pro-posições
e-ISSN 1980-6248

http://dx.doi.org/10.1590/1980-6248-2022-0044EN

ARTICLES

Teaching in Higher Education: which knowledges to mobilize to train teachers? [1] [2] [3] [4]

Docência no Ensino Superior: quais saberes mobilizar para formar professores?

La docencia en la Educación Superior: ¿qué conocimientos movilizar para formar docentes?

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[4] Acknowledgements: To the Ceara Foundation for the Improvement of Scientific and Technological Development for supporting research groups PS1-0186-00218.01.00/21 and to the National Council for Scientific and Technological Development for funding the project No. 420121/2022-6

pro-posições
e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2022-0044EN

Abstract

This article analized some teaching knowledges in order to understand which of them are mobilized by the pedagogical practice in higher education, since they are considered essential for teacher training in undergraduate programs. A qualitative study was conducted, whose data, collected with an online questionnaire answered by 25 professors of undergraduate programs at the School of Education of Crateús of the State University of Ceará, were processed by the IRaMuTeQ software and interpreted considering analytical prescriptions from Bardin. The results inferred that, respectively, the knowledges considered most important are: pedagogical knowledge, political knowledge, technical-professional knowledge, and practical knowledge. They were analyzed considering the four emerging categories: implementation of teaching knowledge; teaching knowledge in face of the challenges of the teacher's work; relevance of teaching knowledge; and acquisition and development of teaching knowledge. In conclusion, teaching knowledge, in its plurality, in order to enhance the educational praxis, must be fostered from the initial training, being improved continuously.

Keywords: Teacher training, Undergraduate program, Teaching knowledge, Educational praxis, Pedagogical practice

Resumo

Neste artigo, analisou-se saberes da docência, a fim de compreender quais deles são mobilizados na prática pedagógica no ensino superior, por serem considerados essenciais para a formação de professores em cursos de licenciatura. Produziu-se um estudo de abordagem qualitativa, cujos dados, coletados mediante um questionário on-line respondido por 25 professores dos cursos de licenciatura da Faculdade de Educação de Crateús da Universidade Estadual do Ceará, foram processados pelo software IRaMuTeQ e interpretados à luz das prescrições analíticas de Bardin. Os resultados inferiram que, respectivamente, os saberes considerados mais importantes são: o conhecimento pedagógico, o conhecimento político, o conhecimento técnico-profissional e o conhecimento prático. Eles foram analisados levando em conta as quatro categorias emergentes: implementação dos saberes da docência; saberes da docência frente aos desafios do trabalho do professor; relevância dos saberes da docência; e aquisição e desenvolvimento dos saberes da docência. Concluiu-se que os saberes da docência, em sua pluralidade, para qualificar a práxis educativa, devem ser incentivados desde a formação inicial, aperfeiçoando-se continuamente.

Palavras-chave: *Formação de professores, Licenciatura, Saberes docentes, Práxis educativa, Prática pedagógica*

pro-posições
e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2022-0044EN

Resumen

En este artículo se analizaron algunos conocimientos docentes con el objetivo de comprender cuáles de ellos son movilizados por la práctica pedagógica en la educación superior, ya que se consideran esenciales para la formación de docentes en cursos de graduación. Se realizó un estudio con enfoque cualitativo, cuyos datos, recolectados a través de un cuestionario en línea respondido por 25 profesores de los cursos de graduación de la Facultad de Educación de Crateús de la Universidad Estadual de Ceará, fueron procesados por el software IRaMuTeQ e interpretados a la luz de prescripciones analíticas de Bardin. Los resultados infieren que, respectivamente, los saberes considerados más importantes son: saber pedagógico, saber político, saber técnico-profesional y saber práctico. Fueron analizados considerando las cuatro categorías emergentes: aplicación de saberes didácticos; saberes didácticos frente a los desafíos del trabajo docente; pertinencia de los saberes docentes; y adquisición y desarrollo de los conocimientos didácticos. Se concluyó que el saber de la enseñanza, en su pluralidad, para cualificar la praxis educativa, debe ser fomentado desde la formación inicial, perfeccionándose continuamente.

Palabras clave: *Formación de profesores, Graduación, Saber didáctico, Praxis educativa, Práctica pedagógica*

Introduction

When considering the specificities of teaching, teacher training professors are required to have knowledge related to the background, including personal experiences from an early age, student experiences and, above all, professional experiences (Tardif, 2003). As teaching is complex and mobilizes multiple rationalities and specific knowledges, its proficient performance requires from teachers a learning posture that is not static, but procedural, founded on a scientifically and culturally validated body of knowledge (Cunha, 2007). These knowledges should support a humanized and emancipatory educational praxis that distances itself from the old educational paradigms associated with technical rationality. A praxis that combines human's action and reflection on the world to transform it (Freire, 1987), with neither distance nor opposition between theoretical thinking and practical action, which presumes a free and conscious subject.

However, conversely, with the market rationale advancing on public policies, under the dictates of contemporary neoliberalism, it is proclaimed the remodeling of teaching undergraduate programs through the utilitarian practice of teacher training (Pimenta & Severo,

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e-ISSN 1980-6248
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2020), configuring them into a new technicism, in which the regulatory State evaluates the results according to a rationality centered on efficiency and productivity (Saviani, 2007) to the detriment of aspects that are relevant to social equalization and teacher valorization.

In this regard, Tavares and Corsetti (2019) caution that the quality of education is not exclusively associated with technical-pedagogical aspects, because it does not dispense the social and political foundations. Neves and Sales (2021) add; it is in opposition to the neoliberal hegemonic interests, to correct the route distortions in teacher training, that the critical reading of the historical reality of teachers and students must be positioned.

According to the postulate of Freire (2011), it is believed that a critical education comprises the scientific acquaintance of teachers coinciding with the ethical rectitude for which a series of knowledges become indispensable, synthesized in the coherence between know-how and pedagogical-know-how, manifested in educational practice based on research, scientific rigor, dialogue, ethics, aesthetics, and loving-kindness, considered one of the forms of struggle capable of promoting and establishing the universal ethics of the human being.

In discussing teacher identity having teaching knowledges as a theoretical-methodological framework, Pimenta (1996) designates them as: knowledges from experience, knowledges from learning, and pedagogical knowledges. The first two originate from the experience socially accumulated throughout life, before pedagogical training, consolidated as students, professionals and so on. Knowledges from learning are produced when information is analyzed and contextualized and reverberate in new humanizing reflections. Pedagogical knowledges are generated through the social practice of teaching, confronted with reality; in other words, it is not the simple combination of themes related to teachers, students and the teaching technique, but are produced in intentional, re-elaborated, and problematizing action. Despite these conceptual explanations, the author recommends defragmenting such knowledges, because they all share the same scope: to resignify the educational processes and teaching practice and to constitute the identity of teachers.

