

PAPER

The Professional Trajectory of Engineers as Teachers: A Study in Engineering Education in Brazil and Portugal

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ABSTRACT

Research on teacher training in the field of engineering seeks to advance understanding of teacher training for engineering education. This topic remains essential given the growing demand for technical professionals. This paper summarizes research conducted since 2000 at four higher education institutions, two in Brazil and two in Portugal. Based on the following categories: Initial motivation; training trajectories and the presence or absence of pedagogical training; the need or otherwise for such training; difficulties faced and opportunities envisioned in teaching; and, finally, self-recognition of the “teacher being.” The paper seeks to analyze how engineering teachers are constituted. Interviews were conducted with teachers working in engineering programs, who indicate professional fulfillment as the main factor common to all.

KEYWORDS

teacher training, professional training, engineers, engineering education, university teaching

1 INTRODUCTION

This paper synthesizes research done on teacher training for professional education in Brazil and Portugal. We analyze the academic and professional trajectories of engineering educators at different institutions in these two countries, with an emphasis on data obtained from previous research [1, 2]. The research began in 2008 as part of a doctoral program, with the topic investigated at two Brazilian institutions. It continued in 2015 as part of a postdoctoral study at a Portuguese institution. The research was concluded in 2020 at another Portuguese institution as part of an educational exchange.

The goal was to understand how engineering educators assume their role, based on their educational trajectories, in Brazil and Portugal, while similar studies in Spain have been recently published [3]. The discussion on teacher professional development has led educators to investigate the possibilities for implementing an educational system that addresses the social demands arising from

Urbanetz, S. T., Alves, G. R. (2026). The Professional Trajectory of Engineers as Teachers: A Study in Engineering Education in Brazil and Portugal. *International Journal of Engineering Pedagogy (iJEP)*, 16(2), pp. 42–54. <https://doi.org/10.3991/ijep.v16i2.60847>

Article submitted 2026-01-01. Revision uploaded 2026-02-12. Final acceptance 2026-02-16.

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changes in the job market, where the demand for scientific, technological, and socio-historical knowledge is increasingly present. This debate is highly contemporary, as discussing teacher development means understanding the complexity of the educational system and the training demands present in everyday academic life. Therefore, the following research question is posed: *How do engineers, given their educational and professional trajectories, constitute themselves as teachers or professors?*

The field of engineering was chosen based on its relevance in the development of industrial production, which led to public and private vocational training initiatives, and because engineering is one of the most comprehensive professional expressions within the exact sciences. Particularly in Brazil, professional training, which encompasses engineering, was structured based on the needs generated by growing industrialization through the creation of apprenticeship and craftsmanship schools in the early 20th century and the foundation of the National Industrial Training Service (SENAI) in 1942 and the National Commercial Training Service (SENAC) in 1946.

In Portugal, according to [4], the period after the First Republic marked the period of initiatives related to engineering education, recognizing the need to modernize and adapt it to the new times and to new social, economic, and even political demands. In 1911, the first Higher Technical Institute was created, and, in 1915, the Polytechnic Academy of Porto was transformed into a Technical Faculty, later the Faculty of Engineering of the University of Porto (1926).

Studying how engineers become teachers or professors can help in understanding their professional trajectory and, thus, help in formulating actions that support teacher qualification. As stated in [5]: *“Engineering education has been addressing these issues, hoping to contribute to better teaching practices more aligned with the engineering professional world.”*

Since 2010, our research on the career paths of engineers who become teachers has shown that they enter teaching through their identity and practices as engineers. This indicates that fragmented training proposals, many based on the epistemology of practice, present gaps and inconsistencies, thus requiring solid and consistent training [6].

It should be stressed that being an educator, both in higher education (HE) and in vocational education and training (VET), increasingly demands clarity on the permanent link between the school environment, as a systematized educational space par excellence, and society.

