Initial teacher training and technologies in Portuguese-speaking communities: uncovering the state of knowledge

Jacinta Lúcia Rizzi Marcom

Integrated Regional University of Alto Uruguai and Missões (URI). Frederico Westphalen, Rio Grande do Sul (RS), Brazil
a098550@uri.edu.br

Ana Paula Teixeira Porto

Integrated Regional University of Alto Uruguai and Missões (URI). Frederico Westphalen, Rio Grande do Sul, Brazil
anapaulateixeiraporto@gmail.com

Abstract: The aim of this article is to map the main academic contributions on initial teacher training and digital technologies in Portuguese-speaking countries, in order to meet the demands of a global society in constant evolution. The methodology used was a qualitative documentary research. The results show a disparity in the number of productions among the countries analyzed, unanimity on the need for initial teacher training focused on the use of Information and Communication Technologies (ICT), and the absence of specific publications on the subject in Portuguese-speaking countries.

Keywords: Initial teacher training; Digital technologies; Lusophony.

Formação inicial de professores e as tecnologias em comunidades de língua portuguesa: desvendando o estado do conhecimento

Resumo: Este artigo visa mapear as principais contribuições acadêmicas sobre a formação inicial de professores e as tecnologias digitais em países lusófonos, atendendo às demandas de uma sociedade global em constante evolução. A metodologia adotada foi uma pesquisa documental de natureza qualitativa. Os resultados revelam disparidade no número de produções entre os países analisados, unanimidade sobre a necessidade de formação inicial de professores voltada para o uso das Tecnologias de Informação e Comunicação (TIC) e à ausência de publicações específicas sobre o tema na lusofonia.

Palavras-chave: Formação inicial de professores; tecnologias digitais; lusofonia.

Formación inicial del profesorado y tecnologías en las comunidades lusófonas: desentrañar el estado del conocimiento

Resumen: Este artículo pretende identificar las principales contribuciones académicas sobre la formación inicial del profesorado y las tecnologías digitales en los países de lengua portuguesa, atendiendo a las demandas de una sociedad global en constante evolución. La metodología empleada fue la investigación documental cualitativa. Los resultados revelan disparidad en el número de producciones entre los países analizados, unanimidad sobre la necesidad de una formación inicial del profesorado centrada en el uso de las tecnologías de la información y la comunicación (TIC) y ausencia de publicaciones específicas sobre el tema en los países de lengua portuguesa.

Palabras clave: Formación inicial del profesorado; Tecnologías digitales; Lusofonía.

1 INTRODUCTION

Initial teacher education and its integration with digital technologies is emerging as a fundamental field of study in contemporary education, especially in the Portuguese-speaking countries that constitute the context of this study. These countries, which have Portuguese as their official language, include Brazil, Portugal, Guinea-Bissau, Angola, Cape Verde, Mozambique, East Timor, and São Tomé and Príncipe. Equatorial Guinea was excluded from this study because Portuguese is not an official language but a second language.

Meanwhile, this research aims to present the current state of knowledge of teacher education in these countries. Therefore, it seeks to identify the existence of studies that address initial teacher education and technologies within the community of Portuguese-speaking countries, highlighting the existence or not of relevant publications, gaps and weaknesses, different research approaches, trends, and academic contributions that the publications identified in the study demonstrate.

The theoretical basis of the discussion is supported by several authors, including Alcantara (2019), Andrade (2019), Banga (2023), D'Ávila (2019), Guedes (2020), Martins (2023), Peixoto (2020), Rocha (2021), Souza (2020), Soares (2019), Sperandio (2019), among others. Exploring the main themes, theoretical references, and conclusions of the collected studies, topics such as initial teacher training for the use of ICT, curricula of initial teacher training courses, public policies for the insertion of technologies, and pedagogical and technological innovation are addressed. These are therefore the axes of reflection of this article.

The central problem is to identify whether there are published records of master's theses and doctoral dissertations, published in the last six years (2018-2023), on initial teacher training and the use of digital technologies in Portuguese-speaking countries. This selection allows for a mapping of the main academic contributions in the field of initial teacher training, as well as the investigation of their correlations with digital technologies in Portuguese-speaking countries. To this end, a systematic literature review method is adopted, allowing for a comprehensive and critical analysis of relevant publications. The review follows rigorous stages of selection, analysis, and synthesis of the identified studies, using pre-defined criteria for inclusion and exclusion. The methodology includes searching academic databases and digital libraries, as well as analyzing theses and dissertations available in institutional repositories.

In short, this study aims not only to fill a gap in academic knowledge about initial teacher education and digital technologies in the Portuguese-speaking world from a comparative perspective, but also to provide a solid basis for future research and educational interventions that promote quality education in line with the demands of the 21st century.

2 METHODOLOGY

This study is configured as a systematic literature review, classified as a state of knowledge. According to Morosini, Kohls-Santos and Bittencourt (2021), this involves the identification, registration and categorization of scientific production in a given field over time, including journals, theses, dissertations, and books. Regarding the nature of the data, the methodology adopted in this study is qualitative, in line with the concept of Denzin and Lincoln (2006), which emphasizes an interpretive approach to phenomena in their natural contexts. The process includes fundamental steps: the preparation of the annotated, systematized, and categorized bibliography, culminating in the propositional bibliography, all carried out with scientific rigor.

In the methodological definition, it is essential to record the repositories used. The criteria for their selection vary due to the difficulty of finding them in operation and with the material available, especially in African countries. Flowchart 1 shows the selected repositories.

The research on the state of knowledge focuses on the analysis of master's dissertations and doctoral theses produced and published in the repositories of the aforementioned countries between 2018 and 2023. The descriptors chosen were aligned with the topic of the dissertation under study, including initial teacher education, initial teacher education in the Portuguese-speaking world, and initial teacher education and digital technologies (DICT). These terms were fundamental to guide the search, exploration, selection, systematization, categorization, and analysis of the data, playing a crucial role in the construction of the final text of the state of knowledge.