Considering this theoretical discussion, the following question arose: how do teachers linked to the undergraduate programs of the School of Education of Crateús (FAEC), an inland institution of the State University of Ceará (UECE), position themselves on the teaching knowledges necessary for pedagogical practice in higher education? To settle this concern, a research was developed to understand which teaching knowledges are mobilized in pedagogical

http://dx.doi.org/10.1590/1980-6248-2022-0044EN

practice in higher education, as they are considered essential for teacher training in undergraduate programs.

Based on the premise that teaching knowledges "are constitutive elements of the teaching practice" (Tardif, 2003, p. 39, free translation) and provide professional development, "configuring and reconfiguring, continuously and situationally," the teacher's way of be and being in the profession (Farias et al., 2014, p. 78) showed the relevance of this study. The research may give visibility to the conceptions of professors in undergraduate programs, fundamental subjects in the training of future teachers and, at the same time, aims to raise critical reflections on a central theme for education. In addition, as subjects involved in teaching and learning processes, materialized in actions within the scope of educational spaces, there are numerous occasions where those knowledges that should not yield to technical and productivist rationality—centered on a practicist efficiency devoid of humanity, ethics and commitment to social justice—are mobilized.

Investigative path

Methodologically, this is a qualitative study, because the scope focused on the understanding, interpretation and debate about the values, experiences and human and social attitudes (Minayo, 2012) of teachers in the exercise of the profession. Thus, teaching knowledges were studied based on the subjectivities of teachers working in the teaching degree programs in Pedagogy, Biological Sciences, History, and Chemistry at FAEC/UECE. These courses were selected considering inclusion of all teaching degree programs of that university, especially where the initial training of future teachers occurs.

FAEC is located in the city of Crateús, the 12th most populous municipality in the state and is located in western Ceará (Instituto Brasileiro de Geografia e Estatística [IBGE], 2022). Its economy is characterized by the commerce of rural products from family farming, especially maize and beans. This location was selected because FAEC is the first and only state institution

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of public higher education in Crateús, therefore, responsible for the initial training of 1,604 teachers in undergraduate[5] programs in Pedagogy, Biological Sciences, and Chemistry.

After completing these teaching degree programs, the professionals trained at FAEC start to work mainly in the cities of the Sertões de Crateús area[6], which comprise about 60,186 students enrolled in primary and secondary education (IBGE, 2022). These students come from a less favored economic class, according to data from the last survey carried out in the late 2018 by the institution itself: 76.7% of the students were part of families whose monthly income is less than a minimum wage; 73% of the students did not work and of this percentage only 31% were included in some scholarship program.

Data collection was conducted in November and December 2021, using an instrument prepared on the Google Forms platform[7] and sent to the institutional email of 42 professors working in FAEC teaching degree programs with an explanatory message, informed consent form and invitation to participate in the study, which resulted in 25 questionnaires answered. In this regard, it is important to clarify that the inclusion criteria were: being a professor part of the faculty of one of the four FAEC teaching degree programs that already had graduated students and accepting to participate in the study.

The decision to use an electronic questionnaire is based on the pandemic, which still required remote activities to preserve people's health in view of the risk of contamination by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Notably, all ethical guidelines published on February 24, 2021 by the National Health Council (CNS) were adopted, according to the procedures in research with any stage in a virtual setting (Ministério da Saúde, 2021).

The informed consent form, approved by all participants, clarified the theme, the objective of the study, the manner of participation, and especially the minimum risks.

[5] There are four programs at FAEC; however, the teaching degree program in History still has no graduates.

[6] The socioeconomic area of the Sertões de Crateús comprises the municipalities of Ararendá, Catunda, Crateús, Hidrolândia, Independência, Ipaporanga, Ipueiras, Monsenhor Tabosa, Nova Russas, Novo Oriente, Poranga, Santa Quitéria and Tamboril.

[7] Google Forms is a free application for creating customizable online forms that can be shared between samples using an internet URL. In it, users can produce multiple-choice surveys, ask discursive questions, request evaluations on a numerical scale, among other options.

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e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2022-0044EN

Anonymity and the use of information were guaranteed to meet the purpose of the research, fostering science, as well as the possibility of disseminating the results in scientific events or journals. In addition, the researchers emphasized legality and ethics regarding data processing, copyright, scientific rigor and other similar aspects, including openly making the data available[8].

The questionnaire consisted of two blocks of questions. The first block contained nine questions related to the sociodemographic profile of the participants: age group; gender; initial education; higher academic degree; type of institutional bond; program to which the institution under research is linked; total teaching time; exclusive teaching time in higher education; and teaching time at FAEC. The second block contained three questions specific to teaching knowledges: one with multiple choice options to learn the characteristics related to teaching knowledges that are most relevant to higher education according to the professors' opinion; two with open answers. In the first subjective question, the teachers mentioned two knowledges considered fundamental to work in higher education, justifying the reasons for such mention. In the second, they described how the so-called fundamental knowledges are manifested in the courses in which they work.

Data were processed by multivariate technique. The Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires (IRaMuTeQ) software, version 0.7 alpha 2, was used to support qualitative textual analysis, which enabled textual statistics, descending hierarchical classification (DHC), correspondence factor analysis (CFA), similitude analysis, and word cloud. In addition to the lexical analysis provided by IRaMuTeQ, the content analysis technique, consistently with Bardin (2016), provided pre-analysis, exploration of the material and results treatment, in addition to inference and interpretation, because, according to Camargo and Justo (2013, 2018), the IRaMuTeQ software does not empty researcher of their analytical role, but rather supports it.

It is important to clarify that, for IRaMuTeQ, *corpus* is the set of all texts built by the researcher and subjected to processing; text is the set of monothematic text segments, also organized by the researcher; while text segments are the main units examined, that is, word environments of approximately three lines sized by the program according to the extent of the

[8]The research data are published and preserved on the Zenodo platform, open to access at any time through the DOI electronic address: DOI: 10.5281/zenodo.6511447.

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corpus. CFA, in turn, enabled analysis through DHC, since the program reduces the text partitions and the linguistic forms used in the responses obtained, presenting their content and the relationships between classes in factorial planes. Discursive positions are highlighted as to the oppositions, differences and relations of approximation and distancing that they establish in images generated to better view the results (Camargo & Justo, 2018).