In other words, being an educator, whether at the basic, technical, or higher education level, requires specific knowledge. This is understood as the basis. In present times, this basis is no longer sufficient. In fact, it never was, but today, besides being insufficient, it is also unacceptable, because, as stated in [2]: *“The challenges faced in the classrooms increasingly force teachers to go beyond their specific areas, linking teaching in an ever-deeper way with pedagogical, psychological, sociological knowledge, etc.”*

Throughout the text, we use the expression “engineering professor” to refer to those who train engineers at the university level; “engineering teacher” to refer to those who teach at the secondary or post-secondary (non-university) level, including VET-level; and “engineering educators” as a sort of umbrella term for those who teach engineering. The expression “professional and technological education” is also used to refer to the VET-level in the Brazilian context.

2 THEORETICAL FRAMEWORK

When discussing teacher training, Nóvoa [7] refers to the fact that we are facing a kind of consensus, but that, despite having a coherent discourse, “[...] *we have not always managed to do what we say needs to be done.*” After all, we continue to face the same dilemmas in teacher training proposals, as we understand that teacher training, as an education professional, is a continuous and demanding training activity, since, when working with human development, it brings with it the challenge of permanent change.

Gatti, Barreto, and de André [8] identified some beliefs that assert that those who know the content inherently know how to teach it and that teachers are born ready. Even though the reality of everyday classroom life demonstrates that these are mere beliefs, teaching continues to be viewed, both by society and universities, as an easy activity or one that can be performed intuitively by anyone, thus not requiring any specific training, as evidenced by anecdotal questions like, “*Professor, do you work too, or do you just teach?*”... as if teaching weren’t working too...

When it comes to professional education in the field of engineering, this situation is even worse, as teaching the specifics of the field requires specialized knowledge that sometimes supersedes educational requirements. According to [9]:

Engineering and rebellion don't go hand in hand. For bridges, buildings, and machines to function, factories to produce, and society to be efficient, order must prevail. Thus, engineering is conservative, and as such, professors in these courses, especially in the field of structures, tend to be quite conservative and skeptical about the possibilities of innovation and change, including in teaching and learning processes ([9], p. 224).

When conducting a research survey on teacher education and teacher training for professional education on the dissertation and theses search engine of the Coordination Agency for the Improvement of Higher Education Personnel (CAPES), of Brazil, as well as at the proceedings of the annual meetings of the National Association of Graduate Studies and Research in Education (ANPEd), covering the years 2000 to 2009, [6] identified only four *stricto sensu* studies that discussed teacher training for engineering education. This number is significantly lower than the 4,695 studies that address teacher training in general, even considering 58 studies that address teacher training for engineering education as a secondary aspect.

Similarly, [10] and [11] updated this survey, indicating there is little literature on the topic, which is even more concerning due to the expansion of VET opportunities and, consequently, the need to expand the teaching staff, following the establishment of Federal Institutes throughout practically the entire Brazilian territory. [10], when updating the statistical survey conducted by [6], with a time frame covering the period from 2010 till 2017, on the CAPES website, using the expression “teacher training” identified 11,419 works. However, using the expression “teacher training for professional education” returned only 25 results, from which 2 discuss this topic in a secondary way. [11] identified, based on the central descriptor “teacher training for professional and technological education,” 540 scientific productions from 2008 till 2017, considering dissertations, theses and articles, which indicates the vast interest that the topic generates. Quoting:

“The survey of academic production in relation to teacher training for professional and technological education, from 2008 till 2018, is justified by the

interest of this research, based on the institutionalization of the Federal Network of Professional, Scientific, and Technological Education, through Law No. 11,892/2008, how federal institutes have or have not developed teacher training policies for professional and technological education and what concepts are expressed in these policies.” ([11], p. 28).

It is worth noting that [11] identified 33 theses and dissertations, demonstrating an increment in research on the topic, and 507 articles, indicating that academic production has been quite intense, especially within the scope of the assumptions of historical materialism. The documents indicate that studies on teachers continue to discuss teaching work, their training, their difficulties and challenges in the face of the intensification and precariousness of work, valorization policies, health and illness, evaluation, and planning and conception of technological education, among other topics, highlighting the persistence of the “[...] *lack of consistent theoretical conceptions and broad and continuous public policies,*” as stated in [12].