The study's time frame is justified by the significant transformations in the teacher training scenario, both in Brazil and in other Portuguese-speaking countries. During this period, significant changes were observed, especially with the integration of digital technologies in education, introducing new trends in school institutions, and initial teacher training.

It is important to emphasize that each country has its repositories, which vary significantly in terms of access to studies, search filters, and types of work, and there is no homogeneity in their composition. Therefore, during the search, we tried to keep the filters as uniform as possible to obtain

results that would provide an equitable view of the production of knowledge on the topic under study in all countries in the research area.

Few filters were applied to ensure the greatest possible fairness. In the repositories of the Coordination of Superior Level Staff Improvement (CAPEs), the following filters were applied "type of production" and "year". For the Open Access Scientific Repository of Portugal (RECAAP), "type of document", "resource" and "date" were used. In the Scientific Repository of the Community of Portuguese Language Countries (RCCPLP), "country", and "format" to select the type of document and "year of publication" were used as filters. In the Digital Repository of the Ministry of São Tomé and Príncipe, "category" and "archive" were used. In the "archive" option, the type of publication was selected, and in the "archive" option, the months of publication were selected.

Boolean operators were not used in the searches because African countries only allow searching by simple descriptors, which requires manual searching for publications relevant to the scope of the study. In particular, Guinea-Bissau has no repository infrastructure, while Mozambique has repositories in some higher education institutions, such as Eduardo Mondlane University, which was selected based on the recommendation of a professor interviewed for the research. Angola has the repository "Ciencia.ao", but its capacity to store and disseminate scientific publications is not fully developed due to its recent implementation. The Scientific Repository of the Community of Portuguese Language Countries (RCCPLP) served as a reference for Cape Verde, East Timor, Mozambique, Portugal, and Brazil, and only these countries presented available publications.

After these definitions, the annotated bibliography phase began, which consisted of organizing the corpus of analysis by skimming the abstracts available in the databases. In order to adequately address the complexity of the topic, all publications found that dealt with the topic were entered into a spreadsheet, including information such as year, author, title, keywords, and abstract. Due to the large number of theses and dissertations found, it was necessary to refine the research by applying inclusion and exclusion criteria to the publications.

For theses and dissertations to be included in the analysis, the descriptors used had to be present in the title of the publication. Thus, all studies that met this criterion were included, and those whose abstracts did not address the proposed topic were discarded.

The next step was the systematized bibliography, which consists of the list of theses and dissertations based on the following items: number, year, author, level, objective, methodology, and results.

The third step was the categorized bibliography, which, according to Morosini, Kohls-Santos and Bittencourt (2021), consists of regrouping the selected material in thematic blocks that represent the categories and subsequent analysis. To proceed with the analysis of the collected material, content analysis was chosen. This approach provided a methodological structure that guided the search for answers to the research problem, facilitating the identification of patterns and the interpretation of data. This methodology, according to Bardin (2011), passes through three phases: pre-analysis, exploration of the material, and treatment of the results - inference and interpretation.

The first stage, called pre-analysis, involved a cursory reading of the titles and abstracts of the 67 papers identified. This phase was the first contact with the dissertations and theses submitted for analysis. In the second phase, the material was examined to categorize the data found. In other words, the highly recurring themes were "cut from the text into comparable units of categorization for thematic analysis and coding methods to record the data" (Bardin, 2011, p. 100, translated by us). The following categories were included in this study: general aspects, most discussed topics, most used references, most cited authors, methodology used, and conclusions.

After collecting the data, the final stage of the study consisted of processing the collected information, including inference and interpretation. Using statistical techniques, several variables and the relationships between them were explored. Based on the results obtained, we sought to highlight the defined information, aiming to highlight relevant trends and patterns. This comprehensive analysis allowed for a deeper understanding of the phenomenon studied.

In conclusion, it is important to emphasize that the search in the repositories was carried out between January 15, 2024, and March 15, 2024, followed by the analysis of the data obtained. It is also important to consider the possible variations that occurred during the research process. During the data search process, several difficulties were identified, such as: the scope of the study, repositories with different filters, the impossibility of using Boolean operators, and the absence of a repository in the country, among others. However, it is important to note that the data found and subsequently analyzed demonstrate the validity and robustness of the research and contribute to a more comprehensive understanding of the scenario analyzed.

2 ANALYSIS OF RESULTS

2.1 Analysis of the General Panorama of Repositories and Number of Dissertations and Theses Found

The first data presented provides an overview of the dissertations and theses on teacher education developed in the Portuguese-speaking world. In general terms, the following flowchart shows the number of dissertations and theses identified in the repositories belonging to Portuguese-speaking countries in which it was possible to carry out the respective searches. It is clear that, due to the lack of general repositories for African countries, databases were used in which publications could be searched, such as the databases of local higher education institutions.

