If so, how and why?"

The research is situated in a phenomenological-interpretative paradigm (Cohen et al., 2000): it seeks to understand the subjectivity of human experience, it maintains the integrity of the investigated phenomenon, and it makes an effort to interpret the phenomenon from the point of view of the participants. Thus, the inferences made emerge from the particular observed situations. The objective of the investigation is to understand the observed phenomena at the specific time and place of observation and to compare what is observed with observations made at different times and places. Every effort is made to understand and interpret the observed phenomenon taking into account its participants.

Research Design

Given these characteristics, we chose a multiple case study design, as it focuses on specific situations that are supposed to be unique and special in certain aspects (Stake, 1995; Yin, 2014). The purpose of using this type of qualitative study is not to obtain knowledge of general properties of a population, but to understand the specificity of a given situation with the intention of producing knowledge about a particular object (Amado, 2014). When studying the processes and dynamics of ITE programmes, the ultimate aim is to provide a better understanding of specific cases, which will contribute to the formulation of working hypotheses about the situation in question.

Participants

The participants in the research were three higher education institutions located in different regions of Portugal, all of which offer ITE programmes for primary school teachers. The institutions were chosen through a documental analysis of their programmes' curricula available online (which included PjBL at some point of the programme) and through previous work that the professors of these institutions had published. The selected institutions have different ITE programmes, but all conceive of project work as an integral strategy in

their courses. At each institution, we interviewed the professors coordinating the Basic Education programme and the Primary School master's programme (six in total, two from each institution).

Instruments

Two data sources were used in the research in order to guarantee methodological triangulation by using two methods for the same object of study (Cohen et al., 2000). The data were collected through documental analysis of the programmes' curricula and through semi-structured interviews, so as to better understand the nature of the PjBL approach throughout the ITE programmes. Document analysis provided data on the context in which the participants operate and on the relevance of PjBL in the ITE curriculum. Furthermore, the information contained in these documents suggested questions for further clarification during the subsequent interviews (Bowen, 2009). The interviews were based on a previously defined protocol, ensuring that all participants answered the same questions (Bogdan & Biklen, 2013), while maintaining a degree of freedom in its exploration.

Analysis

Data analysis consisted of two phases. In the first phase, the ITE programmes' curricula and course syllabi were analysed in order to select the participant institutions. Our criterion was the inclusion of PjBL at some point of the programme, either in the courses' content or method. In the second phase, subsequent to the interviews, the collected data were subjected to content analysis (Amado, 2014) and categorised according to the objectives of the study.

Results

The three higher education institutions participating in the research (named InstA, InstB and InstC) are located in different regions of Portugal and all consider PjBL at some point in their ITE programmes.

The documental analysis of the programmes' curricula revealed that there are no courses with a title referring to PjBL explicitly. Although this strategy is included in the description of the courses of some syllabi, it is not clearly referred to in the titles. With a more detailed analysis focusing on the content of the courses of the syllabi, it was found that PjBL is mentioned both from a **theoretical** perspective (InstA and InstB), as well as from a **didactical** and **practical** perspective (InstA, InstB and InstC). The theoretical perspective includes the evolution of concepts and practices in Education and Pedagogy, the

main pedagogical movements of the modern era, and contemporary pedagogical theorists of Project Pedagogy. The didactical perspective includes the pedagogical knowledge for implementing project work in the classroom centred on PjBL phases (problem definition, planning and development, execution, dissemination and evaluation). The practical perspective includes project work experiences promoted by professors of the ITE programme within a course's work method. Adding to the documental analysis, the interviewed programme coordinators explain that PjBL is approached throughout the education of teachers, albeit implicitly in most cases and not necessarily expressed in the analysed documents.

