

Pedagogical Practice in Initial Teacher Training and Education for Sustainable Development: a systematic literature review

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Abstract

This study aims to understand how Pedagogical Practices are conceived and developed in the context of Initial Teacher Training from a perspective of Education for Sustainable Development. The methodology used was the systematic review of ten articles published in academic journals (2016-2020), which, through content analysis, enabled us to understand that Education for Sustainable Development is a premise of international political agendas, its integration into the Initial Teacher Training curriculum is based on multi, inter and transdisciplinary approaches, aiming at developing critical-reflective thinking skills, autonomy in problem-solving and the ability to transform oneself and one's peers. The results call for the integration of actions and approaches that promote a more sustainable future. The conclusions reflect that the improvement in the operationalization of Pedagogical Practices is achieved by integrating perspectives that enhance the development of teaching skills (of knowledge, of knowing how to do and being) necessary for the desired transformations in the educational process in general.

Keywords

Pedagogical Practice; Initial Teacher Training; Education for Sustainable Development.

Prática Pedagógica na Formação Inicial de Professores e Educação para o Desenvolvimento Sustentável: uma revisão sistemática de literatura

Resumo

Este estudo objetiva compreender os modos como são concebidas e desenvolvidas as Práticas Pedagógicas no contexto da Formação Inicial de Professores numa perspectiva de Educação para o Desenvolvimento Sustentável. A metodologia utilizada foi a de revisão sistemática de dez artigos publicados em revistas académicas (2016-2020), que, através da análise de conteúdo, possibilitou-nos compreender que a Educação para o Desenvolvimento Sustentável constitui uma premissa das agendas políticas internacionais, a sua integração no currículo de Formação Inicial de Professores baseia-se em abordagens multi, inter e transdisciplinares, almejando o desenvolvimento de competências de pensamento crítico-reflexivo, autonomia na resolução de problemas e capacidade de autotransformação e dos seus pares. Os resultados apelam para a integração de ações e abordagens que promovam um futuro mais sustentável. As conclusões refletem que a melhoria na operacionalização das Práticas Pedagógicas concretiza-se integrando perspectivas que realçam o desenvolvimento de competências docentes (do saber, do saber fazer e estar) necessárias para as transformações desejadas no processo educativo em geral.

Palavras-chave

Prática Pedagógica; Formação Inicial de Professores; Educação para o Desenvolvimento Sustentável.

Práctica Pedagógica en la Formación Inicial del Profesorado y la Educación para el Desarrollo Sostenible: una revisión sistemática de la literatura**Resumen**

Este estudio tiene como objetivo comprender las formas en que las Prácticas Pedagógicas son concebidas y desarrolladas en el contexto de la Formación Inicial Docente desde una perspectiva de Educación para el Desarrollo Sostenible. La metodología utilizada fue la revisión sistemática de diez artículos publicados en revistas académicas (2016-2020), que a través del análisis de contenido permitieron comprender que la Educación para el Desarrollo Sostenible es una premisa de las agendas políticas internacionales, su integración en la Formación Inicial Docente. el plan de estudios se basa en enfoques multi, inter y transdisciplinarios, con el objetivo de desarrollar habilidades de pensamiento crítico-reflexivo, autonomía en la resolución de problemas y la capacidad de transformarse a sí mismo y a sus pares. Los resultados llaman a la integración de acciones y enfoques que promuevan un futuro más sostenible. Las conclusiones reflejan que la mejora en la operacionalización de las Prácticas Pedagógicas se logra integrando perspectivas que potencien el desarrollo de las competencias docentes (del saber, del saber hacer y del ser) necesarias para las transformaciones deseadas en el proceso educativo en general.

Palabras clave

Práctica Pedagógica; Formación Inicial del Profesorado; Educación para el Desarrollo Sostenible.

1 Introduction

Nowadays, the world has countless asymmetries from the economic, social, political, and environmental point of view, referred in several investigation studies (AKKARI, 2017; COSTIN, 2020; PEREIRA, 2022; SÁ; ANDRADE, 2008; SÁ; SÁNCHEZ, 2022), resulted of different development scenarios in which some show a diversity of fragilities such as the need of promoting equal rights to all and access to goods and services for populations as a whole. The fast pace of the social, economic, and technological development in some countries (with the consequently unlimited exploitation of the available resources) has raised discussions about the sustainability of our planet, namely the imbalances in different sectors of society with consequences for the educative and formative processes in all levels, causing a social exclusion. In this logic, the protagonists are challenged to adopt cultures that privilege creativity for a

critical reflection on the current issues, identifying the causes and consequences of certain phenomena and evaluating the way they affect not only human beings but the environment in general (FAUSTINO; AMADOR, 2016).