Flowchart 1 - Repositories and publications of dissertations and theses by descriptor between 2018 and 2023

Country	Dissertation and theses repository	Initial teacher training	Initial teacher training and digital technologies/ICT	Initial teacher training in the Portuguese-speaking world
Brazil	CAPEs	Total number of papers: 3050, of which 2290 are dissertations and 760 are theses	Total number of papers: 158, including 131 dissertations and 27 theses	Total number of works: 2, including 2 dissertations
Brazil	RCCPLP	Total number of papers: 2377, of which 1628 are dissertations and 729 are theses	0	0
Portugal	RECAAP	Total number of papers: 406, of which 293 are dissertations and 113 are theses	0	0
Portugal	RCCPLP	0	0	0
Mozambique	RUEM	Total number of works: 2, including 2 dissertations	0	0
Mozambique	RCCPLP	Total number of works: 2, including 2 theses	0	0
Angola	Science.ao	0	0	0
Cape Verde	Cape Verde Knowledge Portal	0	0	0
Cape Verde	Scientific Repository of the University of Mindelo	0	0	0
Cape Verde	RCCPLP	Total number of works: 5, including 5 dissertations	0	0
Sao Tome and Principe	Digital Repository of the Ministry of Saint Joseph and Prince	Total number of works: 8, including 2 dissertations and 6 theses	0	0
Guinea Bissau	There is no repository with publications in the country	-	-	-
East Timor	RCCPLP	0	0	0

Source: Prepared by the authors (2024) based on research into the state of knowledge.

Analyzing the flowchart, it is clear that Brazilian repositories have the largest number of publications on the topic, followed by Portuguese repositories. The other countries do not have enough data for the proposed analysis. It is important to note that Cape Verde, East Timor, and Mozambique are also mentioned as having productions in the Scientific Repository of the Community of Portuguese Language Countries (RCCPLP). However, in these countries, no theses and dissertations dealt with the proposed descriptors in the defined period. It is worth mentioning that in 2012 and 2013, Cape Verde published three publications on the topic in the aforementioned repository.

The first data considered are the publications related to the descriptor "initial teacher education". In Brazil, CAPES contains 2,290 dissertations and 760 theses, while RCCPLP contains 1,628 dissertations and 749 theses. In Portugal, the same articles cited in RCCPLP also appear in RECAAP and were therefore not included in the analysis. RECAAP includes 293 dissertations and 113 theses.

Following this analysis, when we examine the publications of dissertations and theses, the data show that Brazil has a significantly higher production in all the repositories studied, compared to other countries. This difference can be attributed to the intense academic activity and greater investment in research in Brazil, especially in teacher training and digital technologies. Another relevant factor is the number of postgraduate programs (master's and doctoral) offered in Brazil, as well as government incentives. According to the Sucupira platform (Brasil, 2024), the country has 4,643 postgraduate programs, of which 2,666 are doctoral programs. In 2022, these programs will include 197,502 master's students and 157,750 doctoral students.

These figures indicate that the topic is the subject of numerous discussions and academic research, reflecting its importance today, given that several challenges are emerging and need to be overcome. Through this data, it was found that, in Brazil, for example, approximately 70% of publications focus on understanding the professional development processes of teachers and the curricula of these training courses. Around 20% of the research studies address teacher training in general, encompassing areas, disciplines, and other specific teaching contexts. A smaller percentage focuses on digital technologies as a central theme of initial teacher training.

However, when examining the productions found in the repositories of African countries, it is noted that in the RCCPLP there are records of two theses related to research in Mozambique and five dissertations in Cape Verde. In other repositories, some dissertations and theses can be found on the subject, as is the case of the repository of the Eduardo Mondlane University of Mozambique, which has two theses.

From this perspective, in general, these countries have a limited number of publications on the subject during the period indicated by the research. This is attributed to the scarcity of institutions offering postgraduate courses, combined with the lack of public policies and the financial constraints faced by academics seeking these courses offered outside their countries. In Guinea-Bissau, there are no master's or doctoral courses offered to students. The available master's courses are associated with the University of Lisbon. In addition, no legislation regulates the offering of master's degrees in the country.

African students seeking higher education often choose to study abroad, which further exacerbates the lack of local research and studies on teacher education, signaling the correlation between economic, social, and scientific development. Therefore, prioritizing teacher training, including the development of digital skills for pedagogy, is essential to address current educational challenges and ensure a more promising future for future generations on the African continent. However, this depends on significant financial support for institutions and their academic community.

The research focused on the descriptor "initial teacher education and digital technologies/ICT" reveals, according to the data presented in Flowchart 1, a significant number of publications, with Brazil leading in quantity, followed by Portugal. The other African countries present a smaller number of works focused on this area, reflecting the foundations of a nation still developing after long of struggle for its political, cultural, and economic independence.

This may also be related to the lack of investment in the development of digital skills, since if teacher training still requires investment in public programs and policies, it is likely that advances in digital training are also needed, in line with the development of the nations themselves. It is worth mentioning that these data show the scarcity of resources allocated to the integration of technologies in teacher training. Innovation and digital information technology must become essential components of various public policies.

The text "Africa, Towards Digitalization", published in 2021 by the "United Nations" website, highlights the importance of innovation as a driver of global development. It emphasizes that the world is driven by innovation, and unless African governments recognize and appropriate the potential benefits of research, development, and innovation, the global divide will continue to grow. The problem is that while innovation is discussed, this element is not included in national planning and budgeting.

When the search was extended to include "Lusophony", only two publications were identified in the repositories searched. However, both publications have limitations and were not included in the

corpus of analysis, as one publication is a dissertation published in 2012, outside the defined temporality. The other publication, dated 2020, does not directly address the topic in focus, suggesting a gap in research on the topic within the lusophone context and highlighting the urgent need for more research in this area, especially considering the growing role of digital technologies in initial teacher education in all Lusophone countries.

In addition to the data already mentioned, it is important to add that most of the publications found are dissertations, while these are fewer in number. Few theses deal specifically with the topic and even fewer meet the selection criteria for a more detailed analysis. In terms of temporality, the years 2019 and 2020 present the largest number of publications on initial teacher education and technologies. Of the 73 studies considered for a more detailed analysis, 46 were published in 2019 and 2020, i.e. 60% of the categorized sample.

These data suggest some important interpretations. First, the predominance of dissertations over theses may indicate a tendency among graduate students to prioritize more specific and focused studies during their academic training. In addition, the increase in publications in 2019 and 2020 may be partly due to the impact of the Covid-19 pandemic and rapid technological development.

