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Research Articles

Impacts of the pandemic on teacher education: perceptions of future teacher

Impactos da pandemia na formação docente: percepções de futuros professores

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Abstract

This research examines the knowledge production of students at a public university. The objective was to understand their learning conditions in light of the changes brought about by COVID-19. Identifying coping strategies allows us to understand students' perceptions of the teaching profession and their future vision of being and becoming a teacher. This descriptive-analytical research involved 14 students. The collected information was analyzed using an autobiographical approach. The main findings indicate that the uncertain environment has influenced the educational process and its knowledge, as well as the need to transcend decontextualized academic content and knowledge to more critical understanding. As a future perspective for teacher education, we see the need to develop survival strategies for continuing their education.

Keywords: initial training; teaching knowledge; scenario of uncertainty; remote teaching.

Resumo

Esta pesquisa trata da produção de saberes de estudantes de uma Universidade Pública. Objetivou-se compreender as condições de estudo, frente às mudanças provocadas em sua vida pelo Covid-19. A importância de identificar as formas de superação permite conhecer as percepções que os estudantes têm da profissão docente e sua visão de futuro sobre o ser e o fazer-se professor. A pesquisa é de natureza descritiva-analítica e contou com a participação de 14 estudantes. A análise das informações coletadas nesta investigação foram realizadas com base em uma abordagem (auto)biográfica. Os principais achados da pesquisa indicam que o cenário de incertezas tem influenciado o processo formativo e seus saberes, bem como a necessidade de se extrapolar o conteúdo e o conhecimento escolar descontextualizado para um conhecimento mais crítico. Como perspectiva de futuro para a formação de professores, percebe-se a necessidade de criar estratégias de sobrevivência para a continuidade de seu curso.

Palavras-chave: formação inicial; saberes docentes; cenário de incertezas; ensino remoto.

INTRODUCTION

The teacher training process has undergone significant changes in recent years. These include the inclusion of the National Common Core Curriculum (BNCC); new guidelines and resolutions in the field of teacher training (Brasil, 2018, 2019); the recent Covid-19 pandemic; the growing devaluation of teaching as a professional career; the presence of technological demands in training; the increase in social inequality, among other aspects, are situations that have been impacting the work of teacher training. Therefore, we, as researchers, based on the study and survey of issues related to the educational process, examined the future of teacher training as practiced at the University.

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Thus, we conducted postdoctoral research among federal universities with the aim of understanding the conditions of home study in light of the changes brought about in students' lives by the Covid-19 pandemic. After all, what actually comes out of the classroom training process? What should we do during the initial teacher training process to avoid the classic belief that initial training is outdated? Is there any initial training that promotes a full understanding of action and doing? Far from answering all these questions, this text proposes to address the views of students in specific degree programs (Chemistry, Physics, Mathematics, Biological Sciences) on the educational process during the pandemic and their ideas for the future.

When talking about the future, Nóvoa (2014a) points out what teacher training and types of schools may exist. In his text, the author indicates that it is possible that there are three school models: public education with different schools – in which schools can organize themselves in different curricular ways, addressing local and regional issues, partnerships with universities, and specific learning proposals; a learning-centered school – in which the school

process and curriculum construction are based on a learning model or learning-based school promotion; or a public space for education: a new educational contract – a school focused on teaching and learning processes that are not necessarily concerned with social issues, since, for this educational model, there will be a parallel functioning of a government that takes care of society.

In this same context, Lessard and Tardif (2014) also point to three scenarios for educational training and schools: the first is a return to the canonical school and the model of educational inequalities, schools for different profiles and audiences, according to income and educational potential, with teachers and their work focused on welfare or scientific training – varying according to the audience. The second scenario is the takeover of education and schools by entrepreneurs who prioritize technical and technological aspects. In this scenario, we have an aspect focused on the technical training of teachers and the skills they possess to teach with excellence and effectiveness. A third scenario is a deconstruction of the two previous scenarios, aiming to bring quality education to everyone, at all social levels, breaking with the nostalgic education system and, at the same time, bringing in and using new teaching tools and engaging in dialog with those in training.

However, when we think about training teachers for the present/future, the question of what educational future we envision, or what present moment we are living in, brings us into conflict with new training perspectives. Nóvoa and Alvim (2021) point out that teacher training needs to be rebuilt in universities. For the authors, training should be closer to the school environment so that the reality of the school can be effectively addressed in training, that is, an idea that theory and practice should be closer to both practicing teachers and teachers in initial training.

This idea is not new. Zeichner (2010) already presented it with the proposal to create a third space, and this has been a recurring theme for those who study and discuss teacher training, a space that brings practicing teachers closer to students/teachers in training. As a symbolic space in which teacher professionalization is discussed and the professional identity of teachers is developed, it is also a space for the exchange of experiences and theoretical and formative debates on teaching, that is, a meeting place for practice and theory.

Thus, it is of utmost importance to understand how the pandemic has impacted students' educational knowledge in order to understand their study conditions in light of the changes brought about in their lives by COVID-19, which becomes the objective of this research, as it is necessary to reflect on how this formative knowledge contributes to this process in a world of constant change that has thrown us into a scenario of uncertainty, as referred to by Morin and Viveret (2013).