To address these challenges, it is noticeable a growing concern from rulers worldwide to invest in the education of citizens, enabling the promotion of a curriculum that meets the challenges of ESD (AKKARI, 2017), by increasing changes in the attitude of teachers and their trainers, particularly in the context of particularly on the context of Initial Teacher Training (ITT). According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), it is not just educating in any way, but an education that contemplates both the professional skills of a discipline and the sustainable and general ones that enable a quality teaching professional performance in order to form a global citizenship, the guarantee of a more sustainable future (UN, 2022; UNESCO, 2005, 2015, 2016).

This study is based on a systematic review seeking to answer the following question: what orientations emerge from published research on the design and development of Pedagogical Practice (PP) in the context of ITT in an Education for Sustainable Development (ESD) perspective? In addition to this introduction, the article includes two sections, the first one describing the theoretical framework, and the second one presenting the methodology of the study followed to analyze the articles (documentary corpus) on the development of PP in the context of ITT, in which the results of the analysis of the documentary corpus are presented. It ends with the conclusions, which present the main reflections on this theme, hoping to contribute to new insights on the conceptions of PP.

2 Theoretical framework

The term "Sustainable Development" (SD) is being used in different fields in modern society, from political speeches to economic and environmental studies, among others. Notwithstanding this multiplicity of domains, there seems to be no consensus among authors (SACHS, 2004; SANTOS; SILVA; PEDROSA, 2016; VILCHES; PÉREZ, 2012), thus being considered one "[...] of the most polysemic concepts", its meaning depending on the "method to be used", the concerns and the

specific socioeconomic interests pursued to achieve it (FAUSTINO; AMADOR, 2016, p. 2023).

Though being widely recognized the imperative of practices supported by a more informed action concerned with the balance between environmental, economic and social systems at a planetary level, this seems to show an interest of the governments in (ARAÚJO; PEDROSA, 2014; FAUSTINO; AMADOR, 2016; ROSA; MALACARNE, 2016; SANTOS; SILVA; PEDROSA, 2016; VILCHES; PÉREZ, 2012), “[...] building a new mentality, a new ethics, and a new praxis” (SANTOS; SILVA; PEDROSA, 2016, p. 272) through the promotion of actions aimed at social responsibility and improving the quality of life of citizens (ARAÚJO; PEDROSA, 2014; LAURIE *et al*, 2016; ROSA; MALACARNE, 2016; SANTOS; SILVA; PEDROSA, 2016).

The literature referring to SD only started having a more formal explanation after the release of the *World Strategy for Nature Conservation of the Sixties* and, later, in 1987, in a more effective and defined way, in the Bruntland Report. The definition of SD is referenced in numerous studies, such as the one presented by the United Nations (UN) Commission on Sustainable Development in 1988: "Sustainable Development is that which meets the needs of the present without compromising the ability of future generations to meet their own needs".

The very terms “Sustainability and “Sustainable Development” are constantly used as synonyms in the literature (FAUSTINO; AMADOR, 2016), referring to SD as that dynamic transformation process consisting of making economic growth, human and social development, and environmental quality compatible, and "Sustainability" considered as the goal of that same development (FAUSTINO; AMADOR, 2016; SACHS, 2004; VILCHES; PÉREZ, 2012).

Sustainability implies the increasing reduction of economic inequalities, decreasing poverty levels, increasing solidarity with the most disadvantaged, permanent search for a greater social balance, more autonomy and, essentially, promotion of participation of all citizens. Both terms seem to be considered undefined concepts (SÁ; ANDRADE, 2008), SD is perceived as a way to achieve Sustainability, and Sustainability is considered a goal (FAUSTINO; AMADOR, 2016) and, regardless of the perspective that is assumed, concrete, objective and integrated educational practices should be

developed at the different levels of education that promote, in fact, the change of habits and behaviors towards sustainability (SÁ; ANDRADE, 2008).