During the pandemic, education had to quickly adapt to the restrictions imposed by social distancing, leading to a greater need for understanding and using digital technologies in the educational context. This may have motivated an increase in research and discussion on the integration of technology in teacher education. Therefore, the data reflect not only academic trends but also the demands and challenges faced by the education sector in the face of global changes that drive the thematic focus of studies.

In conclusion, from all the data presented, 59 dissertations and 14 theses from the repositories of Brazil and Portugal were selected for more detailed analysis. In addition, some publications were found in repositories of countries where students from the African continent study and deposit their publications. It is useful to look for some studies to understand what is discussed by the small number of students who seek postgraduate studies on the subject outside their countries.

The need for initiatives to promote and encourage the production of knowledge in this area within the Portuguese-speaking world is highlighted, aiming to strengthen and enrich the educational systems of these countries through studies that can produce scientific knowledge capable of helping to improve initial teacher training and the effective use of digital technologies.
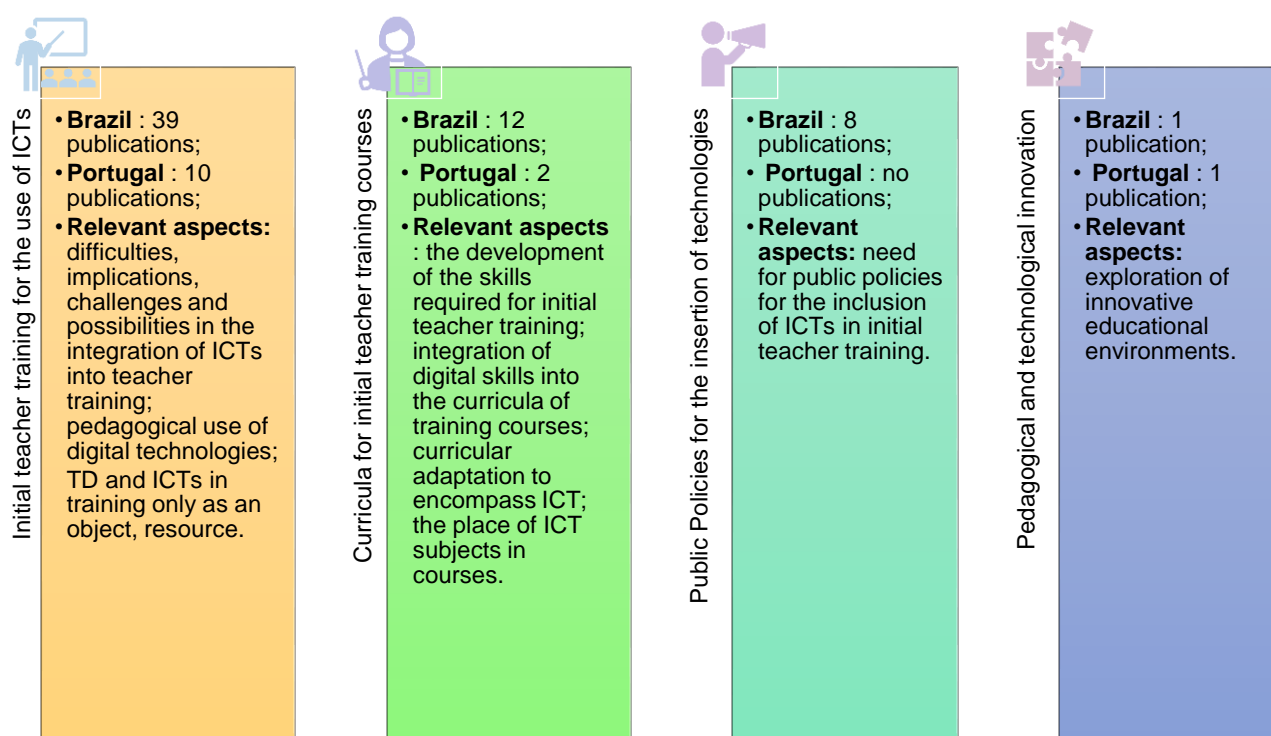
2.2 Initial Teacher Training and Digital Technologies in Lusophony as an Object of Study in Dissertations and Theses - What Does the Research Reveal?

2.2.1 Most discussed topics

When identifying the most discussed topics in the repositories of Brazil and Portugal, the data related to the analyzed publications are presented in the following flowchart.

Flowchart 2 - Data relating to publications found

Initial teacher training for the use of ICTs
- **Brazil**: 39 publications;
- **Portugal**: 10 publications;
- **Relevant aspects:** difficulties, implications, challenges and possibilities in the integration of ICTs into teacher training; pedagogical use of digital technologies; TD and ICTs in training only as an object, resource.

Curricula for initial teacher training courses
- **Brazil**: 12 publications;
- **Portugal**: 2 publications;
- **Relevant aspects**: the development of the skills required for initial teacher training; integration of digital skills into the curricula of training courses; curricular adaptation to encompass ICT; the place of ICT subjects in courses.

Public Policies for the insertion of technologies
- **Brazil**: 8 publications;
- **Portugal**: no publications;
- **Relevant aspects:** need for public policies for the inclusion of ICTs in initial teacher training.

Pedagogical and technological innovation
- **Brazil**: 1 publication;
- **Portugal**: 1 publication;
- **Relevant aspects:** exploration of innovative educational environments.

Source: Prepared by the authors (2024) based on research into the state of knowledge.

It can be seen that most studies emphasize teacher training and the use of technology and recognize their importance. In second place are studies that address the curricula of these initial training courses. In Brazil, some studies advance and record the importance of thinking about public policies on the topic, and two publications raised the issue of technological and pedagogical innovation. These topics are extremely relevant and deserve attention, especially in the context of cyberculture and the links between technologies and learning.