In this combination of procedures, to preserve the identities of participants, the received questionnaires were organized by using alphanumeric codes: from P1 to P25, according to the order of the date they were sent. The *corpus* was prepared according to the codification and the command line "**** *perg_13" for the grouping of the 25 answers to the question: "Mention two knowledges that you consider essential to be a professor and justify the reason for your choice." In addition to "**** *perg_14" in reference to the 25 answers to the question: "How do these so-called essential knowledges are manifested in your pedagogical practice in the courses in which you work?"

Before submission to IRaMuTeQ, the *corpus* was corrected and adjusted by joining terms composed of the *underline* character, replacing verbal emclisis with proclisisis, and standardizing acronyms, in addition to being saved as plain text (.txt) and converted into another encoding, Unicode Transformation Format 8 bit code units (UTF-8).

Access to the typical text segments of the DHC provided the content of the classes generated, from which we extracted the nuclei of meanings that guided the categories analyzed according to Bardin (2016). Subsequently, the results were presented using tables, graphs, figures and analytical thematic categories, in which the formulations of IRaMuTeQ and the categories intersected transversely with the chosen theoretical framework, substantiating the discussion.

Results

The study enabled us to define the sociodemographic profile of professors representing the FAEC/UECE teaching degree programs according to the variables related to personal and professional data. Of the respondents, 14 were female and 11 were male. Three were aged from

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e-ISSN 1980-6248
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21 to 30 years; nine, from 31 to 40 years; ten, from 41 to 50 years; three, from 51 to 60 years, and none of them were older than 61 years.

The initial training of these subjects was quite varied: 15 had attended some teaching degree program; seven, bachelor's degree programs; and three, bachelor's degree and teaching degree programs concomitantly. All had professional training at the postgraduate level: 16 doctors, seven masters and two specialists. Of these, 14 had an effective contract employment relationship and 11 had been hired for a fixed period, as substitutes or temporary professors.

When surveying which program linked them to the institution, we found that most of them (13) were part of the Pedagogy program; the Biological Sciences and Chemistry programs had five teachers each, and the History program had two subjects.

The teaching time variable encompassed three perspectives: total teaching time; exclusive teaching time in higher education, and specific teaching time at FAEC/UECE. As for total teaching time, regardless of the level or stage of work, four teachers had less than five years of experience; six teachers had six to ten years of experience; other six teachers said they had 11 to 20 years in this area; and nine teachers said they had more than 20 years of experience. Specifically for teaching in higher education, three teachers had more than 20 years; nine teachers had 11 to 20 years old; also nine teachers had less than 5 years, and three were beginners at that level, having less than one year. As for teaching time at FAEC/UECE, 14 teachers had less than five years; two teachers had six to ten years; two teachers had more than 20 years; and seven teachers had 11 to 20 years, as detailed in Chart 1.

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http://dx.doi.org/10.1590/1980-6248-2022-0044EN

Chart 1. Sociodemographic profile of the research participants

Parameter	N
Gender	
Female	14
Male	11
I would rather not say	0
Total	**25**
Age group	
21 to 30 years	3
31 to 40 years	9
41 to 50 years	10
51 to 60 years	3
61 years and over	0
Total	**25**
Initial Training	
Teaching degree program	15
Bachelor's degree program	7
Bachelor's and teaching degree program	3
Total	**25**
Highest academic degree	
Doctoral degree	16
Master's degree	7
Specialization course	2
Total	**25**
Institutional bond	
Contract	14
Temporary	11
Total	**25**
Program to which they are linked at FAEC	
Pedagogy	13
Biological Sciences	5
History	2
Chemistry	5
Total	**25**
Total teaching time	
Less than 5 years	4
From 6 to 10 years	6
From 11 to 20 years	6
More than 20 years	9
Total	**25**
Exclusive teaching time in higher education	
Less than 5 years	9
From 6 to 10 years	4
From 11 to 20 years	9
More than 20 years	3
Total	**25**
Specific teaching time at FAEC	
Less than 5 years	14
From 6 to 10 years	2
From 11 to 20 years	7
More than 20 years	2
Total	**25**

Source: Prepared by the authors (2022).

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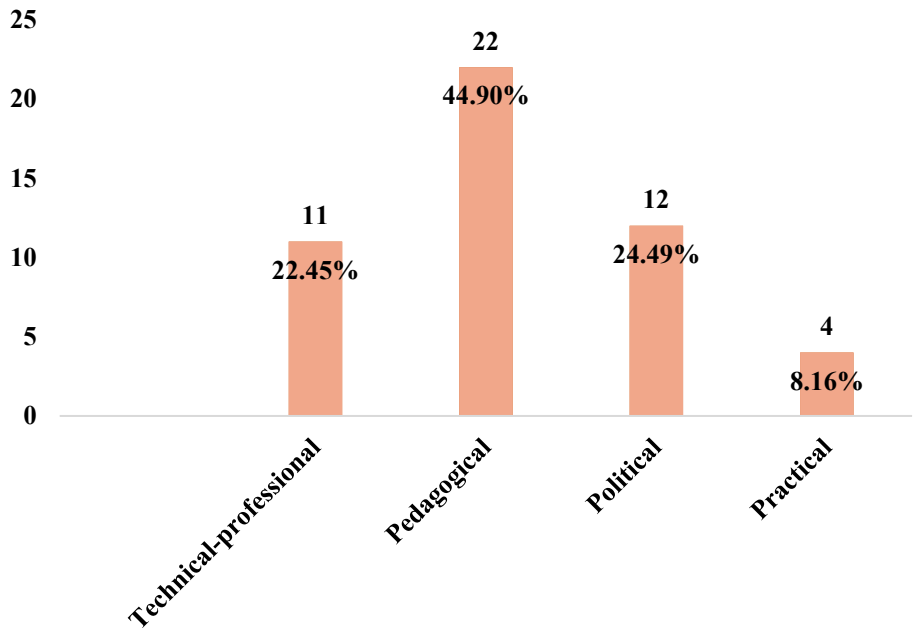
e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2022-0044EN

In addition to the data presented in Chart 1, the study enabled learning about the respondents' opinions regarding the teaching knowledges of greater relevance to higher education, according to Graph 1.

Graph 1.
Knowledges of greater relevance according to the higher education professors



Source: Prepared by the authors (2022).