Kuenzer [13] already recommended higher education courses within their specific areas for training these teachers, since, in these courses, it is possible to articulate the formation of a common basis. The author understands that it is possible, in this training, to articulate knowledge of the specificities of professional education.

We also emphasize that this discussion on teacher training for professional and technological education is closely linked to debates on the relationship between work and education, given the lack of teacher training, which indicates that “*this lack of training, in turn, has repercussions on educational processes that distance themselves from a view of education and the desired society, of the transformations in the world of work and their implications in the educational field, as well as of the analysis of the context and conditions in which teaching work is constituted in professional and technological education.*” ([10], p. 24).

In 2020, a search in the Digital Library of Theses and Dissertations (BDTD) using the expression “engineering teacher training” yielded nine results, eight of which were specifically about teacher training. The Scientific Electronic Library Online (SciELO) yielded 20 results, but only three specifically addressed the topic. The *Brazilian Journal of Engineering Education* (<http://revista.educacao.ws/revista/index.php/abenge>) contained two articles specifically addressing teacher training.

Considering the new challenges facing engineering professors, it is important to reflect on how faculty will be prepared to teach their students. This concern is also expressed in publications of the Brazilian Association for Engineering Education (ABENGE). Their website contains documents resulting from discussion panels conducted at its annual meetings, such as the one held in 2019.

These meetings addressed how engineers should be trained considering present challenges. According to the recent Brazilian National Curricular Guidelines (DCN) for undergraduate engineering degrees [14], an engineer should be able to:

I – formulate and design desirable engineering solutions, analyzing and understanding user needs and their context; [...] II – analyze and understand physical and chemical phenomena through symbolic, physical, and other models, once verified and validated by experimentation; [...] III – conceive, design, and analyze systems, products (goods and services), components, or processes; [...] IV – implement, supervise, and control engineering solutions; [...] V – communicate effectively in written, oral, and graphic forms; [...] VI – act and lead multidisciplinary teams; [...] VII – know and ethically apply legislation and normative acts within the scope

of the exercise of the profession; [...] VIII – learn autonomously and deal with complex situations and contexts, updating themselves in relation to advances in science and technology, as well as in relation to the challenges of innovation ([14], p. 43).

Therefore, the discussion is on how to do teacher training in engineering, encompassing aspects such as empathy, emotional balance, dialogue, comprehensive assessment, learning theories, creating environments conducive to learning, self-assessment and a sense of continuous improvement, collaborative teamwork, and research and teaching involving students. Furthermore, we consider engineering as inclusive social development within an exclusionary society, among other daily challenges.

Obviously, before becoming an engineering educator, one should be an engineer. The specific knowledge of the field, often acquired through professional practice and academic training, constitutes the foundation of teaching, as no one teaches what one does not know. However, research has shown that this knowledge alone is not sufficient for the teaching profession. There must be integration between content knowledge and didactic and pedagogical knowledge. Pedagogical knowledge aims to organize educational means and processes. This knowledge is constructed through systematic study and research by teachers of their own practice, with the contribution of pedagogical theory. Since engineering educators typically lack knowledge of pedagogical theory, they do not construct this knowledge. Didactic knowledge is focused on teaching, which sparks the interest of engineering educators. Knowing how to evaluate is a fundamental aspect of pedagogical knowledge, but it is extremely sensitive for engineering educators.

Quoting [7]: “[...] *the way each of us teaches is directly dependent on who we are as a person when we teach,*” because “[...] *it is impossible to separate the professional self from the personal self*” (p. 17). Similarly, Imbernón [15] argues that training is essential, but it is not the only path to the development and constitution of a teacher, which corroborates [16], when pointing out that teachers’ knowledge is related to “[...] *the persons and [their] identity, with their life experience and professional history, with their relationships with students in the classroom and with other school actors in the school, etc.*” (p. 11).

Noticeably, none of these authors dismiss the need for specific training for teachers. Bazzo, Pereira, and Linsincen [17] assert that it is no longer possible for “[...] *the teaching process to become an undisguised affirmation of the reality of the object by the teacher and a passive memorization of technical information, preferably mathematized, by the students*” ([17], p. 125), since current demands demonstrate how traditional methods have become insufficient. In line with what is seen today in discussions held at ABENGE, we need to rethink the teaching model and traditional teaching methods in engineering.