Discussions of the studies reveal two different realities. While there is unanimity in the results found in Brazil and Portugal, pointing to the technological evolution and stating that digital technologies are already part of most people's lives and there is no going back, on the other hand, there are studies such as that of Pedro Agostinho Tomba Banga, published in 2023, carried out in the context of São Tomé and Príncipe, which highlights the situation of African countries about this issue. For the author, several factors and problems can condition the effective use of ICT in the educational context, both in São Tomé and Príncipe (STP) and many African countries.

After analyzing the themes raised by the studies, it is possible to state that, of the 73 publications analyzed, the majority emphasize the need for initial teacher training, essentially in the century in which we live, added to the need for practical experience in the use of ICT and Digital Technologies (DT) in the aforementioned training courses. Some argue that digital technology is present in the courses, but the evolution of the published studies shows that the way it is used does not always fulfill its role.

The results of the study conducted by D'ávila (2019) show that most of the courses have some discipline related to ICT, with a workload that varies between 30 and 240 hours. However, they generally deal with content related to basic computing and not with the teaching-learning process, according to the research. The data collected suggests that teachers have some familiarity with digital technologies and recognize their advantages in the pedagogical context.

Along the same lines, Souza's (2020) publication supports the theme by concluding that teachers understand technologies as technological support for teaching and show interest in seeking training to use them. According to the author, this result highlights the importance of the current debate on the integration of ICT in professional training practices. Santos (2019) adds that it is not enough to have the resources, but it is also necessary to have teachers and curricula prepared for activities that use technologies. And Bezerra (2022) adds that the use of ICT requires a paradigm shift in initial teacher training.

Marfim (2019) contributes to the discussion, noting in his study that the demands of the university for the use of ICTs are based on an instrumental conception. This is because the relationship between ICTs and education ends up being limited to the discussion of technological devices as didactic-methodological tools in the exercise of teaching.

On the other hand, the study by Peixoto (2020) notes that most teachers in the institution studied did not receive initial training that prepared them to work in digital culture and pedagogical mediation with DICTs, making it necessary to develop a continuous training process that fills this

gap. Andrade (2019) reinforces that initial training does not direct future teachers toward the assertive use of these technologies with a view to promoting new classroom configurations. According to the author, the study's findings reinforce the understanding of the need to review initial teacher training proposals to consolidate the inclusion of TDICs in pedagogical practices.

Furthermore, the study by Martins (2023) shows that the use of these technologies is still predominantly associated with exposure practices, both in the school environment and in initial teacher training. This highlights the need for a paradigm shift in the way technologies are approached and incorporated into teacher training courses. In the same vein, Alcantara (2019) highlights in her research that although schools have a basic infrastructure for digital information and communication technologies (DICTs), they are little used by teachers. The researcher argues that investing in teacher training in DICTs can significantly contribute to improving the teaching-learning process in schools, with a focus on the student.

An additional contribution is made by Meredyk's (2019) study, which emphasizes the need to transform the knowledge required for initial teacher education, as described by Tardif (2002), through the integration of digital technologies. The author identifies this knowledge as disciplinary technological knowledge, curricular technological knowledge, professional training technological knowledge, and experiential technological knowledge. It is noteworthy that this approach suggests a reassessment of traditional knowledge in light of contemporary demands, emphasizing the importance of teacher preparation that incorporates digital skills for the current educational context.

In the context of public policy, the dissertations of Soares (2019) and Bezzerra (2022) show that there are laws and that ICTs have a place in them. The first study points out that CNE/CP Resolution No. 2/2015 assumes the role of training teachers for quality and contemporary education, and the second that ICTs have a place in the undergraduate courses studied, generally described in the legal and regulatory references, in the graduate profile, in the skills to be developed by the graduate and in the curricular matrix. In addition, Yong's thesis (2021) addresses digital inclusion policies as a fundamental condition for the effective use of digital technologies in teaching contexts.

Sperandio's (2019) study also confirms that the documents analyzed address, albeit superficially, the use of ICT in teacher education. However, the author notes that, according to the teachers surveyed, this approach is almost exclusively limited to the curricula of the subjects they teach. Guedes (2020) states that when analyzing the project of the course studied, it is clear that there are gaps in the use of these tools in the subjects covered in the curriculum.

The curriculum of training courses is another topic addressed by several dissertations. For example, the dissertation of Bezzerra (2022) examines the curricular matrices of courses. Although these matrices include ICT in the curricular components, the study shows that the space in the Pedagogical Projects of the Courses (PPC) is still very limited. The study indicates that the number of compulsory subjects that deal with ICTs in the classroom as a pedagogical tool is still limited. Riedner's (2018) research adds that although in most pedagogical projects there are subjects that deal with the use of digital technologies and teachers use different digital resources in their pedagogical practices, the level of integration still does not allow this use to go beyond the instrumental.

Riedner (2018) raises the issue of innovation, highlighting that the few experiences identified show that teachers' technological capital is a predominant factor for changes in pedagogical practices. However, these isolated experiences do not yet have the potential for dissemination and adherence by the teaching group due to the lack of a favorable institutional climate for innovation. Possibly, this lack of a favorable environment results from the absence of an institutional project to promote the use of digital technologies in pedagogical practice or an institutional teacher training policy that sets objectives to improve teacher training.

Many publications highlight studies based on legislation and point out the importance of including digital skills in the curricula of initial teacher training courses. In the thesis of Peixoto (2020), it is highlighted that the BNC-Training provides professional teaching skills that the student must develop. These skills are integrated, interdependent, and non-hierarchical. These skills are composed of three dimensions: knowledge, practice, and professional commitment.