In this regard, the answers had multiple choices. Thus, the 25 teachers chose 49 options, with pedagogical knowledge being considered the most relevant, selected 22 times (44.9%), followed by political knowledge, with 12 (24.49%), technical-professional knowledge, with 11 (22.45%), and, finally, practical knowledge, with 4 (8.16%). This typology of knowledges has theoretical support in the assumptions of Tavares and Corsetti (2019), Pimenta (1996) and Tardif (2003), previously explained in the introduction; however, the nomenclatures adopted here were due to the higher incidence in the professors' report. Pedagogical knowledge involved knowledges acquired in initial training in teaching degree programs that are mobilized to carry out teaching-learning; political knonwledge concerned the contextualization of knowledge in a critical manner; technical-professional knowledge related to the specific knowledge of each field

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e-ISSN 1980-6248
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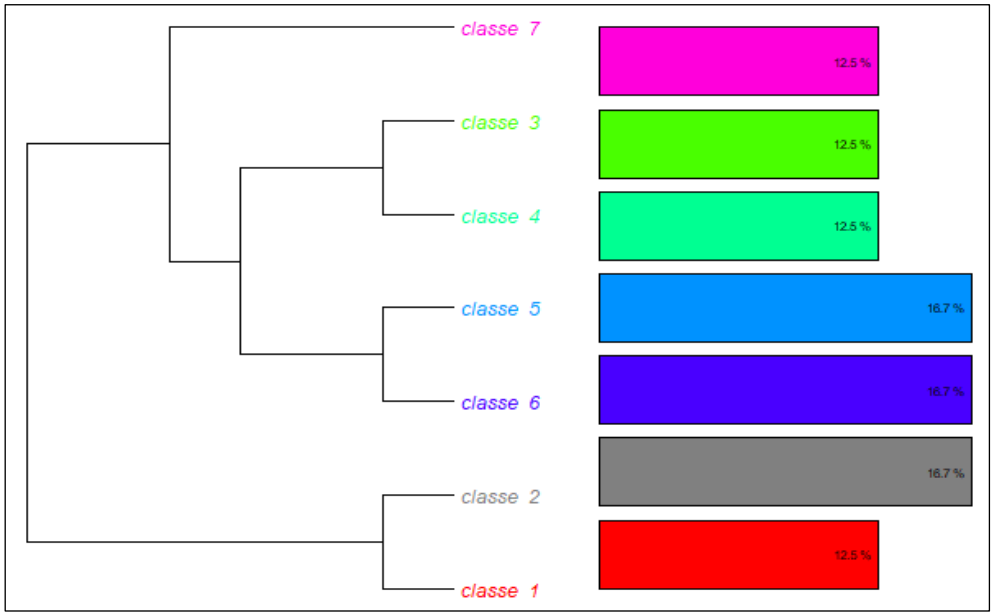
of knowledge; and practical knowledge derived from the learning acquired in professional practice.

The data from the answers to the open questions, when processed with IRaMuTeQ, enabled two texts, divided into 82 text segments (TS), with 1,018 different forms, with use of 72 TS (87.80%) and organized into seven classes.

The partitions performed in the *corpus* are represented in the DHC dendrogram, which, when read from left to right, was divided, in a first partition, into two *sub-corpus*: one formed with classes 7, 3, 4, 5 and 6 and the other with classes 1 and 2. A single branch contains class 7 at the top level, which connects with two *sub-corpus* of the same level, one with classes 3 and 4 and the other with classes 5 and 6. On the other side of Figure 1, there are also classes 2 and 1. Hence, the sets that have the same level are: classes 3 and 4; classes 5 and 6; classes 2 and 1, until DHC, in presenting similar words, stabilized, as shown below.

Figure 1.
DHC Dendrogram



Source: IRaMuTeQ formulation based on research data (2022).

In each class, when examining the percentage of TS and the forms of greatest significance in the association of words, those with $P < 0.0001$, it was noticed that class 1 corresponded to 12.5% of TS and its most significant words were "teaching" and "higher"; class 2 contained 16.7% of TS and highlighted with greater strength "no/not," "work," "directly,"

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e-ISSN 1980-6248
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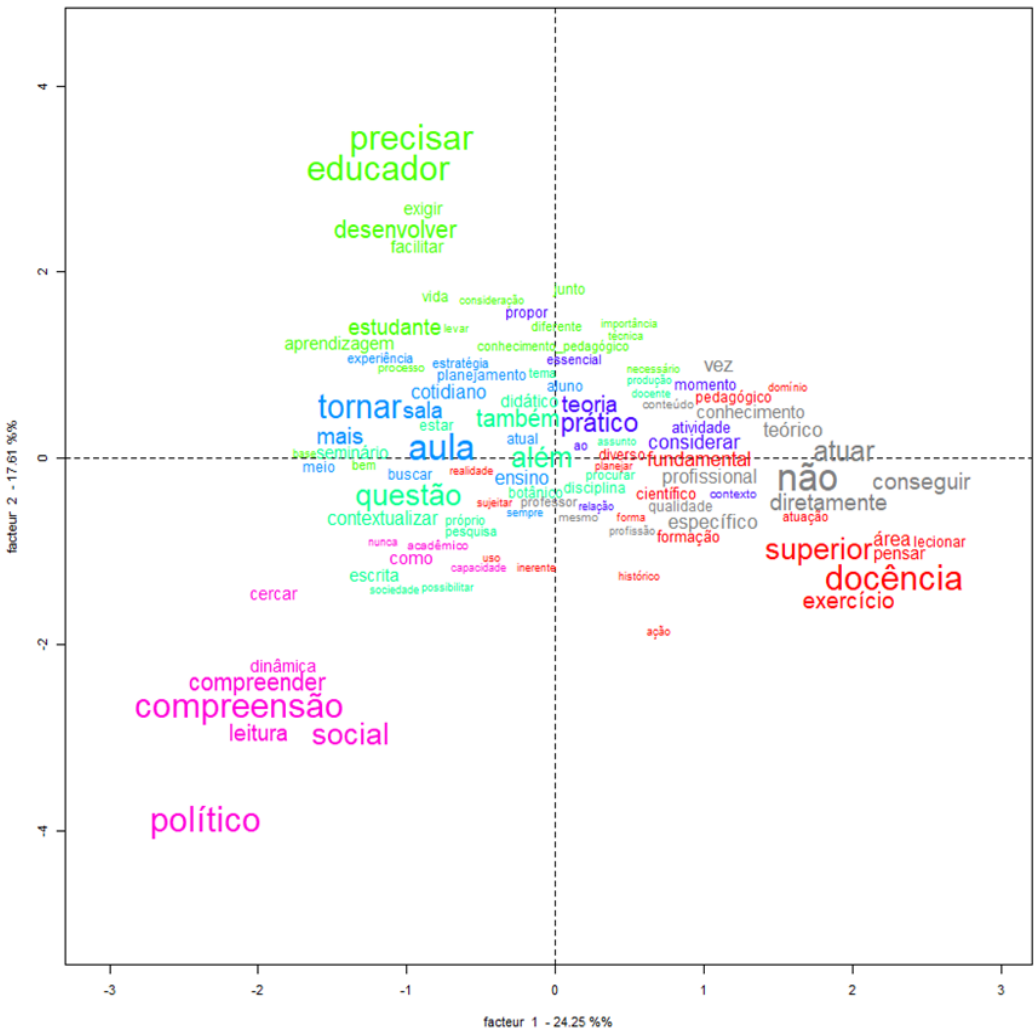
and “achieve”; class 3 presented 12.5% of TS and emphasized “need,” “educator,” and “develop”; class 4 comprised 12.5% of TS and evidenced “question,” “beyond,” and “also”; class 5 contained 16.7% of TS and highlighted “class,” “make,” “more,” and “room”; class 6 represented 16.7% of TS and emphasized “practice” and “theory”; class 7, with 12.5% of TS, highlighted “understanding,” “political,” “social,” and “understand.”