In the educational sphere, the introduction of the concept of SD was consolidated in 2004, with the establishment of the UN Decade of Education for Sustainable Development (2005-2014); goal 4.7 emphasizes that education is the fundamental way to achieve sustainability, as alluded to by Costin (2020), who, by 2030, aims to ensure "[...] that all students acquire the knowledge and skills necessary to promote sustainable development" by learning to develop sustainable lifestyles, promote human rights, gender equality, "[...] a culture of peace and nonviolence, global citizenship, and appreciation of cultural diversity" (UNESCO, 2015).

It is crucial to bring about such changes, which should be aimed at developing the ability to analyze educational processes from a more holistic and integrative perspective, to think about alternative futures, developing critical and systemic thinking and promoting the active participation of collaborative work through inter, multi and transdisciplinary curriculum in particular in ITT (ARAÚJO; PEDROSA, 2014; ASSAI; BROIETTI; ARRUDA, 2018; CEBRIÁN, 2019; COSTIN, 2020; EXPÓSITO; CIURANA, 2017; FAUSTINO; AMADOR, 2016; LAURIE *et al.*, 2016; ROSA; MALACARNE, 2016; SANTOS; SILVA; PEDROSA, 2016; PEREIRA, 2022; TRINDADE *et al.*, 2019).

ITT has been addressed by several reference authors, such as Estrela (2002, p. 18), who considers it as "[...] the institutionally framed and formal beginning of a process of preparation and development of the person, in order to professional performance and achievement in a school at the service of a historically situated society". Mendes, Medeiro, and Peneda (2005, p. 85), citing several authors, refer to ITT as:

[...] 'the stage of training of the future teacher, in which he/she acquires didactic and pedagogical competences and which gives him/her the status of a teaching professional, granted by a specialized school', [aiming at] 'the development of diversified competencies that should contribute to improve efficiency, the quality of teaching and promote pedagogical innovation'.

At this formative stage, it becomes essential to be based on the integration of content of cognitive, psychomotor and psychoaffective domain, emphasizing the combination of research and action, promoting participatory, collaborative, and active learning (CEBRIÁN, 2019; COSTIN, 2020). The curricula of ITT courses integrate the discipline Pedagogical Practices (PP), also called Supervised Internship (ALFREDO,

2019; ASSAI; BROIETTI; ARRUDA, 2018; CANHICI; LEITE; FERNANDES, 2019; LIMA; ANDRADE; COSTA, 2020; MORGADO, 2014; PIMENTA; LIMA, 2012; RIBEIRO; ARAÚJO, 2017), considered an integrative, essential and mandatory component, being highlighted as one of the central axes of ITT courses, in which future teachers begin the development of their professional identity, learning to experience, build and mobilize the thinking of themselves and of the teaching profession (FORMOSINHO; MACHADO; MESQUITA, 2015; ROLDÃO, 2007) in all its dimensions, aware that "[. ...] that their learning takes place in the interaction with others and with themselves, in processes of self and/or hetero supervision of pedagogical practice" (MACHADO; ANDRADE; NEVES, 2020, p. 138).

Schön (1990) and Zeichner (1993) suggest the triple movement "knowledge in action", "reflection in action" and "reflection on action" and suggest that relationships are established between techniques and teaching strategies and ethical issues related to what is taught, so it becomes necessary to print changes in the culture of dominant pedagogical practices, through the adoption of pedagogical strategies that prioritize student-centered learning (MUÑOZ *et al.*, 2017). For Nóvoa (1992) and Holly and McLoughlin (1989), it is not enough to change the professional, it is also necessary to change the contexts in which he or she intervenes, since ITT goes through a process of articulations between research-action and research-training devices to give sustainability to the appropriation of knowledge mobilized in professional practice.

Observing several research, we notice a convergence in the attempt to make a panorama where there are already studies on the theme of articulation of an ITT with ESD are presented (ALFREDO, 2019; ARAÚJO; PEDROSA, 2014; BRANDT; HOBOLD, 2019; CHISSINGUI; COSTA, 2020; EXPÓSITO; CIURANA, 2017; ROSA; MALACARNE, 2016; SANTOS; SILVA; PEDROSA, 2016; VILCHES; PÉREZ, 2012). However, these studies seem to reflect recurring limitations when addressing the competencies of teachers for their performance, justified by the way knowledge has been viewed, with the training process (initial and continuous) not being seen for its systematicity, but rather for being shown as a product, marked mainly by: strong inclination to the exposure of content by teachers and its reproduction by trainees; poor preparation of teachers in IT to exercise the teaching profession; and articulation

between the various components during the process of ITT not aligned with the requirements of ESD. These topics emerge from the studies in reference, which anchor the development of the present a systematic literature review.