At InstA, PjBL is addressed for the first time in practical terms in an interdisciplinary course in the first year of the programme. In this course, students have to carry out project work with the contribution of various areas of knowledge (Portuguese, Mathematics and Social Sciences). Later, it is addressed in more depth, in theoretical and didactical terms, in the programme's third year, with didactical application in an Initiation to Professional Practice course. There is an intention to "create the basis for students to build a project with children when they are on the internship" (Coordinator₁ InstA). Thus, in the final year of the degree in Basic Education, students are asked to develop project work with preschool or primary school pupils (depending on the students' choice), being supported by a set of professors from several areas of knowledge. The main objective is for the project to be developed from an interdisciplinary perspective. These projects can originate from the pupils' curiosity about various themes or from the teacher's proposal (such as the solar system, animals, countries, etc.); alternatively, they can emerge from a directly observable problem (improvement of the playground, improvement of the library, optimisation of spaces in the classroom, etc.). In the master's degree Supervised Teaching Practice courses, the use of PjBL is not mandatory and depends on the conditions students find in their internship schools, the openness of the cooperating teacher to apply this strategy, and their interest and intention to use it. The intention in these internships is that future teachers develop their educational practices according to their pedagogical interests, with the methods that motivate them most, so it is not required to use project work. In addition to these moments, there are courses throughout the programme in specific areas of knowledge that propose the realisation of projects to be developed by student teachers as the course's work method, although not necessarily with the collaboration of different areas. The programme coordinator admits that, in higher education, it is always more complicated for professors from different curricular areas to work together due to several factors, such as a lack of

time and the specificity and curriculum of their own courses. Despite these difficulties, there is an intention that “professors put student teachers to work on projects so that they could do the same with children on their internships” (Coordinator₁ InstA). Consequently, there is a need for student teachers to develop projects themselves in order to have this experience in the first person.

At InstB, PjBL is addressed for the first time during the second year of the programme, in a theoretical course in which various teaching strategies are studied. As a continuation of this theoretical approach, project work appears throughout the programme in some courses as a work method, which means that students develop projects related to a proposed topic within the scope of the particular course’s area of knowledge. Although these projects typically cross several areas of knowledge, they primarily aim to deepen knowledge in a specific area. Some professors also request that students read articles about project work in order to consolidate this strategy, and the topic is approached again later in the master’s degree so that student teachers can apply it in their Initiation to Professional Practice. Thus, future teachers are not obliged to develop this strategy with pupils in internships unless they consider it relevant and believe that they are able to execute it in the school where their practice is taking place. The programme coordinators interviewed also reveal a concern regarding project work in schools, stating that it is often impractical due to the requirement of many schools to devote a high number of hours to Portuguese, Mathematics and Environmental Studies, which is done in a segmented, un-integrated way. Thus, there is little time to develop projects, depending on the openness of the cooperating teacher to do so. The coordinators nonetheless say that some cooperating teachers do demonstrate an interest in developing projects. Moving away from the “manual-training-exam logic that is very present in some schools (...) we have [cooperating] teachers who support, encourage and give space” (Coordinator₂ InstB) to future teachers to develop other methods, different from the ones they usually adopt.

In the case of InstC, PjBL assumes a logic of continuity throughout the programme, as a work method for several courses. Project work first appears in the programme’s first year, in the Natural Sciences course, and subsequently in several courses that seek to work in an interdisciplinary way by using this strategy. This model allows two courses from different areas of knowledge to develop the same work from different perspectives, using their respective specificity to enrich the learning experience for future teachers. This type of work method is carried out throughout the programme, with particular focus on courses in the areas of Portuguese, Mathematics and Natural Sciences. In these courses, students develop project work in two modalities: (i) short-term projects related to proposals

of the professor, who provides theoretical support material and the method to be used, on which students have to base their work in order to develop the activity, analyse the results and present a final product; (ii) medium or long-term projects, starting with the observation of a social and cultural reality, in which students “have to identify the problem-issue, define a theoretical framework, determine the method to use, build a data collection instrument, collect data in the field, analyse and interpret the data, establish conclusions and defend [their discoveries] at the end of the semester” (Coordinator₁ InstC). In this institution, there is a designated physical area dedicated to projects, in which students can work freely and discuss their work with colleagues and professors. In Supervised Teaching Practice internships, future teachers are not obliged to use this strategy, although they often do so due to their personal experiences gained throughout the programme. The intention is that future teachers take these personal experiences to the internships, but this is often difficult due to the schools’ conditions and demands. According to the coordinators:

Student teachers have a lot of pressure to teach the official curriculum, and that sometimes does not give them the necessary time to implement project work, since time is known to be one of the biggest obstacles to the development of this type of work, and the [cooperating] teachers in the schools are often unable to give them the time to implement these types of activities” (Coordinator₁ InstC).