In Figure 2, all the forms that are part of each class were distributed in the factorial plane, in which, in its horizontal and vertical axes, the words are identified according to the color of the classes and the power assigned to each one of them, represented by the size directly proportional to the importance of the word in the classes. Thus, highlighted, in red, are those belonging to class 1; in gray, to class 2, and so on.

Figure 2.

CFA according to the forms that are part of the classes contained in the DHC



Source: research data ordered by IRaMuTeQ (2022).

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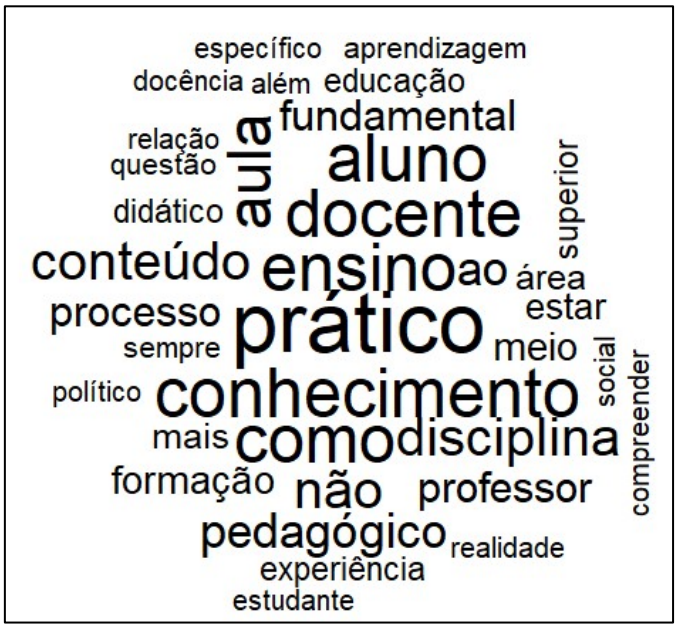
e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2022-0044EN

In Figure 2, class 7 (in dark pink color) is more isolated in the lower left quadrant, in a position of opposition to class 3 (in lime green color), located in the upper left quadrant. Class 1 (red) is more prevalent in the lower right quadrant, but words from all classes cluster in the central region, except for classes 3, 7, and 1, which exhibit more considerable distance from the midpoint.

IRaMuTeQ also highlighted the most reiterated active forms in the *corpus*, as noticeable in the center of the word cloud (Figure 3).

Figure 3.
Word cloud



Source: prepared by IRaMuTeQ according to research data (2022).

The word cloud above, in line with the other productions of the software, highlighted, at the epicenter, in greater dimensions, the words "*prático* [practical]," with frequency (*f*) 32, "*conhecimento* [knowledge]" (*f* 25), "*aluno* [student]" (*f* 24), "*como* [how]" (*f* 24), "*docente* [professor]" (*f* 24), "*ensino* [teaching]" (*f* 24), "*aula* [class]" (*f* 22), "*conteúdo* [content]" (*f* 19), "*disciplina* [course]" (*f* 19), "*não* [no/not]" (*f* 17), "*fundamental* [essential]" (*f* 15), "*professor* [teacher]" (*f* 15), and "*processo* [process]" (*f* 15).

In the ramifications of the similarity graph, Figure 4, we observed how the text was built and which links between the words emerged from the subjective answers provided by the teachers. In order to facilitate the understanding of the central connections and the structure of

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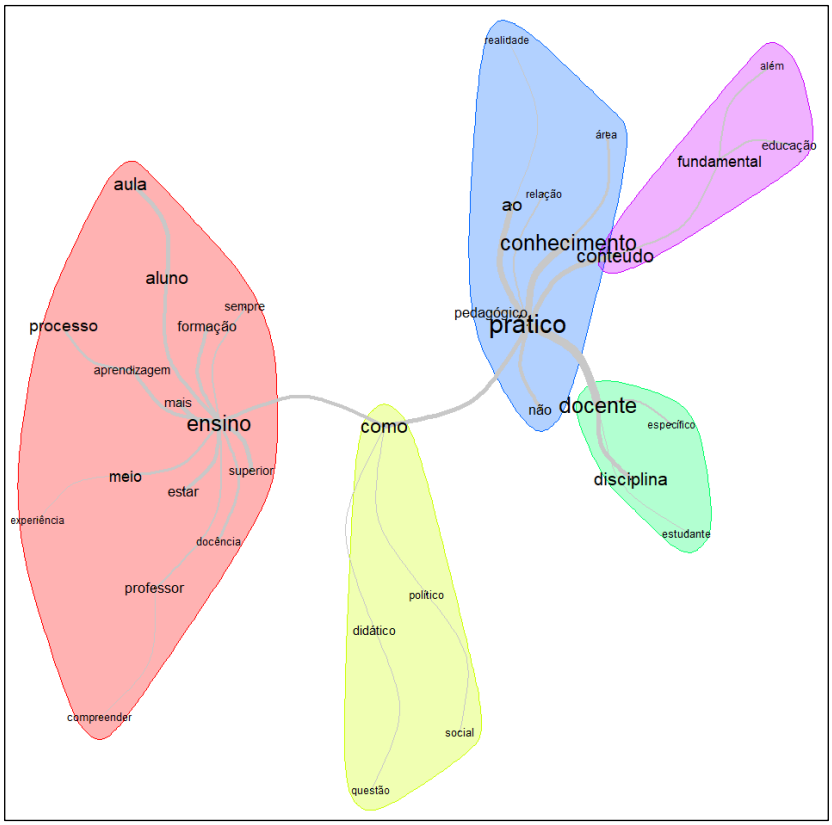
e-ISSN 1980-6248
http://dx.doi.org/10.1590/1980-6248-2022-0044EN

the textual *corpus*, this presentation was configured with graphic limits delimited by different colors, in which the colors were automatically assigned by IRaMuTeQ in areolar format and, differently from Figure 1 (DHC) and Figure 2 (CFA), the do not identify the classes to which the lexical forms grouped in each halo belong.