3 Methodology

Given the intention to understand the ways in which the discipline of PP in the ITT has been operationalized and how it can constitute a learning space to face the challenges of ESD, the following research questions are more general premises of a larger project on the subject and, more specifically, we have listed the following research questions:

- a) What is the place of ESD in ITT curricula?
- b) What is the place of ESD in PP?
- c) How do you propose to work with ESD in the ITT?

Considering the issues listed above, we aimed to analyze the guidelines emerging from the articles published and consulted regarding the design and development of PP in the context of ITT, from an ESD perspective. In this context, we believe it is important to conduct this study based on a Systematic Literature Review (SLR), as it is a more appropriate route that allows educational research "[...] to obtain an overview of the current knowledge on a topic in focus" (BRYMAN, 2012; NEWMAN; GOUGH 2020).

According to Munn *et al.* (2018), SLR follows a framework of a predefined process, requiring rigorous methods and thorough searching to ensure that the results are reliable and meaningful to end users. In this logic, the RSL process is preceded by the development of a clear research question, the definition of the search strategy, the establishment of inclusion and exclusion criteria for articles, and the careful analysis of the selected literature (NEWMAN; GOUGH, 2020; VOSGERAU; ROMANOWSKI, 2014).

We opted for a qualitative review, framed primarily in the interpretive paradigm (AMADO, 2014; BOGDAN; BIKLEN, 2013; COUTINHO, 2016), as we sought to know, analyze, and interpret the phenomenon under study. This was supported by the fulfillment of the model proposed by Bryman (2012, p. 103), which includes the stages presented in Table 1.

Table 1 – Structure of the SLR stages

Stages	Description
1	Defining the goal and scope of the review.
2	Defining questions of the investigation.
3	Researching studies relevant for the goal of the review.
4	Examining the studies identified in the previous stage [...] based on the rigorous application of the defined criteria.
5	Analyzing each study and synthesizing the results.

Source: Bryman (2012).

Once defining the questions and goals of the investigation, we started to identify and select the articles that would be part of the documental corpus, based on the rigorous application of the defined criteria, in order to analyze each article and synthesize its results to obtain an overview of how the theme has been investigated by reference authors.

In the first stage of the search strategy, we identified the ways in which the concepts are treated, by entering the keywords and related terms in credible databases from the scientific point of view (Scielo, Google Scholar, Redalyc, and Rcaap) and in the three languages defined, as well as a complete search for their variations in English and Spanish, since we think this is a considerable number of languages that can possibly help avoid bias, a characteristic of this type of review, according to the provisions in Table 3, justified by the greater visibility of publications according to the relevance of the theme.

Table 2 – Keywords and related terms

Main keyword	Correlated terms
Prática Pedagógica	Estágio Supervisionado Supervised internship Pasantía supervisada
Formação Inicial de Professores	Professor em formação inicial Inicial teacher education Formación docente inicial
Educação para o Desenvolvimento Sustentável	Desenvolvimento sustentável Sustainable development Desarrollo sostenible

Source: Elaborated by the authors (2021).

The second stage, which consisted of the operationalization of this model, was the selection of articles, which was based on the inclusion criteria - articles whose titles, abstract, and keywords contemplated: (i) references on (a) ITT; (b) PP; (c) ESD and

peer-reviewed; (ii) all articles published in prestigious scientific journals were available for online consultation (with open access); (iii) the articles analyzed should preferably be published in the last five years (between 2016 and 2021); and we excluded articles that, (a) despite fitting in ITT, focused on training components other than PP, (b) only referred to the in-service training of teachers, (c) focused on training developed in other contexts and not in ITT, and (d) duplicated publications.