3 METHODS AND DATA

To answer our research question, we conducted a qualitative and exploratory research, following a bibliographical design, supported by a literature review of classical authors and experts in the field, as well as interviews and their analyses. We emphasize that the main objective of understanding interviews as a research method is to understand the interviewees within their historical and social context. Based on the principles of [18] and [19], content analysis can extract different

types of ideas from the analyzed message: expression, relationships, evaluation, enunciation, and thematic categories.

As methodological indicators of the research, we adopted the design described in [20], which proposes three major dimensions for investigation, namely, “Views of the relationship with practice,” “Views on students,” and “Views on training relationships.” Thus, we analyze the following categories:

- Initial motivation that led engineers to enter the teaching profession/career.
- Initial educational trajectories and if pedagogical training was mandatory.
- Whether or not such training was necessary.
- Difficulties faced and opportunities envisioned in teaching.
- Self-recognition of “being a teacher,” that is, whether these professionals consider themselves teachers or not.

In 2010, research developed as part of a doctoral program at the Federal University of Paraná (UFPR) sought to identify “[...] *how engineers, given their educational and work history, have constituted themselves as engineering professors*” [1]. 10 professors at an academic university and 10 professors at a corporate university, all from the field of electrical engineering, were interviewed in that research.

In 2015, the same research was conducted with 14 faculty members from the Faculty of Engineering of the University of Porto (FEUP), Portugal, based on the same research premise. In 2019 and 2020, another 10 faculty members from the Higher Institute of Engineering of the Polytechnic of Porto (ISEP), Portugal, were interviewed.

To ensure greater consistency in the data from this study, we considered the characteristics of professors working only at academic universities, as the corporate university previously involved presents very different characteristics. Therefore, we present below the characteristics of the teachers/professors interviewed in Brazil and Portugal at different points in the study (refer to Tables 1, 2, and 3).

Table 1. Characterization of teachers interviewed in Brazil

Interviewee	Age	Service	Teaching Experience			Education/Qualification				
	Years	Years	Lab Tutor	VET	Higher Education	Scheme 1	Scheme 2	Specialization in Teaching Methodologies	MSc	PhD
1	40	12	X	X	X	X	X	X	X	X
2	66	19		X			X			
3	46	10		X	X	X		X	X	X
4	52	15		X	X	X	X	X	X	X
5	43	10		X		X		X	X	
6	38	7	X	X		X				
7	40	7	X		X					
8	62	20	X	X	X	X	X		X	X
9	67	22		X	X	X	X		X	
10	65	25	X	X	X	X	X	X	X	X

Source: Author’s own, adapted from [6].

Table 2. Characterization of the professors interviewed at FEUP, Portugal

Interviewee	Age	Service	Previous Experience		Pedagogical Training	
	Years	Years	Yes	Where	Yes	What
1	54	30			X	Varied, plus project @ FEUP**
2	60	35			X	Varied
3	52	16			X	Project @ FEUP
4	57	20	X	Informatics company (4y)		
5	53	30				
6	63	42			X	Occasional seminars
7	49	24			X	Varied
8	38	7	X	Energy distribution company (2y)		
9	43	18			X	Project @ FEUP plus IGIP**
10	51	28	X	Initially, alongside university, in a metalworking firm (1y)	X	Varied
11	61	40	X	Engineering firm (1y)	X	Some
12	65	43			X	Few
13	56	34	X	Industry (6m)		
14	66	44			X	Few

Sources: Author's own, adapted from [2]. ** IGIP – International Society for Engineering Education – Training delivered on-site at FEUP.