Figure 4.
Similitude analysis



Source: research data organized by IRaMuTeQ (2022).

In the five ramifications of Figure 4, it is highlighted, in a colored halo in salmon, "*processo ensino-aprendizagem* [teaching-learning process]," bringing together the terms "*aluno* [student]," "*aula* [class]," "*professor* [teacher]," "*formação* [training]," and others. In yellow-colored section, there are the terms "*como* [how]," "*didático* [didactic]," "*político* [political]," "*questão* [question]," and "*social* [social]." In the blue segment, "prático [practical]," "conhecimento [knowledge]," "pedagógico [pedagogical]," "conteúdo [content]," and others are shown. In green, "*docente* [professor]," "*disciplina* [course]," "*estudante* [student]," and "*específico* [specific]" are

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e-ISSN 1980-6248
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observed. In pink, "*fundamental* [essential]," "*educação* [education]," and "*além* [beyond]" are highlighted.

The analytical theoretical understanding of IRaMuTeQ's formulations supported the categorization of content according to the technique of Bardin (2016). Thus, when studying the details of the classes, through the DHC *typical text segments*, the distribution and highlight of words in the CFA quadrants, in the word cloud, and in the similarity graph, four categories can be identified, which are arranged in the subsequent paragraphs.

Category 1 (**implementation of teaching knowledges)**, from the TSs of classes 1 and 2:

Class 1 data

I always try to relate the two knowledges I mentioned: scientific knowledge and pedagogical knowledges related to teaching in higher education.

. . . Exercise of teaching in higher education. . . reflects on the scientific denialism that plagues a considerable percentage of the Brazilian population today.

. . . Critical exercise. . . and its articulation with social reality.

Class 2 data

Ability to think critically independent of specific content.

. . . That the teacher is not just someone who pasess content on.

Category 2 (teaching knowledges in face of the challenges of teaching), from the TSs of classes 5 and 6:

Class 5 Data

Experiential knowledge with the global COVID-19 pandemic and remote education used in classes becomes a challenge.

I seek to develop methodological teaching strategies that favor learning . . . .

. . . A very diverse audience.

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I try to make my classes as didactic as possible, understandable and thought-provoking, which is a constant challenge.

Everyday effort undertaken in each class and even before classes .. . so these knowledges are articulated, producing the effective achievement of the teaching-learning process.

. . . One class is never the same as another.

Class 6 Data

Combine theory into practice.

Every group of students is different.

How we position ourselves in face of false expectations that students bring.

Avoid dichotomy between academic production and students' daily lives.

Whenever possible, I encourage them to propose strategies that could be utilized.

Category 3 (**relevance of teaching knowledges)**, contemplated in the TSs of classes 3 and 4:

Class 3 data

Pedagogical knowledge is fundamental in order to learn about the different types of methodology and thus develop the themes with students, especially now that we are using remote education.

Experiential knowledges. . . make me reflect on my practice, creating other practices.

Curricular knowledge, as, in the teaching process, knowledge and mastery of contents are necessary.

Scientific knowledge and community popular knowledge, because they presuppose dialogue between different experiences of practical life and of academic or school life.

Class 4 data

Pedagogical knowledge, as, throughit, we provide in a didactic way. . . the conduct of the teaching-learning process.

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Curricular knowledge is fundamental for teachers in the process of training new professionals.

Category 4 (acquisition and development of teaching knowledges), inspired by the TSs of class 7:

Class 7 data

We never stop understanding the world around us.

Knowledge or a minimum follow-up of research or events that encompass political issues.

Every teacher is first and foremost a citizen and must understand that citizenship is closely linked to the socio-political projects of an era.

Creative ability to integrate content.

It is always necessary to observe the world so that we have sufficient bases.

Discussion

In advance, it should be noted that the IRaMuTeQ program contributed significantly to the processing and analysis of qualitative data from the open answers presented by professors representing the FAEC/UECE teaching degree programs on teaching knowledges that are essential to higher education. In fact, all the formulations of this *software* dialogued with one another, highlighting the most recurrent forms and their respective connections, so it optimized the content analysis carried out in accordance with Bardin (2016). However, the discussion based on previous research and the reflections emerging from the results to expand knowledge in the field of teacher training are qualitative facets developed through the qualified subjective interpretations of the researchers.

The textual *corpus* obtained 87.8% retention, exceeding the recommended minimum, which is 75% (Camargo & Justo, 2013, 2018). There was no incongruity between IRaMuTeQ's formulations and the researchers' analytical cognitive activity. Each ramification of the classes presented in the DHC inspired one of the four thematic categories. The way the words were distributed in the CFA quadrants indicated the connections existing in the responses presented

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by the respondents. The *typical text segments* of the classes contained TSs of both texts, those encoded by "**** *perg_14" and "**** *perg_13," corroborating the intertwining of the set of communications obtained with the investigation.

Effectivelly, the results of this study, in cross-sectional dialogue with the theoretical support referenced, shed light on the understanding of the epistemology of professional practice with a focus on teachers' opinions on the knowledges that materialize in the daily work routine, mainly because such knowledges constitute "a plural knowledge, formed by the amalgamation, more or less coherent, of knowledges arising from professional training and disciplinary, curricular and experiential knowledges" (Tardif, 2003, p. 36, our translation).

Analysis of the similarity graph enables inferring that teachers correlate teaching knowledges to student needs. From this perspective, they do not conceive the effectiveness of the teaching and learning processes as separated from the integrative teaching of the list of knowledges of the various issues alluding to education, such as pedagogical training and the political and social contexts. Pozebon and Lopes (2021) corroborate that teachers, before students, are mediators of systematized knowledge and occupy a central position in the schooling that problematizes and socializes collectively built knowledge.

These results are consistent with the doctoral study carried out with 29 teaching internship supervisors and 66 interns in Cape Verde, Africa, which found that the personal, professional and organizational dimensions of the training of future teachers require articulation promoting professional development and student learning (Lima et al., 2020).

When asked about the most relevant knowledges for higher education, they highlighted pedagogical knowledge as the most prominent (44.9%), but also underlined political knowledge (24.9%) and technical-professional knowledge (22.45%), with practical knowledge being the least significant (8.16%). With no intention to generalize, this finding probably suggests that the respondents are interested in acquiring knowledge, from basic training, pertinent to proficient performance in the classroom. Similarly, a study carried out by Merellano-Navarro, Almonacid-Fierro and Oyarce (2019), with professors from the Autonomous University of Chile, to understand the relationship between pedagogical knowledges and their applicability, found in them a greater engagement with the educational part focused on the strategies they will use to manage to enter the labor market and achieve effectiveness in student learning. The phenomenological study by Duman and Erdamar (2020), when evaluating the programs on the

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knowledges and experience of higher education teachers and teachers under training linked to eight universities in Turkey, found the need for more intensive monitoring and greater workload in practical internships so future teachers feel better trained for professional practice.