The approach to PjBL in the three institutions has been a mutual concern for some years, with some of the institutions having a history of more extensive development over time. At InstA, project work was typically undertaken in preschool teacher programmes, while PjBL was approached mostly in a theoretical way in the primary school teacher programmes, as a strategy that could be used with pupils. It was only after the implementation of the Bologna Process in 2007 that the request for student teachers to try this strategy in the Supervised Teaching Practice internships began. The track record at InstB is similar, with PjBL being approached more theoretically in the pre-Bologna period and more didactically after the implementation of the Bologna Process. At InstC, PjBL has emerged in more recent years. Although it was not even approached theoretically for a long time, engagement with the didactical and practical approaches of this strategy began in a more consistent and integrated way in some courses of the programme’s curricula in 2016.

Regarding how students cope with the appropriation of PjBL, all three institutions highlight the difficulty students demonstrate in understanding its essence due to the lack of experiences of this nature throughout their own

schooling. InstA notes that students' first contacts with project work in the programme are sometimes unsuccessful, but they gradually begin to give it more importance:

In the first year of the programme, the results of the evaluation/satisfaction questionnaires answered by students show that there are many who do not appreciate this course [which requests them to develop a project of their own] and they are very resistant to this type of work method. However, in the third year, when we talk about PjBL in a different light, addressing its application with children, they adhere to it very well. This may have to do with several factors. One is that three years have passed since the first experience and the students have engaged with a series of issues in educational and pedagogical terms that makes them perceive [education] in another way. The other reason may be the fact that they no longer have to do the project themselves, they supervise the children to do the project, which may make it easier to see how the process works from an outside perspective. (Coordinator₁ InstA)

The interviewed coordinators at InstB note that although students find this strategy easy to understand and learn, they face some difficulties in putting it into practice when integrating it in the Supervised Teaching Practice internships: "They do not have [difficulty] in appropriating [the strategy]. It is more in the difficulty of implementing it later, and that also has to do with the lack of experience in terms of project work" (Coordinator₁ InstB). InstC considers that the students' previous experience in their own schooling, which is marked by an expository or teacher-centred teaching pedagogy without active approaches to learning, is an initial obstacle to the appropriation of this strategy. However, due to the inclusion of project work as the work method of some courses since the programme's first year, it becomes a natural work path for students. "When an activity of this type appears [later in the programme], the gears of this work strategy, either of individual or group work, are already more oiled" (Coordinator₁ InstC). As for the application of the strategy with children, the interviewees refer to aspects that are in agreement with all of the other institutions:

There is greater skill in their understanding of all of the stages of a project and its transposition to its planning. However, it is noted that they still have to face several obstacles to its implementation in the field, that is, they understand the theoretical part of the project because they also experienced it in their own practice in the activities they do with us, but then its implementation [at schools] is another type of difficulty" (Coordinator₁ InstC).

Asked about the importance and significance of PjBL in the programmes in comparison to other teaching strategies, all of the interviewees consider that this approach is important, but they do not give it prominence, instead regarding it with the same importance as other teaching strategies. Regardless of the type of PjBL approach carried out in the institutions, all of the coordinators mentioned that PjBL is an often-explored topic by future teachers in their final master's degree report every year.

The following table (Table 1) systematises the information obtained during the interviews, according to the most relevant mentioned characteristics.

Table 1

Synthesis of the PjBL approach in the three higher education institutions

PjBL	InstA	InstB	InstC
Predominant perspective	Theoretical, didactical and practical.	Theoretical and didactical.	Practical, as the work method of some courses.
Students' first encounter with PjBL in the programme	1st year, as a course's work method.	2nd year, as a theoretical approach.	1st year, as a course's work method.
Importance given throughout the programme	Theoretically balanced in relation to other teaching strategies. Reinforced didactically in the 3rd year, when students apply it in Supervised Teaching Practice internships.	Theoretically balanced in relation to other teaching strategies.	Theoretically balanced in relation to other teaching strategies. Reinforced practically as the work method in some courses.
Approach history	Theoretical in pre-Bologna programmes. Theoretical, practical and didactical in post-Bologna programmes.	Theoretical in pre-Bologna programmes. Theoretical, practical and didactical in post-Bologna programmes.	Theoretical in pre-Bologna programmes. More consistently incorporated into the programme's curricula since 2016.
Application in Supervised Teaching Practice internships	Mandatory in the 3rd year of the Basic Education degree internship. Not mandatory in master's internships.	Not mandatory in Basic Education degree and master's internships.	Not mandatory in Basic Education degree and master's internships.