Table 3. Characterization of the professors interviewed at ISEP, Portugal

Interviewee	Age	Service	Previous Experience		Pedagogical Training	
	Years	Years	Yes	Where	Yes	What
1	49	22	X	Quality Consulting	X	Occasional courses, lectures, workshops
2	51	25			X	Training course offered by ISEP
3	51	17	X	Non-Engineering area	X	Occasional training
4	47	24			X	Short courses
5	52	27	X	Engineering Firms	X	Technology training
6	53	30	X	Industry	X	Occasional training
7	45	19	X	Electrical Installation Company	X	Training course
8	54	26	X	Designer		
9	50	21			X	Pedagogical development program
10	53	30				

Source: Author's own, based on the characterization table published in [2].

The discussion of Brazilian and Portuguese faculty (at FEUP) has already been presented in [2], so this article focuses on faculty at ISEP. Overall, the characteristics of those interviewed in 2019 and 2020 are as follows: regarding gender, four are women and six are men; regarding their work prior to ISEP, six faculty members have experience in engineering beyond teaching; three began their professional careers as faculty, one as a tutor, and one began his career as a researcher at a research center. Prior experience in engineering appears as a characteristic of the interviewed group, as it did for those interviewed at FEUP. All have a master's degree in engineering, and nine have a PhD in the field. Regarding pedagogical training, nine have taken sporadic and ad hoc courses on some methodological aspects. Out of these nine, two completed a 3-month training course. These data are also comparable to the group interviewed at the FEUP, which might indicate that the provision of training at both institutions occurred and provided opportunities for some learning and discussion on educational topics, although it no longer occurs as frequently (according to reports in the interviews).

Libâneo [21] reminds us that schools are privileged learning spaces for teachers, not just for students, since it is in this space, in daily practice, that these professionals make decisions about the work to be developed. Collectively or individually, teachers learn by acting and participating in educational actions developed by school management, sharing difficulties and strategies, and developing an understanding of the context in which they find themselves.

Therefore, one does not learn to be a teacher solely as a student, and this is clearly reflected in the interviewees' statements. Professional experience, while often successful, would certainly be better if accompanied by solid pedagogical training. Interviewee 2's statement, "*Perhaps it came late,*" highlights the lack of this training and the teacher's awareness of how much it could have helped him, perhaps avoiding some setbacks.

The differentiation between beginner and experienced teachers (with more than ten years of experience) did not appear among the teachers interviewed at ISEP, however, it is worth remembering that training needs are different; therefore, the teachers interviewed have already experienced the beginning of their careers, where they report having faced the greatest difficulties.

These teachers have already achieved intellectual, academic, and educational process management maturity, allowing them to develop their pedagogical actions with the confidence acquired through experience in the classroom and in other spaces within the institution.

The shift from merely transmitting information to teaching is evident in these teachers' work, especially since the technological resources currently available to students make mere transmission unnecessary. Teachers are responsible for mediating, articulating, contextualizing, and deepening the scientific concepts necessary for student development. This is another area that teachers point to as problematic: student complacency and low interest in further study.

Clearly, this attitude can be attributed to the social context of devaluation of knowledge and science due to current social, historical, and cultural issues. This requires teachers to be able to understand and interpret this reality so they can seek possible alternatives that provide students with a solid education.

To achieve this, it is not enough to simply have training in engineering; it is necessary to be aware of the broader social context of science and technology development, since teaching involves much more than simply following programs and syllabi.

Likewise, it is necessary to have a greater understanding of the rapid technological changes we are subjected to and to recognize that individuals develop different

learning processes, which implies the planning of different teaching methodologies, techniques, and resources.

As in any profession, being a good engineer does not imply being a good teacher. Therefore, knowledge of the specific field of engineering alone does not guarantee good teaching performance, as interviewees attest. After all, teaching is not a prescription-only activity; it is a dynamic activity that deals with people and processes that often do not repeat themselves, so it requires constant attention and study.

Some training programs offered to bachelors and technologists generally indicate the need to understand aspects directly linked to classroom teaching, plus management aspects that involve planning and broader participation. Thus, from a general overview of education in the country to the details of inclusive pedagogical actions, teacher training involves understanding what course planning is and its relationship to the lesson plan; the context of teaching in technical and higher education, each level and modality of education with its particularities; the various dimensions of classroom teaching; the link between teaching, research, outreach, and innovation; technological resources, such as gamification; and content production, increasingly necessary and frequently cited in interviews, as teachers state that the available literature in the field often does not meet the course syllabi, requiring teachers to produce their own teaching materials. In addition to all these topics, another concern raised by the interviewees concerns assessment instruments and strategies.