In the third stage, which consisted of searching for studies relevant to the purpose of the present review. The procedure allowed us, through the Boolean operator "AND", to define the context of the studies (education in higher education, ITT, and the categories: "education" and "multidisciplinary"). We thus constituted the first set of 72 articles. From the reading of their titles and abstracts, we selected 36 articles that were closest to the focus of our research. This phase was long and exhaustive, requiring continuous returns to the databases, a process characterized by the examination of each study identified and rigorous application of the inclusion and exclusion criteria defined here, until we reached a set of ten articles (our documentary corpus), as shown in Chart 4. In the table, we list the texts considering the attribution of a code for each article; next, there is the complete reference of each study, country of research development, and the keywords, elaborated with the support of Mendeley software.

Table 3 – Characterization of the documental corpus

(to be continued)

Code	Reference (ABNT norms)	Country	Keywords
A1	CALERO, M. <i>et al.</i> La educación para la sostenibilidad en la formación del profesorado de ciencias experimentales en Secundaria. <i>Enseñanza de las Ciencias</i> , Barcelona, v. 37, n. 1, p. 157-176, 2019.	Spain	Educación para la sostenibilidad; Formación del profesorado; Máster en Formación del Profesorado; Educación Secundaria; Guías docentes.
A2	SANTOS, L. C.; SILVA, R. M. G.; PEDROSA, M. A. Practices of education for sustainable development: contributions, limitations and future possibilities. <i>Indagatio Didactica</i> , Aveiro, v. 1, n. 1, p. 210-228, 2016.	Portugal	Teacher training; Education for Sustainable Development; Relations Science; Technology; Society and Environment.
A3	CEBRIÁN, G. La educación para el desarrollo sostenible en el currículum universitario: una investigación-acción cooperativa con profesorado. <i>Revista Iberoamericana de Educación Superior</i> , Huixquilucan, v. 11, n. 30, 2020.	United Kingdom	Educación para el desarrollo sostenible; Investigación-acción; Sostenibilidad; Universidad; Currículum; Profesorado; Aprendizaje activo; Reino Unido.

Table 3 – Characterization of the documental corpus

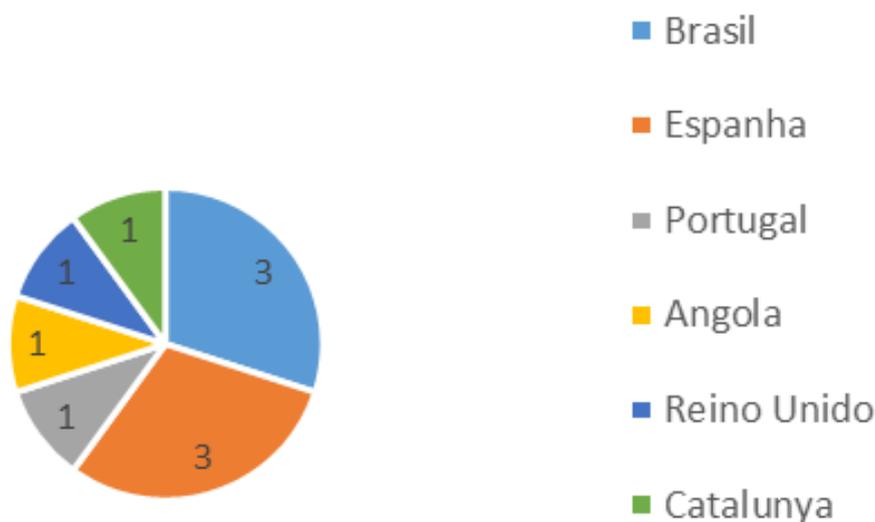
(conclusion)