In Portugal, studies confirm the trends already presented. In his thesis, Moreira (2020) concludes that the training offered in the course studied is insufficient to work adequately with digital media in the context of early childhood education. This is due to the lack of specific subjects in the initial training courses or subjects that prepare them, or, when they exist, the training is essentially limited to theoretical subjects in Brazil and instrumental approaches (use of applications or programs) in Portugal.

The author also notes that the data show that future teachers report not having had significant experience in the educational use of ICT during the course, not being able to apply adequately what they learned during the internship, or if they did, it was in a very limited way. Along the same lines, we find the statements of Ramos Fonseca (2020), who points out the difficulty that future teachers have in going through the experience of observing and experimenting with examples of innovative use of ICT.

A study by Assis (2018) also addresses another relevant issue, highlighting both the advantages and limitations of using technology. The author points out that the advantages include speed, contextual diversification and increased motivation. On the other hand, limitations include insecurity, difficulty of access and lack of pedagogical training. In general, teachers feel the need for training covering aspects of personal, technical and pedagogical mastery.

It is important to emphasize that although texts dealing with initial teacher training and its links with digital technologies were not found in the repositories of African countries, they were selected, taking into account authorship by academics from these countries and hosting in repositories in other countries.

Flowchart 3 – Texts found in other repositories

Country	Year	Author	Title
Sao Tome and Principe	2023	Pedro Augustine Kills Banga	Information and communication technologies in the education system in São Tomé and Príncipe
Guinea Bissau	2023	Mamadu is gone Djaló	Initial teacher training in Guinea-Bissau: Curriculum, program and pedagogical strategies in initial training: A comparative study (Cacheu, Bafatá and Buba)
Mozambique	2022	Education for All Movement, Eduardo Mondlane University	Assessment of teachers' skills in the use of information and communication technologies
Cape Verde	2021	Graciete Santos Rocha	Educational use of digital technologies by primary and secondary school teachers in Cape Verde
Angola	2020	Isaac Saquengue Bonga	The role of information and communication technologies in teacher training: what challenges in Angola?
East Timor		The research carried out in the country's repositories did not find any publications in the period proposed for the investigation. The studies found are dated from the years 2012 and 2013.	

Source: Prepared by the authors (2024) based on research into the state of knowledge.

Publications found in repositories from other countries, but reflecting the reality of African countries, agree that there is still a lack of action to integrate technologies into initial teacher education. Although some progress has been made, such as discussions on the topic, implementation of policies, and recognition by teachers of the need for initial training with technologies, these efforts

are still insufficient to ensure the full inclusion of ICTs in the curricula of training courses for future teachers.

Rocha (2021) describes that in Cape Verde, the integration of digital technologies is an issue that deserves more attention from government authorities and the Ministry of Education. It is necessary to find solutions to meet the training needs of teachers and to equip classrooms with technological equipment, thus encouraging teachers to use digital technologies in education with their students.

Along the same lines, the study by Banga (2023) shows that São Tomé and Príncipe must take measures to overcome these problems/difficulties through the creation of a national strategic plan for the integration and effective use of ICT in the education system, which may include the improvement of technological infrastructures (technological equipment, Internet quality, and electricity), as well as the training/qualification of teachers.

The other texts also discuss the difficulties and the agreement that the countries face. Some young people even regularly use technologies for interactive purposes, especially through social networks. However, the use of these technologies in an educational context is very limited or non-existent.

The Education for All Movement (2022) discusses the reality in Mozambique. Members of the movement's research group, including António Cipriano Parafino Gonçalves, Manuel Valente Mangue, and Nilsa Cherinda, among others, report that approximately 15.7% of the teachers who participated in the study do not have any means of accessing or using ICTs, including computers, understood as the main tool for facilitating learning. For the majority, 43.9%, access is done from home. Most teachers who claim not to have a computer are in primary schools, representing approximately 23.7%. For 94.4% of primary school teachers, the school where they teach does not have a computer room or lab.

Another important fact highlighted by the researchers is that, in Mozambique, there was no formal training for teachers using ICT in the classroom, much less related to the use of ICT in the classroom. The experience or use during the academic training and the imposition in the context of Covid-19 increased some level of proficiency of the teachers.

2.2.2 Theoretical and methodological aspects of research

An examination of the methodological aspects present in the Brazilian, Portuguese and African studies selected for more in-depth analysis revealed the prevalence of four different approaches: 1)

documentary research; 2) interview and/or questionnaire; 3) case study; 4) participatory research. The following flowchart illustrates this relationship.

Flowchart 4 – Types of research found in publications

Search Type	Brazil	Portugal	African Countries
Documentary Research (legislation, course project, bibliographic review)	17	1	0
Interview and/or Questionnaire	29	9	3
Case Study	10	3	1
Participatory Research	4	0	0

Source: Prepared by the authors based on data from Portuguese-speaking countries (2024).

First, there is a strong emphasis on interviews and questionnaires as data collection methods, allowing researchers to obtain valuable data in the context of educators and professionals involved in initial teacher education and digital technologies. There are 41 publications that use this method as the main data collection method. In the studies, the target group for the interviews and/or questionnaires are usually students in the training courses at the universities studied or teacher trainers. This is an important method of data collection.

In second place, with 18 publications, is documentary research, which stands out as a fundamental approach that provides a solid base of theoretical and practical knowledge to support studies on teacher education and educational technologies. The study of legislation, course projects, and curriculum matrices emerges as an area of growing interest, providing an opportunity for detailed analysis of training practices implemented in educational institutions, as well as their effectiveness and impact.

Case studies are also widely used. This methodology seeks to understand data by analyzing situations in which future teachers are placed, allowing for a detailed and contextualized investigation.