The three institutions approach PjBL from theoretical, didactical and practical perspectives, although some focus more on one perspective than the others. The first time this strategy appears in the programmes is in their first year and it continues throughout the subsequent years. All of the institutions give a balanced theoretical importance to PjBL compared to other teaching strategies. Furthermore, it is didactically reinforced at InstA and more

experimentally reinforced at InstC throughout the programmes. PjBL has been a part of ITE programmes in these institutions over time in theoretical terms, but has gained some relevance in a practical and didactical way, especially after the implementation of the Bologna Process. Regarding the application of PjBL in student internships, it is not mandatory in the master's degree Supervised Teaching Practice, being left to the discretion of future teachers, depending on their interest in this strategy or the conditions found in schools enabling its application.

Discussion and Conclusions

It is possible to verify that all of the institutions surveyed value and care about the PjBL approach in ITE, whether in theoretical, practical or didactical terms. It is, of course, not the only strategy taught during the programmes, nor is it considered the most important strategy in relation to other teaching approaches, but it is nonetheless an integral part in the programmes' courses and, in some situations, in Supervised Teaching Practice internships.

All of the institutions show a concern with the learning environments valued by the OECD (2017), namely Learning Principle 1 "the learning environment recognises the learners as its core participants, encourages their active engagement and develops in them an understanding of their own activity as learners" (p. 22), and Learning Principle 2 "the learning environment is founded on the social nature of learning and actively encourages well-organised cooperative learning" (p. 23). Although regarded as an important aspect by all of the institutions, there is an increased effort by InstC to promote Learning Principle 7 (OECD, 2017) more actively: "the learning environment strongly promotes 'horizontal connectedness' across areas of knowledge and courses as well as the community and the wider world" (p. 26).

The implementation of the Bologna Process gave added impetus to PjBL, reinforcing the importance of student-centred teaching models. In the pre-Bologna period, PjBL was approached in an essentially theoretical way, but since the implementation of the Bologna Process it has been approached from a more didactical perspective in two of the institutions surveyed and from a more practical perspective in the third. In this way, ITE programmes have sought to move from a traditionalist knowledge transmission system to a competency-based system accordingly to the Decree-Law No. 74/2006 from the Ministry of Science, Technology and Higher Education of Portugal.

There is, however, still widespread difficulty in applying PjBL in ITE programmes. The professors of the institutions surveyed exhibited some

difficulty in implementing interdisciplinary projects with students if the projects are not foreseen in the course's syllabus. This is due to the extension of curricula and the lack of time for working cooperatively with colleagues from other knowledge areas. Given that education departments in higher education institutions are mainly divided by knowledge areas and typically work independently, integration between these areas becomes difficult, and is only possible through involvement and collaboration between the professors who value an integrative curriculum. This division results in some difficulties for an interdisciplinary approach in teacher education, even though it is desirable for future teachers do adapt this approach in their professional practice. The collaboration between professors of different areas should be a primary focus in ITE in order to overcome the curricular fragmentation of the programmes (Pantić, 2012). We agree with Nicu (2015) that there is a need to invest more in teaching approaches that promote student activity such as PjBL, to ensure the conditions for professors to do so, and to further complement their training whenever necessary. According to Fernandes et al. (2014), the approach to project work must be systematic and must not appear as an isolated case in teacher education programmes.

Regarding how the student teachers cope with in the appropriation of PjBL, all three institutions agree that there is an initial difficulty and resistance due to the lack active learning experiences in the students' own schooling. During the programme, however, the students reveal an ease in appropriating and understanding PjBL, although there can be some difficulty in implementing it in contexts of Supervised Teaching Practice. The inclusion of more active learning experiences and research studies in ITE could develop future teachers' high level professional competences, as stated by Niemi (2011), leading to a more confident approach to these strategies with pupils.