Code	Reference (ABNT norms)	Country	Keywords
A4	MUÑOZ, V. G. <i>et al.</i> Revisión sistemática sobre competencias en desarrollo sostenible en educación superior. <i>Revista Iberoamericana de Educación</i> , Madrid, n. 73, p. 85-108, 2017.	Spain	Sostenibilidad; Competencias; Educación superior; Universidad española.
A5	EXPÓSITO, L. M. C.; CIURANA, A. M. G. Avanzar en la educación para la sostenibilidad. Combinación de metodologías para trabajar el pensamiento crítico y autónomo, la reflexión y la capacidad de transformación del sistema. <i>Revista Iberoamericana de Educación</i> , Madrid, v. 73, p. 131-154, 2017.	Spain	Educación para la Sostenibilidad; Metodologías activas. Innovación; Didáctica.
A6	CHISSINGUI, A. V.; COSTA, N. Teacher Education and Sustainable Development Goals: A Case Study with Future Biology Teachers in an Angolan Higher Education Institution. <i>Sustainability</i> , [S.l.], v. 12, n. 8, p. 1-14, 2020.	Angola	Sustainable development; Biology; Initial teacher education; Angola; Case study.
A7	FUERTES-CAMACHO, M. T. <i>et al.</i> Article integrating sustainability into higher education curricula through the project method, a global learning strategy, <i>Sustainability</i> , [S.l.], v. 11, n. 767, 2019.	Catalunya	Sustainability competencies (SC); Competencies in education for sustainability (ESD); Project method; Sustainable food; Degree in early childhood education; teacher training; Higher education; Curricular sustainability; sustainable development goals; SDGs.
A8	ROSA, T. R. V.; MALACARNE, V. Formação Docente e Sustentabilidade. Um Estudo sobre Ambientalização Curricular no Curso de Pedagogia da Universidade Estadual do Oeste do Paraná. <i>Revista Iberoamericana sobre Calidad, Eficacia y Cambio en Educación</i> , Madrid, v. 14, n. 3, p. 95-107. 2016.	Brazil	Formação docente; Currículo; Educação ambiental; Sustentabilidade.
A9	FLEIG, R.; NASCIMENTO, I. B.; MICHALISZYN, M. S. Desenvolvimento sustentável e as instituições de ensino superior: Um desafio a cumprir. <i>Arquivos Analíticos de Políticas Educativas</i> , Arizona, v. 29, n. 95. 2021.	Brazil	Sustentabilidade; Universidade; Desenvolvimento Sustentável; Educação Superior.
A10	GAZZONI, F. <i>et al.</i> O papel das IES no desenvolvimento sustentável: estudo de caso da Universidade Federal de Santa Maria. <i>Revista Gestão Universitária na América Latina</i> , Florianópolis, v. 11, n. 1, p. 48-70, janeiro 2018.	Brazil	Sustentabilidade; Gestão de IES; Conhecimento.

Source: Elaborated by the authors (2021).

Of the ten articles under analysis, there is a predominance of a greater number of publications developed in Spain and Brazil (3), which presupposes the timeliness and interest of the theme in recent times and whose work is referenced internationally. We found one article respectively published in countries like Portugal, the United Kingdom, Catalunya, and Angola. Despite this reduced number of publications, we emphasize the growing need and interest for research on themes related to this study in recent times, although not published, as illustrated in Chart 1.

Chart 1 – Distribution of articles per countries.

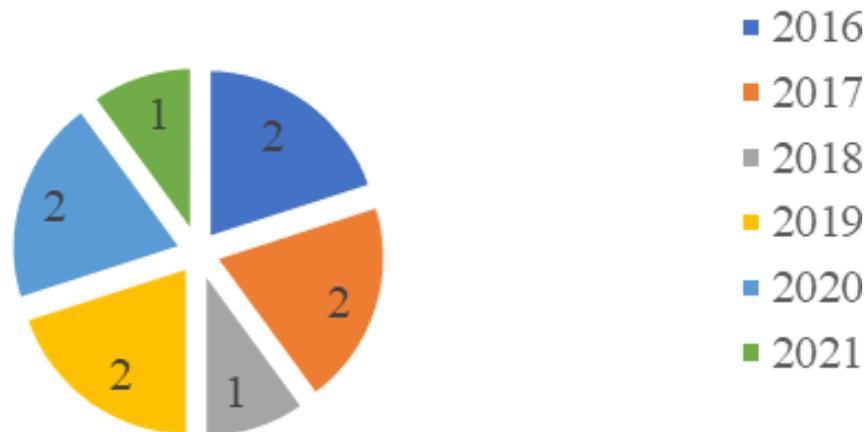


Source: Elaborated by the authors (2021).

Concerning the research context, it is noted that all the articles refer to studies carried out in teacher training in higher education, which is the chosen framework, therefore not including those that had education in general or secondary education, which reinforces the idea of having defined as one of the keywords "initial teacher training", being a relevant criterion, referring to the concern and interest of researchers in analyzing how to improve PP at this level and in spaces of critical-reflective training.