It should be noted the number of teachers excluded from an effective contract bond with the study institution, 11 of the 25 were hired for pre-stipulated time, which refers to the precariousness of labor still accentuated in the Brazilian educational public spheres. A recent survey carried out by Neves, Fialho and Machado (2021) showed that the precariousness of teaching in Brazil, despite being historical, has intensified with the COVID-19 pandemic and the lack of priority in government agendas, and still has neoliberalism as one of its main causes, in which the minimal State insists on making social and labor rights more flexible and/or removing them, such as the suppression of employment stability.

In fact, quality in education is a polysemic term linked to educational purposes and the determination of social roles alluding to the subjects of the interest group in this context involved (Mesquita, 2021). Therefore, it requires political effectiveness and correction of these distortions not only in Brazil, but also in other countries with greater economic power, as shown by the study carried out by Wilcox (2020) in England, where the recurring discourses try to sustain a standard of excellence in higher education, but there are disjunctions between the claims and institutional priorities that interfere with the guarantee of quality of teaching, student access and the employability of teachers. Therefore, they advise that educational institutions contextualize this quality with the perspectives of the teaching staff.

The category **implementation of teaching knowledges** informs how teachers apply the teaching knowledges they deem most relevant. As shown by the CFA in the lower right quadrant, in which class 1 predominates, permeated by class 2 of DHC, that is, the respondents equip themselves with the knowledges considered essential to guide their corresponding praxes, interconnecting them with a realistic critical view, in an attitude that is counter-hegemonic as to today's Brazilian scientific denialism.

In order to foster the students' critical perspective, regardless of the specific disciplinary contents, it is agreed with Freire (1987) that the educators' role is not to inoculate students with the content of their education, but to lead them to authentic thinking and to break vertical schemes in order to transform the oppressive reality. That is because, as Souza and Anselmo (2021) argue, the current system is exclusionary, which, by disseminating that education is

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neutral, falsifies the truth and operationalizes teaching for the benefit of dominant interests. However, Fialho and Sousa (2021) infer that this inhuman reality requires pedagogues with critical education that is contextualized with reality, who promote human emancipation, especially because teaching is a way of intervening in the world, irreconcilable with the transmission of packages of pre-elaborated knowledges that are at incompatible with the social context (Freire, 2011; Freitas & Oliveira, 2019).

The category **teaching knowledges in face of the challenges of the teaching work**clarifies how teachers mobilize teaching knowledges to face the old and emerging challenges that affect the teaching work. It is presented in the connection between classes 5 and 6 and stands out in blue tones, disseminated in the central position of the CFA, more visible in the upper right and left portions. In the detailed observation of the TSs that compose it, compared with the entire content of the responses collected, it is shown that the current COVID-19 pandemic underscores the need for teachers to boost relevant knowledge, such as those necessary to conduct classes remotely, which favor the education of students belonging to discrepant realities. These findings are consistent with the research by Santos and Oliveira (2021), which found that the abrupt call for teachers to teach mediated by Digital Information and Communication Technologies (DICT), without sufficient prior qualification, evinced the digital exclusion, much more perverse for students in the public education network, while requiring teachers, students and family members to make new material and intellectual appropriations, albeit often lacking institutional and governmental support. Sensitive to the students' differences and needs, the teachers under research articulate their teaching knowledges to the specificities of their students' reality and try to bridge the gap between theory and practice, encouraging students to propose solutions to the problems that affect them.

In this path, the problematization of reality—in an exercise of analysis in the pursuit of meanings and validity of the knowledge produced—combines with the multicultural educational perspective, as Abu-El-Haj and Fialho (2019) inferred when studying elementary education teachers in New York, United States, engaged with inclusive educational practices, where the commitment of these educators may derive from their own life trajectories, marked by experiences of injustice and social exclusion. In the Brazilian context, the study by Fialho, Machado and Neves (2022) shows that especially teachers who experienced outrages due to their social, race and gender conditions resignify their life and work trajectories, becoming militants against the conditions that subjugated them. The opposite is also true, as noted by

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Soares and Cunha (2010), teacher training must engender their own protagonism, in a reflective manner and committed to their life trajectory, while participating in a broad context full of political and social articulations. In other words, life experiences influence the teachers' repertoire of knowledges, just as such knowledges (re)build the meaning of being a teacher.

The category **relevance of teaching knowledges** specifies which knowledges teachers consider most relevant to their praxis. It is a category from classes 3 and 4, which in the CFA predominates in shades of green in the upper left quadrant, with blends in the central portion of the other compartments.

According to the respondents, all knowledges have their relevance focused on certain educational purposes. As proof of that, they understand that pedagogical knowledge makes known the methodologies necessary for classes; experiential knowledge enables reflecting on the teacher's performance, directing the formulation of classes, and curricular knowledge provides the appropriate content for the training of new teachers. Sordi (2019) and Alves (2015) even reinforce, when researching teaching in higher education, the importance of strengthening a university pedagogy that does not relegate the educational perspective to the supposed needs of the labor market.

Moreover, they argue that scientific knowledge should not exclude popular knowledge; on the contrary, pedagogical practice requires a perennial dialogue between life experiences and popular, scientific, school and academic knowledge. In a recent survey of the state of the issue, Monteiro, Pacheco, Magalhães Junior and Silva Neta (2020) showed that professors' access to teaching in higher education is provided by *stricto sensu* academic postgraduate programs, but as the main purpose of these programs is scientific research, and not teaching, the work in higher education is especially based on the knowledges of experience and specific knowledges from the initial training.

Certainly, Rodrigues (2018) explains that the construction of knowledge occurs through the tension between knowing and not knowing. Despite the tendency to disqualify common sense and ennoble science, scientific truth depends on the confidence in it, since even the most robust theories admit a contrary position. Such reflection has the potential to recreate educational processes with a view to obtaining education for all social subjects, because "it brings challenges, immersive narratives, creativity, self-training, self-criticism and focus on collaboration between teachers and students" (Brandenburg et al., 2019, p. 13, our translation).

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In the words of Freitas and Oliveira (2019), the social and intersubjective relations established by teachers throughout their life trajectory participate in the structure of their praxis and are the guiding thread for the construction of teaching knowledges articulated in practice and science. Evidently, the teacher polishes the knowledge to make it accessible to the student through dialogue, since, according to Freire (1987), those who learn and those who teach do so in communion.