Although the student teachers encounter certain difficulties, the motivation they gain through their experiences during ITE encourage them to develop PjBL with pupils in their Supervised Teaching Practice internships, and even to develop research work on this strategy, as shown by the Supervised Teaching Practice reports that they produce as their final work to obtain the master's degree required to become primary school teachers. These reports reveal the impact that PjBL has on some student teachers, leading them to apply it in the context of professional internships and to investigate its results and implications for the learning processes of primary school pupils.

In general, the results of the present research give some insight into understanding the nature of the PjBL approach in the curricula of ITE in higher education institutions, the importance institutions attribute to this type of work

throughout their programmes, and the implications of this approach for future teachers, as well as some difficulties experienced during the process.

There is a recognised need to continue to invest in the inclusion of teaching methods that promote students' active involvement in the learning process in ITE programmes, given that the students' own schooling is marked mainly by transmissive and expository teaching approaches; many of them will have their first experience with teaching strategies such as PjBL during their ITE. Bearing in mind that it is desirable for future primary school teachers to shift from the familiar transmissive teaching model to a student-centred teaching approach (Almeida, 2015; Ball & Cohen, 1999; Leite & Ramos, 2010; Rangel & Gonçalves, 2011), their experiences as ITE students is extremely important. In agreement with Pietila and Virkkula (2011), as well as Lasauskiene and Rauduvaite (2015), we believe that PjBL should be included in ITE programmes, not only from a theoretical perspective, but also didactically and practically. By being exposed to a range of experiences, future teachers will come into contact with different teaching methods and be encouraged to apply them during their Supervised Teaching Practice internships and subsequently in their professional practice as teachers.

There is, however, still some way to go in optimising the approach of teaching methods that encourage students to be more actively engaged in the learning process in ITE programmes, as students still demonstrate some difficulties in integrating these methods in their own teaching practices. Higher education institutions should provide more diversified teaching experiences to students, so that they can experience their effectiveness and feel confident to apply them with their pupils. On the other hand, Supervised Teaching Practice internships should enable students to experiment with different teaching methods, rather than limiting them to what is usually developed by schools. In this way, we could observe a better appropriation of these methods by students and their consequent application in professional practice.

Despite the fact that the collected data are extremely valuable for the characterisation of the PjBL approach in higher education institutions' ITE programmes, a characterisation that could be extended to other programmes with similar teaching models, a multiple case study does not allow us a national overview of the subject. Although such an overview was not our objective, this could be regarded as a limitation of the present research. Future investigations could involve extending the research field to institutions in other areas of the country and establishing a comparative analysis at an international level.

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References

- Almeida, M. M. de. (2015). Desenvolvimento profissional docente no ensino superior [Teacher professional development in higher education]. In A. Loss, A. P. Caetano, & J. P. Ponte (Eds.), *Formação de Professores no Brasil e em Portugal. Pesquisas, Debates e Práticas* (pp. 77–104). Appris Editora. <https://doi.org/10.17648/cbcs-2019-110597>
- Amado, J. (2014). *Manual de investigação qualitativa em educação* [Handbook of qualitative research in education] (2nd ed.). Imprensa da Universidade de Coimbra. <https://doi.org/10.14195/978-989-26-0879-2>
- Ball, D. L., & Cohen, D. K. (1999). Developing practice, developing practitioners: Toward a practice-based theory of professional education. In G. Sykes & L. Darling-Hammond (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 3–32). Jossey Bass.
- Biesta, G. (2011). The future of teacher education: Evidence, competence or wisdom? *Invited keynote lecture at the 2010 the future of teacher education conference, Vienna, 2-3 March 2011*. <https://doi.org/10.1007/978-981-10-4075-729>
- Bogdan, R., & Biklen, S. (2013). *Investigação qualitativa em educação – uma introdução à teoria e aos métodos* [Qualitative research in education – an introduction to theory and methods] (12th ed.). Porto Editora.
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40. <https://doi.org/10.3316/QRJ0902027>
- Braga, F. (2001). *Formação de professores e identidade profissional* [Teacher training and professional identity]. Quarteto Editora.
- Brew, A., & Saunders, C. (2020). Making sense of research-based learning in teacher education. *Teaching and Teacher Education*, 87, 102935. <https://doi.org/10.1016/j.tate.2019.102935>
- Cohen, L., Manion, L., & Morrison, K. (2000). *Research methods in education* (5th ed.). Routledge Falmer.
- Darling-Hammond, L. (2006). Constructing 21st-century teacher education. *Journal of Teacher Education*, 57(3), 300–314. <https://doi.org/10.1177/0022487105285962>
- Darling-Hammond, L., & Baratz-Snowden, J. (2007). A good teacher in every classroom: Preparing the highly qualified teachers our children deserve. *Educational Horizons*, 85(2), 111–132.
- Daves, D. P., & Roberts, J. G. (2010). Online teacher education programs: Social connectedness and the learning experience. *Journal of Instructional Pedagogies*, 4, 1–9. <https://files.eric.ed.gov/fulltext/EJ1096997.pdf>