This entire context implies the need for teacher training that encompasses, in addition to technical, scientific, and area-specific knowledge, pedagogical knowledge, which draws on many areas of knowledge, such as psychology, history, sociology, and linguistics, among others, which contribute to the teacher's understanding of the broader social context in which he or she is inserted.

4 RESULTS AND DISCUSSION

Regarding the categories listed—Initial Motivation, Initial Training Paths, Need for Training, Difficulties Faced and Possibilities, and Self-Recognition of “Being a Teacher”—the initial motivation for choosing teaching shows that everyone made this choice consciously, stating that they decided to become teachers because (1) they enjoyed it, e.g., *“I’ve always enjoyed teaching”* (Interviewee 3); (2) they were invited; or even (3) it was their first job opportunity. Other justifications for their choice include a passion for research, the gratification of their initial tutoring experience, and the possibility of a more flexible work schedule, even though in many situations (such as during the pandemic), the work schedule is more intense. This satisfaction is evident in statements such as, e.g., *“It started as a discovery”* (Interviewee 5) and *“Essentially, it was the first job opportunity that came up.” This opportunity arose, and I decided to try it, and in the meantime, I liked it and continued”* (Interviewee 4).

As all interviewees have degrees in engineering and only one stated that he had never taken a pedagogical training course, it is worth highlighting that these teachers learned to be teachers in their daily practice, evidenced in the following statements: *“Basically, most of us were self-taught”* (Interviewee 2) and *“I would say that we are neither prepared nor trained to teach. It’s always a very autonomous process. We learn from our own mistakes. There’s no validation mechanism, so to speak; we evolve on our own initiative based on the feedback we receive, essentially, from students, so it’s a learning process. If there had been some kind of support, or even some institutional obligation, in terms of pedagogical preparation for teachers, I think that it could have been something that would have helped us in the process”* (Interviewee 4).

Interviewee 4's statement demonstrates an awareness of the need for pedagogical training, as eight interviewees highlighted this need, noting existing problems and the connection with the reality they face in everyday life. Still within this perspective, another teacher stated, *"Trying to develop something pedagogically that would allow us, perhaps even providing recommendations for tools, even assessment tools, that would allow us to better meet the students' needs"* (Interviewee 3).

Interviewee 4 details what he considers to be important: *"These training sessions basically force us to become more aware of factors that we might sometimes consider unimportant. Something as simple as the teacher's voice placement and posture—aspects related to how we convey information to students. We can't dismiss these as unimportant, but some of this information helps us reflect on whether we're adopting the most appropriate posture when conveying information."*

However, despite recognizing the importance of pedagogical training, since *"knowledge doesn't take up space"* (Interviewee 7), teachers who don't miss it stated, *"I would say I don't miss it, because those difficulties have already been overcome. Which doesn't mean that if I were to participate in such an activity, I wouldn't learn things I don't know. That's why I don't miss it, because I don't know what it is."* (Interviewee 1). They also don't miss it, expressing that perhaps the time for this training has passed, as indicated by one of the interviewees who stated, *"I don't miss it anymore"* (Interviewee 3).

This is perhaps because the reality imposed on these teachers has led them to build their work based on their professional experiences in the field of engineering, because *"[...] pedagogical life only exists if we have practice"* (Interviewee 8).

When reporting the difficulties of teaching, the interviewees stated that the greatest challenges are the excessive number of students and activities; the lack of preparation—*"We're not prepared to teach"* (Interviewee 4); the lack of competitive exams and hiring opportunities; and the students' level of knowledge and interest—*"It seems to me that they go just to take a degree, not because they want to"* (Interviewee 10); and also the lack of encouragement and support.