The category **acquisition and development of teaching knowledges** shows the behaviors that teachers adopt to reach and strengthen the teaching knowledges. It emerged from class 7, which, at the higher level, has a single branch that connects to the other classes and, in CFA, is more clearly highlighted in the lower left plane, suggesting the notability of the repertoire of teaching knowledges for pedagogical practice.

The study showed that the foundation of the condition of professional and citizen stems from the continuous effort to understand the world. In this path, incompleteness is the certainty; however, this incompleteness is the dynamo for teachers to progress. Therefore, they seek, even minimally, to learn about scientific productions and socio-political events for the promotion of contextualized classes that converge to the current educational theories, in an evident approach to the principles of a Historical-Critical Pedagogy instituted by Saviani (2007) and also the Liberating Pedagogy of Paulo Freire (2011).

About this enterprise, Tardif (2003) emphasizes that teaching knowledges are acquired by interacting with society in a continuous process. Oliveira, Araújo and Silva (2021) corroborate this understanding, in a research concerning the knowledges and practices of high school teachers working in the public education network of the state of Ceará, Brazil, to overcome the educational gaps capable of establishing bridges between theoretical-practical knowledges, despite the complexity of teaching, as it is reciprocal work with human beings, their main object, teachers transform daily work routine into a learning space. Also in this regard, a study with teachers from a university in Sweden, developed by Sandoff, Nilsson, Apelgren, Frisk and Booth (2018), to learn about how and when teachers learn, showed that learning from experience is continuous and includes the ability to articulate, reflect and share with the members of the category the real teaching situations experienced, whose best result also includes recognition by higher education management.

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http://dx.doi.org/10.1590/1980-6248-2022-0044EN

Consequently, as mentioned, in the results section, class 7 predominates farther from the central quadrants of the CFA, in a position of opposition to class 3, possibly implying that, without the understanding arising from the dynamic, continuous and critical reading of the world in its multiple aspects, such as social and political aspects, the achievement of teaching knowledges may not be effected, hindering teaching and learning situations.

The FAEC/UECE teachers demonstrate a critical conception about the fundamental knowledges for teaching and affirm that they mobilize them consciously in the exercise of their pedagogical functions, in a clear sense of critical rationality, which indicates the conception of education as a historical and intentional phenomenon that goes beyond the individual development of the subject, of the curriculum as a space for intervention, and of teaching as an essential task.

The findings of this research enable us not only to infer the importance of the continuous acquisition of teaching knowledges and their mobilization in the exercise of the teaching praxis, but also to expand knowledge in the area of Education—more specifically in the field of initial training—, by demonstrating that the teaching and learning isues in Brazil go beyond pedagogical factors—because they also involve social issues and point to the need to disregard conservative and simplistic proposals for teacher training based on technical rationality, while providing the possibility of educational practices that seek social transformation.

Final considerations

This study had the objective of understanding which teaching knowledges are mobilized in the pedagogical practice in higher education, as they are considered essential for teacher training in teaching degree programs. To this end, we conducted a qualitative research with teachers who taught in the FAEC/UECE teaching degree programs, who point out that pedagogical knowledge is the most important knowledge, followed by political knowledge and technical-professional knowledge, with practical knowledge being the least relevant.

It enabled us to build the sociodemographic profile of the investigated subjects and to identify the knowledges that they considered most relevant to their respective daily work routines, which weere organized in the formulation of four categories: (i) implementation of

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teaching knowledges; (ii) teaching knowledges in face of the challenges of the teaching work; (iii) relevance of teaching knowledges; (iv) acquisition and development of teaching knowledges.

The profile showed that most of the teachers of the teaching degree programs worked in the Pedagogy program, were women, had more than five years of experience, and were aged from 50 to 51 years. However, we note the significant number of substitute and temporary teachers, close to the number of contract teachers, which demonstrates that many of the professionals are subjected to precarious working conditions.

The first category showed that the teachers apply teaching knowledges to foster the students' criticism and protagonism, obtain effectiveness in teaching and learning situations, and break dominant paradigms, which determine what and how educational institutions should teach for the benefit of hegemonic interests. The second category evinced some of the multiple challenges faced by teachers, especially those intensified by the COVID-19 pandemic, including those concerning disparities in access to resources for remote classes. The third category listed and reflected on teaching knowledges specific to the most particular situations, as it was concluded that, as pedagogical knowledge is situated in relation to didactics and methodology, curricular knowledge is situated in relation to educational content, and so on. The fourth category showed that teachers recognize the importance of pedagogical knowledge for conducting teaching and learning processes, strengthening the notion that teaching requires specialized knowledge, but, in the transversality of the list of knowledges, they should not fragment them or belittle those of popular origin. In summary, teaching was understood as a socially referenced practice, organized and conducted in a conscious and intentional manner through specific knowledges, thus, a scientifically developed capacity transformed throughout professional life.

It was learned, with the reflection associating the findings in IRaMuTeQ to the content analysis, that the methodological intersection favored the interpretation of the set of communications obtained in the qualitative studies and that the teaching knowledges, in their plurality, must be continuously built to legitimize the educational praxis. The word cloud showed that the educational practice, when based on teaching knowledges, places students at the center of the teaching process. Similarly, the similitude tree branches showed the intertwining of all knowledges around teachers and students.

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It was evidenced, however, that, although the data show that in the process of initial teacher training there is mobilization of knowledges in order to develop a knowledge-based humanizing pedagogical praxis, basic education still has problems related to students' deficient learning of contents. There seem to be no linear relation between what teachers learn in training spaces and what they do in schools, which dispenses with the understanding that it is necessary to consider the existence of factors that are not always pedagogical and that interfere in these processes, such as the students' socioeconomic conditions, family participation, school structure and, above all, the lack of a consistent and lasting political plan to enhance the quality of Brazilian education.

Practical knowledge—which was given the least importance—is fundamental for building a quality praxis; after all, it is on the school setting that it is possible to inseparably interrelate theory and practice. Thus, we suggest further research that can determine how practical knowledges are mobilized in teaching degree programs and what gaps its poor valorization can cause in teacher training.

As with all qualitative research, we note as limitation the impossibility of generalizing the data to the entire Brazilian context, not only due to the restricted number of participants but also due to the regional specificities of the Northeast region, more specifically in the countryside of the state of Ceará, in the city of Crateús. In fact, the study is important for contributing to the debate on teacher training, still the subject of political discourses, but requiring effective actions, which is ultimately reflected in the quality of formal education—that is still deficient.

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Submission data:

Submitted for evaluation on May 5, 2022; revised on September 12, 2022; accepted for publication on November 16, 2022.

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