- Decree-Law No. 43, 22 February 2007 (2007). Defines the conditions necessary for obtaining professional qualification for teaching. *Diário da República*, 1st series, No. 38.
- Decree-Law No. 74, 24 March 2006 (2006). Approves the legal regime for higher education degrees and diplomas. *Diário da República - I Series-A*, No. 60.
- Estrela, M. T. (2002). Modelos de formação de professores e seus pressupostos conceptuais [Teacher training models and their conceptual assumptions]. *Revista de Educação*, Vol. XI(1), 17–29.
- Estrela, M. T. (2001). Questões de profissionalidade e profissionalismo docente [Issues in the teaching profession and teaching professionalism]. In M. Teixeira (Ed.), *Ser Professor no Limiar do séc. XXI* (pp. 113–142). ISET.
- Fernandes, S., Mesquita, D., Flores, M. A., & Lima, R. M. (2014). Engaging students in learning: Findings from a study of project-led education. *European Journal of Engineering Education*, 39(1), 55–67. <https://doi.org/10.1080/03043797.2013.833170>
- Hattie, J. (2008). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.
- Hayes, D. (2010). The seductive charms of a cross-curricular approach. *Education 3-13*, 38(4), 381–387. <https://doi.org/10.1080/03004270903519238>
- Kavanagh, S. S., Conrad, J., & Dagogo-Jack, S. (2020). From rote to reasoned: Examining the role of pedagogical reasoning in practice-based teacher education. *Teaching and Teacher Education*, 89, 102991. <https://doi.org/10.1016/j.tate.2019.102991>
- Kostiainen, E., Ukskoski, T., Ruohotie-Lyhty, M., Kauppinen, M., Kainulainen, J., & Mäkinen, T. (2018). Meaningful learning in teacher education. *Teaching and Teacher Education*, 71, 66–77. <https://doi.org/10.1016/j.tate.2017.12.009>
- Lasauskiene, J., & Rauduvaite, A. (2015). Project-based learning at university: Teaching experiences of lecturers. *Procedia - Social and Behavioral Sciences*, 197, 788–792. <https://doi.org/10.1016/j.sbspro.2015.07.182>
- Leite, C., & Ramos, K. (2010). Questões da formação pedagógica-didáctica na sua relação com a profissionalidade docente universitária. Alguns pontos para debate [Issues of pedagogical-didactic training regarding its relationship with professionalism in university teaching. Some points for debate] In C. Leite (Ed.), *Sentidos da Pedagogia no Ensino Superior* (pp. 29–45). CIEE.
- Leite, E., Malpique, M., & Santos, M. R. dos. (1989). *Trabalho de projeto – II: Leituras Comentadas* [Project work – II: Commented reading]. Afrontamento.
- Leite, T., & Arez, A. (2011). A formação através de projetos na iniciação à prática profissional [Training through projects in the initiation of professional practice]. *Da Investigação Às Práticas*, 1(3), 79–99. http://www.eselx.ipl.pt/cied/publicacoes/revista_atual/79_99.pdf
- Menezes, L., & Ponte, J. P. da. (2006). Da reflexão à investigação: Percursos de desenvolvimento profissional de professores do 1.º ciclo na área de Matemática [From reflection to research: Professional development paths for primary school teachers in the area of mathematics]. *Quadrante*, XV(1&2), 3–32.