Training activities also stand out as an important aspect, demonstrating the interest in understanding and improving the strategies and approaches used in training teachers to integrate digital technologies into their pedagogical practice. This trend reflects the diversity of approaches and methodologies used by researchers to explore and understand the challenges and opportunities associated with teacher training and the use of digital technologies in contemporary education.

Finally, in smaller numbers, some studies used participatory research. This approach seeks to involve the community in the analysis of its reality, developing from the interaction between researchers and members of the situations investigated.

3 WEAVING SOME FINAL CONSIDERATIONS

The results of the analysis carried out in this study provide a comprehensive overview of the academic production related to the topic of initial teacher education in the Portuguese-speaking world. First, it was found that a significant part of the publications emphasize the urgency of changes in this training. However, it is important to highlight that many of these publications do not provide specific guidelines or clear recommendations on what changes need to be implemented. This suggests a gap in the academic literature and indicates the need for more in-depth and targeted research to identify the specific areas that require intervention and development.

Another trend in the reviewed papers is the recurring concern with the intersection of digital technology, education, and teacher training, but this is not evident in African research. Most studies address this issue in a comprehensive manner, exploring both the challenges and opportunities presented by the integration of digital technologies in the educational context. This concern reflects the growing relevance of digital technologies in contemporary pedagogical practice, as well as the need for educators to be prepared to use these tools effectively and meaningfully in their teaching activities.

It is important to highlight the differences and similarities between the countries studied, which can be divided into three distinct groups. In particular, the African countries share a similar condition: they are all in an initial and deficient stage of methodological organization and public policies related to the integration of technologies in school environments and teacher training courses. This reality can be attributed to historical, cultural, political, and economic factors specific to each country.

Portugal stands out as a reference in several programs, studies, and policies on digital technologies and teacher training. The country is a significant source of knowledge and literature on

the subject, with authors whose works are widely recognized and used in Brazil and African countries. Brazil is in an intermediate position: although it is not as far behind as African countries, it still needs to make considerable progress in this field.

Another important consideration is the lack of studies that address the issue of initial teacher education and digital technologies in Portuguese-speaking countries with a comparative bias, especially in the African context, as highlighted. This highlights a significant gap in academic research, as the comparative bias allows us to broaden the horizons of understanding different scenarios. Therefore, it is imperative to deepen and study this area, given its importance in the contemporary educational context which outlines significant advances in the exploration of digital technologies in training and work environments. If the digital culture, with its advances and challenges, has become increasingly assertive, it is urgent that teacher education not be excluded from this knowledge and reflection.

It is important to recognize that there is still much progress to be made in this area, both in terms of research and pedagogical practice. Furthermore, this study, in addition to providing a comparative framework, should also propose concrete alternatives to promote significant progress in the integration of digital technologies in initial teacher education. These alternatives may include more effective educational policies, continuing education programs for teachers, and the development of innovative pedagogical strategies that fully exploit the potential of digital technologies to improve the quality of teaching and learning.

In summary, the results of this analysis point not only to the critical importance of rethinking and redesigning initial teacher education but also to the urgent need to explore more deeply the implications and challenges associated with the integration of digital technologies in education. These findings provide a solid basis for future research and interventions aimed at promoting quality education relevant to the demands of the 21st century.

Based on these considerations, it is understood that the comparative study on teacher training in the Portuguese-speaking world must continue with new developments, as there are still multiple issues to be explored, including: research that includes listening to basic education teachers in each country; the proposal of common public policy cores for Portuguese-speaking contexts; the construction of an international curricular base.

REFERENCES

ALCANTARA, Sonia Maria Leite. **A formação dos docentes para o uso pedagógico das tecnologias digitais da informação e da comunicação no ambiente escolar da rede pública municipal de ensino de Timon-MA**. Dissertação (Mestrado Profissional em Tecnologia e Gestão em Educação a Distância) – Universidade Federal Rural de Pernambuco, Recife, 2019.

ANDRADE, Belisa Rabelo Dourado de. **O potencial didático-pedagógico das tecnologias digitais de informação e comunicação e a formação de professores de Geografia para o seu efetivo uso na educação básica**: percepções de licenciandos. Dissertação (Mestrado em Educação) - Pontifícia Universidade Católica de Minas Gerais, Belo Horizonte, p. 261. 2019.

ASSIS, Neucilane Oliveira de. **Utilização das TIC em sala de aula e a formação de docentes: um estudo de caso no Instituto Federal de Goiás**. Dissertação (Mestrado em Assessoria de Administração) – Instituto Superior de Contabilidade e Administração do Porto, Instituto Politécnico do Porto, Porto, p. 98. 2018.

BANGA, Pedro Agostinho Tomba. **Tecnologias da informação e comunicação no sistema educativo em São Tomé e Príncipe**. Dissertação (Mestrado em Tecnologias da Informação e Comunicação em Educação) – Instituto Politécnico de Viana do Castelo, Escola Superior de Educação, Viana do Castelo, p. 157. 2023.

BARDIN, Laurence. **Análise de conteúdo**. São Paulo: Edições 70, 2011.

BEZERRA, Marcelo dos Santos. **Formação para o uso das TDIC em cursos de licenciatura da área das ciências da natureza da Universidade Federal de Sergipe, Campus Professor Alberto Carvalho**. Dissertação (Mestrado em Ciências Naturais) – Universidade Federal de Sergipe, Itabaiana, p. 125. 2022.

BRASIL. Ministério da Educação. **Plataforma Sucupira.** Programas de Pós-Graduação. Available at: https://sucupira-v2.capes.gov.br/sucupira4/. Accessed on: Apr. 16, 2024.

D'ÁVILA, Fernanda Vieira Sofiatti. **Tecnologias digitais na educação infantil: formação inicial e continuada.** Dissertação (Mestrado em Educação) - Instituto Federal do Espírito Santo, Programa de Pós-graduação em Ensino de Humanidades, Vitória, p. 192. 2019.