Another aspect was the analysis of the articles considering the year of publication, framed in Graph 2, detailing two articles published in 2016, 2017, 2019, and 2020 and one in the years 2018 and 2021. This distribution made it possible for us to infer the period in which there is more interest in researching topics related to our object, as well as the countries with the highest number of published articles.

Chart 2 – Distribution of articles per year of publication



Source: Elaborated by the authors (2021).

This order of distribution is an indicator that the theme related to the present review integrates a field of research interest in the last five-year period (2016-2021), an important factor of constant (re)construction of knowledge about ESD in ITT, which can obviously serve as a basis for further studies. From the researched articles, there is a relevant data on an increase in the number of publications in the years 2016, 2017, 2019 and 2020, with two articles, respectively; this fact proves to be very relevant to prove the topicality of the theme. There is a slight decrease in the following year (2018), which seems to be related to the emerging challenges and constant dynamics that are imposed in the context of ITT in recent times, a factor that arouses the interest of researchers and educational professionals, a number that will be registered in the year 2021.

4 Results and discussion

The selected articles were analyzed and then categorized by reading and interpreting the objectives and discussions involved in each of the productions. In this case, we defined three categories of analysis that could best answer the guiding question, namely: (i) the place of ESD in the ITT curriculum; (ii) the space of ESD in the subject of PP; and (iii) the dimensions of ESD contemplated in the contents of the training.

The results of the analysis of the ten articles indicate, regarding the first category, that ESD is a premise of the political agendas of several international

organizations (e.g. UNESCO and UN) and of several national programs for higher education, making it a key element to ensure that the processes of educating the citizens of the future integrate a holistic and critical vision among their lines of action (A1, A2, A4, and A8).

The integration of contents on ESD in the higher education curriculum becomes a major challenge for universities, particularly in the ITT, since these are considered spaces where knowledge and training of future professionals are shared, encouraging them to develop actions that promote ESD and enable the construction of more sustainable societies. Articles A5, A6, and A7 demonstrated the global trend of inclusion of ESD in higher education, although the results of the study A6 and A9 revealed that the pedagogical curriculum plan and the formative trajectory of some realities do not explicitly integrate the Sustainable Development Goals (SDGs) and their challenges for the ITT, put another way, although sustainability is a topic present in the development plans of the institution, there is not in fact an institutional policy aimed at sustainable development.

Most of the analyzed articles have shown that ESD is still "something not very tangible" in Universities, since its operationalization largely depends on the main actors involved in the formative processes, although, as mentioned in A3 and A9, sustainability is still seen as an imposed agenda, and not linked to their specific discipline, i.e. teacher educators see sustainability as peripheral to their roles and they are dependent on verticalized policies, compromising the operationalization of ESD. In this sense, articles A5, A9, and A10 claim that it becomes imperative to establish cooperation with developing country governments, making Universities more dynamic.

In studies A3, A4, and A9, there is a call for a comprehensive review of curricula promoting ESD in order to ensure the inclusion of basic cross-cutting contents on sustainability in all education cycles. ITT should be based on this logic, according to which it is essential to promote reflection, collaborative and interdisciplinary work, and systemic thinking (A4 and A9), thus enhancing the approach with a multidimensional, inter and transdisciplinary character that goes beyond the boundaries of a single field of knowledge (A2 and A10).

Regarding the category of analysis ii) the space for Education for Sustainable Development in the discipline of Pedagogical Practice, the literature refers that the

pressing need for change in the curricula for ITT (A1, A3, A7, A8, and A9) is a challenge facing the institutions that train these professionals, and not only them. In this perspective, the institutions responsible for the training process (initial and continuing) should become spaces for the training of sustainable educators.

The PP, as a space for the socialization of transversal knowledge of ITT courses (ALFREDO, 2019; CHISSINGUI; COSTA, 2020), presents itself weakened in the structure of their programs in contents related to ESD (A5 and A10) because the more clarity the teacher has about sustainable development, the more it can contribute to changes in attitudes towards the interaction of man in nature (A8 and A9) and enable solutions to issues related to the promotion of their quality of life. From the pedagogical point of view, the integration of ESD implies breaking with the pedagogical tradition that favors actions of individual character (A1), producing changes in punctual strategies, as mentioned in A3 and A5. These reflected that such changes go through the promotion of active methodologies, which print changes "from transmission-based learning to discovery-based learning" and experimentation, which, on the other hand, move "from teacher-centered to student-directed approaches" and, essentially, which move "from theoretical to action-oriented learning", establishing a dialogical relationship between theory and practice (ZEICHNER, 1993).