- Nicu, A. (2015). Policy and practice of initial teacher training. *Procedia - Social and Behavioral Sciences*, 180, 80–86. <https://doi.org/10.1016/j.sbspro.2015.02.089>
- Niemi, H. (2011). Educating student teachers to become high quality professionals - A Finnish case. *Center for Educational Policy Studies Journal*, 1(1), 43–66.
- OECD [Organisation for Economic Co-operation and Development]. (2017). *The OECD handbook for innovative learning environments*. OECD, Publishing.
<https://doi.org/https://dx.doi.org/9789264277274-en>
- Pantić, N. (2012). Teacher education reforms between higher education and general education transformations in south-eastern Europe: Reviewing the evidence and scoping the issues. *Center for Educational Policy Studies Journal*, 2(4), 71–90.
- Pietila, M., & Virkkula, E. (2011). Integrating therapy and practice according to PBL-based project designs in secondary vocational education of engineering and music. In J. Davies, E. Graaff, & A. Kolmos (Eds.), *PBL across the disciplines: Research into best practice. Proceedings from the 3rd International Research Symposium on PBL* (pp. 54–63). Aalborg University Press.
- Rangel, M., & Gonçalves, C. (2011). A metodologia de trabalho de projeto na nossa prática pedagógica [Project-based learning in our pedagogical practice]. *Da Investigação Às Práticas*, 1(3), 21–43.
- Silva, I. L. da. (2011). Considerações finais: Das voltas que o projeto dá... [Final thoughts: Of the turns that the project takes...]. *Da Investigação Às Práticas*, 1(3), 118–132.
- Silva, I. L. da (2005). Projectos e aprendizagens [Projects and learning]. 2.º *Encontro de Educadores de Infância e Professores Do 1º Ciclo, Porto, 24–25 February 2005*.
- Stake, R. E. (1995). *The art of case study research*. Sage Publications.
- Tamim, S. R., & Grant, M. M. (2013). Definitions and uses: Case study of teachers implementing project-based learning. *Interdisciplinary Journal of Problem-Based Learning*, 7(2), 5–16.
<https://doi.org/10.7771/1541-5015.1323>
- Tasci, B. G. (2015). Project based learning from elementary school to college, tool: Architecture. *Procedia - Social and Behavioral Sciences*, 186, 770–775. <https://doi.org/10.1016/j.sbspro.2015.04.130>
- Vasconcelos, T. (2011). Trabalho de projeto como “Pedagogia de Fronteira” [Project work as “Border Pedagogy”]. *Da Investigação Às Práticas*, 1(3), 8–20.
- Vasconcelos, T., Rocha, C., Loureiro, C., Castro, J., Menau, J., Sousa, O., Hortas, M. J., Ramos, M., Ferreira, N., Melo, N., Rodrigues, P., Mil-Homens, P., Fernandes, S., & Alves, S. (2012). *Trabalhos por projeto na educação de infância: Mapear aprendizagens, integrar metodologias* [Project work in early childhood education: Mapping learning, integrating methods]. Direção-Geral da Educação.
- Yin, R. K. (2014). *Case study research: Design and methods* (5th ed.). Sage Publications.

Biographical note

TIAGO TEMPERA is an Assistant Professor of Education and Mathematics in Lisbon's Higher School of Education. With a Master degree in Mathematics Education, he is currently a PhD student of Teacher Education in Instituto de Educação, University of Lisbon. His research is being funded by the Fundação para a Ciência e Tecnologia (FCT) in Portugal. His main research projects are in the areas of teacher education, professional development, supervised teaching practice and mathematics education.

LUÍS TIHOCA, PhD, is an Assistant Professor at the Institute of Education, University of Lisbon, with experience in the development of both graduate and undergraduate courses, as well as an active researcher in the areas of teacher education, competence-based learning assessment and group work collaboration in online environments. He is a member of the Education Research and Development Unit, and a collaborator at the Distance Education Laboratory. He earned his PhD in Science Education from the University of Texas at Austin in 2004.