DENZIN, N. K. e LINCOLN, Y. S. Introdução: a disciplina e a prática da pesquisa qualitativa. In: DENZIN, N. K.; LINCOLN, Y. S. (Orgs.). **O planejamento da pesquisa qualitativa**: teorias e abordagens. 2. ed. Porto Alegre: Artmed, 2006. p. 15-41.

GUEDES, Giane Tais Cruz. **Uma investigação sobre a formação docente e a integração das tecnologias da informação e comunicação nos cursos de licenciatura em Física dos Institutos Federais do Estado do Rio Grande do Sul**. Dissertação (Mestrado em Educação Matemática e Ensino de Física) – Universidade Federal de Santa Maria, Santa Maria, p. 122. 2020.

KENSKI, Vani Morreira. **Tecnologias e Ensino Presencial e a Distância**. 9. ed. Campinas: Papirus, 2012.

MARFIM, Lucas. **Sociedade informacional entre demandas e contradições:** os limites e as potencialidades para integrar as tecnologias digitais de informação e comunicação às práticas educativas na formação inicial do pedagogo - estudo de caso junto aos licenciandos da Universidade

Federal de São Paulo. Dissertação (Mestrado em Educação) - Universidade Federal de São Paulo, Guarulhos, p. 267. 2019.

MARTINS, Keissy Carla Oliveira. **Tecnologias digitais de informação e comunicação e as relações entre a formação inicial e as práticas pedagógicas de professores de Física**. Dissertação (Mestrado em Ensino de Ciências) – Fundação Universidade Federal de Mato Grosso do Sul, Campo Grande, p. 225. 2023.

MEREDYK, Fernanda. **A formação de professores de Matemática no contexto das tecnologias digitais**: desenvolvendo aplicativos educacionais móveis utilizando o software de programação App Inventor 2. Dissertação (Mestrado em Educação em Ciências e em Matemática) – Universidade Federal do Paraná, Curitiba, p. 147. 2019.

MOREIRA, Lilian da Silva. **Tecnologia educativa na formação inicial de educadores de infância e professores do primeiro ciclo do ensino básico: estudo de caso múltiplo Portugal-Brasil**. Tese (Doutoramento em Ciências de Educação) – Universidade do Minho, Braga, p. 2020.

MOROSINI, Marília; KOHLS-SANTOS, Pricila; BITTENCOURT, Zoraia. **Estado do conhecimento**: teoria e prática. Curitiba: CVR, 2021.

MOVIMENTO de Educação para Todos. **Avaliação das competências dos professores no uso das tecnologias de informação e comunicação**. Universidade Eduardo Mondlane - Faculdade de Educação. Maputo, 2022 Membros do grupo de pesquisa desse movimento: António Cipriano Parafino Gonçalves, Manuel Valente Mangue, Nilsa Cherinda. Available at: https://news.un.org/pt/story/2021/06/1752412. Accessed on: Jan. 10, 2024.

PEIXOTO, Anderson Gomes. **Formação de professores para a cultura digital:** mediação pedagógica com as tecnologias digitais da informação e comunicação em oficinas de ensino. Dissertação (Mestrado em Educação) – Universidade de Brasília, Brasília, p. 140. 2020.

RAMOS FONSECA, Maria Gorete. **As tecnologias de informação e comunicação na formação inicial de professores do 1.º ciclo do ensino básico**: crenças e perspetivas de formadores. Tese (Doutoramento em Educação) - Universidade de Lisboa, Instituto de Educação, Lisboa, p. 361. 2020.

RIEDNER, Daiani Damm Tonetto. **Práticas pedagógicas e tecnologias digitais no ensino superior**: formação inicial de professores e inovação na UFMS. Tese (Doutorado em Educação) – Pontifícia Universidade Católica do Rio de Janeiro, Rio de Janeiro, p. 185. 2018.

ROCHA, Graciete Santos. **Utilização educativa das tecnologias digitais pelos professores do ensino básico e ensino secundário em Cabo Verde**. Dissertação (Mestrado em TIC na Educação e Formação) – Instituto Politécnico de Bragança, Escola Superior da Educação, Bragança, p. 107. 2021.

SANTOS, Willian Wesley Ribeiro dos. **Da formação inicial à prática docente: percepções de um grupo de professores de Rondônia sobre a utilização das TIC no ensino de Química**. 2019. 96f. Dissertação (Mestrado em Química) – Universidade Estadual de Londrina, Londrina, 2019.

SOARES, Terezinha Gorete Vilela. **Um olhar bakhtiniano para o uso das tecnologias digitais na formação docente**. Dissertação (Mestrado em Linguística) - Universidade de Franca, Franca, p. 103. 2019.

SOUZA, Edleuza Nere Brito de. **Interações entre cultura digital e educação**: uma investigação sobre TDIC na formação de professores no ensino superior de Licenciatura do IFMA. Dissertação (Mestrado em Cultura e Sociedade) – Universidade Federal do Maranhão, São Luís, p. 125. 2020.

SPERANDIO, Paula. **Formação inicial de professores no curso de Pedagogia e a utilização de tecnologias de informação e comunicação**. Dissertação (Mestrado Profissional em Educação) – Universidade Federal da Fronteira Sul, Erechim, p. 201. 2019.

TARDIF, Maurice. **Saberes docentes e formação profissional**. 4. ed. Rio de Janeiro: Vozes, 2002.

YONG, Lesly Diana Pimentel. **Ensino de língua espanhola**: a integração das tecnologias digitais na formação inicial de professores em região de fronteira no Amazonas. Dissertação (Mestrado em Ensino) – Fundação Vale do Taquari de Educação e Desenvolvimento Social - FUVATES, Lajeado, p. 122. 2021.