When reporting the possibilities they envision in their profession, the joy in their eyes and smiles demonstrated the satisfaction they find in identifying the support they receive in developing their professional careers, monitoring student development, providing autonomy and intellectual stimulation, and fostering research. One of the quotes reveals both what the teacher likes and dislikes most about their profession: *"I like teaching, but without assessment, teaching is horrible. I don't like exams; I don't like them. I like teaching, but I don't like assessment; assessment is unpleasant."* (Interviewee 7) The following quotes clearly demonstrate the satisfaction felt and expressed by the interviewees: *"I really enjoy teaching, and even now with this position, today is one of those days; I have a class; it's the best time of the week when I'm in the classroom."* (Interviewee 1); *"I couldn't see myself doing anything else."* (Interviewee 7); *"Even though it wasn't what I wanted to do when I was taking my degree, after the experience of tutoring, I really enjoyed it."* (Interviewee 10); and *"I'm here by option, because I had other opportunities to work in the industry and chose to teach."* (Interviewee 3).

This shows these teachers feel fulfilled, even with the difficulties encountered in teaching, as we can see in Interviewee 4's statement about feeling professionally fulfilled: *"Yes, at that time, it was about taking advantage of that opportunity. And it's worth mentioning that you also learned to enjoy what you do, right? Being a teacher was never a childhood dream; it was an opportunity that arose, and I seized it. It went well; I felt good. I progressed in the sense that I completed the training, which was the natural follow-up of a master's and a doctorate. It's an attractive type of activity because it inherently affords us a certain autonomy that we don't have in other contexts. It's a positive*

aspect, and I enjoy it. We live in a context where, every year, we have the same level of students in terms of age; it feels like we've stopped in time a bit. Every year, new students join. We get older, but the students don't, and that's always challenging." (Interviewee 4)

5 CONCLUSION AND FUTURE WORK

As a general conclusion, both Brazilian and Portuguese teachers face the same challenges, with little variation in the emphasis placed on one or another specific aspect.

The shared passion for research and the professional satisfaction and fulfillment they experience are clear, even though they began their careers in different ways.

Research appears to be an essential factor in choosing a profession, and Brazilian teachers are very concerned about funding difficulties, while Portuguese teachers are concerned about the lack of new opening positions, which leads to an increased teaching workload due to the lack of new faculty. Consequently, time dedicated to research is also scarce.

Regarding the need for specific training for teaching, the interviewees emphasized that it would have been beneficial to have had more systematic support and pedagogical training, but they presented different options in terms of topics and delivery methods. Many believe it is no longer necessary, as they have already discovered "in practice" how to do it.

There is no doubt that ongoing and continuous training is a necessity for every professional. This means that, in addition to updating and improving skills, training is consolidated as one of the fundamental principles of the professionalization process, given that the daily routine and complexity of any professional practice require new knowledge adapted to the reality and contexts in which professionals operate.

At this point, it is necessary to delve deeper into the topic, identifying the teacher training initiatives proposed in the relevant legislation for the development of technical and higher education, based on an analysis of official documents and actions implemented by ABENGE and the Portuguese Society for Engineering Education (SPEE), published by ABENGE and the International Journal of Engineering Pedagogy (iJEP).

To achieve this goal, it is necessary to survey and analyze official training proposals in Brazil and Portugal, analyze the proposals contained in the *Report: Modernization of Higher Education* (2013), cited by the Directorate General of Higher Education of Portugal as a baseline document to be studied and implemented, and analyze these publications.

A possible compilation of publications on the topic is also appropriate to contribute to a greater systematization of studies. Another issue to be addressed concerns the challenges posed to teachers by the COVID-19 pandemic experienced in 2020 and 2021, which imposed different work on everyone in many aspects. Finally, and most important at the time this paper is being submitted, the widespread use of artificial intelligence (AI) tools, particularly those based on large language models (LLM), is presenting new challenges to the entire educational landscape, not only to those who are already taking a degree but also to those who are exposed to their availability at earlier ages. The technological shift pace is advancing so quickly that the 4-years' time lapse that separates the interviewees made at ISEP and the present time, now provides a totally different educational scenario. As such, it would be worth repeating the interviews while providing the interviewees with their previous answers and having them reflect upon this change.

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