In the same logic, A2 and A8 emphasize that ESD is about the implementation of interactive strategies based on actions aimed at building a new mindset, a new ethic, and a new praxis, based on the convergence of multi- and interdisciplinary approaches, and encouraging partnerships and collaboration between different formal and non-formal institutions. From the above, we deduce that, in the authors' words, teacher education must be constantly questioned, on the one hand, by the challenges imposed by technological advances and, on the other, by the demands of epistemologies and methodologies of complexity and transdisciplinarity as factors that bring them together (A8 and A9).

It is essential that ITT curricula experience new interdisciplinary organizations and, in particular, PP as a professionalizing subject, includes themes that can be worked on integrating the objectives of ESD. Although the literature calls for the reconfiguration of curriculum plans, it is important to call for it to be included as a premise in institutional policies and essentially articulated to the educational practices

of ITT teachers, since it is expected to train professionals with the ability to look broadly at the dimensions of educational processes.

Regarding category iii) ESD dimensions covered in the contents of initial teacher education, the literature revealed that the concept of sustainability is seen as a set of knowledge, values, attitudes, and skills that an individual needs to successfully face the challenges of sustainable development (A1, A3, and A4). It is denoted, in this sense, that education is the fundamental way to achieve sustainability at all levels.

Articles A1, A3, A4, and A5 refer to the recent promotion in the context of higher education worldwide of the inclusion of transversal competences in curricula, such as i) critical analysis of knowledge and its relation to sustainability; ii) rational use of natural resources and prevention of their impact on the environment; iii) community participation in actions to raise awareness about sustainability and the application of ethical principles in personal and professional behavior. In this framework, it is recognized the need to integrate the dimensions of ESD in the programs of university courses, aimed at promoting and developing competencies in future teachers at the level of knowing, knowing how to do and knowing how to be (A4 and A5), based on the use of active methodologies centered on the future teacher and enabling them to prepare for the exercise of their future profession.

The studies A4, A5, and A9 reveal, on the one hand, that most of the competences analyzed and developed in ITT relate to content knowledge, didactic knowledge, and motivation to implement ESD. On the other hand, A4, A5, and A9 mention that the real inclusion of competences for ESD in ITT and their development presupposes the use of methodologies based essentially on the promotion of participatory and collaborative learning, that mobilize critical-reflective thinking, autonomy, and initiative in problem-solving, as well as the ability to transform systems related to sustainable development.

5 Closing remarks

This study aimed to know, which actions from the articles published and analyzed, which actions are being carried out in teacher education frameworks from an ESD perspective. We consider it necessary to continue to develop more exhaustive

investigations in order to better understand the ways in which reality-transforming strategies are operationalized in higher education, prioritizing the intention to particularly address the gaps in the ITT curriculum in relation to the integration of actions promoting ESD and its aims.

The results presented in this article helped identifying the intention of the various studies to place ESD as a premise in institutional policies, when articulated with the educational practices of teachers in ITT, focusing on multi, inter, and transdisciplinary approaches. Their integration seems to guarantee the inclusion of evaluative and altitudinal content, about sustainability, that is transversal in all formative cycles.

The articles also helped us understand that ITT takes place within courses offered in higher education, through the mobilization of methodologies that enable the development of professional teaching competencies at the level of knowing (content knowledge), knowing how to do (didactic learning), and knowing how to be (motivation to implement), based on actions directed at building a new mentality, a new ethic, and a new praxis, though there are still teaching programs that insist on focusing teachers' reflections on their own teaching practice and/or on students, neglecting the social conditions that influence professional development.

Therefore, it is indispensable that partnerships be established with the governments of developing countries, on the one hand, and that, on the other hand, ITT should be based on collaborative work between different institutions and essentially on participatory learning. Thus, we believe that the improvement in the operationalization of the PP of ITT involves integrating perspectives that emphasize the development of competencies needed for the desired transformations in the educational process in general, including ESD.

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