FORMATIVE KNOWLEDGE AND THE WORK OF TEACHERS

The initial training of future teachers is a subject that involves different types of knowledge related to teaching. In relation to specific degree courses, there are different types of knowledge, and they become more complex as the debate deepens. Gatti (2010) points

out that in most degree courses, pedagogical knowledge is not associated with scientific knowledge in the field (be it history, geography, biology, chemistry, mathematics, among others). And that training does not always establish this relationship, leaving students to make the connections between theoretical knowledge and professional practice. To corroborate this, a study conducted by Silva, Guimarães and Sano (2020) points out that teachers in specific areas of knowledge do not relate their knowledge to the training of future teachers.

Following this line of thought, Gatti (2010) and Pereira (2006) show that specific training courses sometimes explore scientific knowledge to the detriment of pedagogical knowledge, associating teaching with simply knowing the content. As a result, it is up to students to make and establish a relationship between the knowledge they use in their practice.

When we talk about knowledge, we understand that there are different references that mark and differ in the way knowledge is related. Borges (2001) presents in her article different possibilities of contexts in which knowledge is presented. It is important to note that the author also points out that this knowledge depends on translation and how it is used as a theoretical reference. Here, we will use the references of Tardif and Raymond (2000), Tardif (2000), and Gauthier (1998) as a basis.

The latter presents a concept that considers the nature of knowledge. The interesting thing about this approach to knowledge is that it relates to the subject and their formative histories, that is, there is a construction of the subject and their formation based on interactions and what knowledge means to the subjects. Thus, Gauthier (1998) points out that the context in which this knowledge is constructed is fundamental to understanding the constructions/conceptions presented by the subjects.

Using this reference, Tardif (2000) points out that professional knowledge is situated and personalized, thus being appropriate, subjective, and incorporated knowledge, which is difficult to dissociate from experiences and the work situation. In this sense, Tardif (2000, p. 15) warns: "A teacher has a life history, is a social actor, has emotions, a body, powers, a personality, a culture, or even cultures, and their thoughts and actions bear the marks of the contexts in which they are inserted".

Considering that knowledge is subjective and situated and that the definitions of knowledge developed in training processes depend on these relationships between subjects, Tardif and Raymond (2000) propose a framework of knowledge related to the training process and teacher development. In this proposal, the pluralism of professional knowledge is considered and is related to the actions of teachers and their learning. Thus, the experiences of the subjects promote the construction of different relationships with this knowledge, whether in training, in actions as teachers and/or personal experiences and subjectivities, among other possibilities.

Thus, Tardif and Raymond (2000, p. 215) propose a framework with the knowledge presented in Chart 1. The authors highlight that the separation of knowledge is directly related to time and source. That the processes and experiences in the subjects' lives will build and rebuild relationships with professional knowledge and its development. In this study, which involves teachers in initial training, we can explore the concepts presented about knowledge and its subjectivities, as well as this table by Tardif and Raymond (2000) – with the exception of knowledge related to experiences, since they are future teachers. It is worth noting that some studies on teaching knowledge have focused on the knowledge gained from experience and practice as if they were constructed independently of initial training (Lima, 2012).

However, although we focus on the knowledge of initial training for teacher professionalization, we must always bear in mind what knowledge is identified by students and which should be highlighted as training gaps and shortcomings that can be filled or provided through continuous actions, reflections on teaching experiences, thus creating an idea of ongoing teacher training.

In this regard, Imbernón (2009) states that the training of practicing teachers should be developed in collaboration with training communities, developing the teacher's identity in a broader way and directly addressing problematic situations – since this implies the

Chart 1. Teachers' knowledge.

Teachers' knowledge	Social sources of acquisition	Ways of integration into teaching work
Teachers' personal knowledge.	Family, living environment, education in the broad sense, etc.	Through life history and primary socialization.
Knowledge from previous schooling.	Primary and secondary school, non-specialized post-secondary studies, etc.	Through pre- professional training and socialization.
Knowledge gained from professional training for teaching.	Teacher training institutions, internships, courses, etc.	Through professional training and socialization in teacher training institutions.
Knowledge gained from programs and textbooks used at work.	Through the use of teachers' "tools": textbooks, programs, exercise books, worksheets, etc.	Through the use of work "tools" and their adaptation to tasks.
Knowledge gained from their own experience in the profession, in the classroom, and at school.	The practice of the profession at school and in the classroom, the experience of peers, etc.	Through work practice and professional socialization.

Source: Tardif and Raymond (2000, p. 215).

engagement of teachers in training activities, an aspect pointed out by Gatti (2010) as one of the problems of ongoing training, which acts much more in the academic than in the school context.

Understanding that professionalization and training influence the work of teachers in some way, it is important to contextualize some issues of teacher training that are influenced by teaching work. In this sense, Lessard and Tardif (2014) point out that the massification and bureaucratization of education have influenced teacher professionalization. Added to this is the complexity of teaching in the face of the uncertainties that are established with teaching, since each school subject, school, city, and/or state has its own issues and worldviews regarding teaching and the teaching and learning process (Morin, 2014).

This scenario of uncertainty is a recurring theme in the construction of the profession and professionalization of teaching work. "Uncertainty is where we move, not only in action, but also in knowledge" (Morin; Viveret, 2013, p. 55). In this regard, Imbernón (2016) points out that for quality training and performance, teachers need training that brings pedagogical improvements, such as new digital tools, labor improvements — related to freedom of action in the classroom and professional legislation — and, finally, social improvements, considering the space and time in which the school is inserted. All these issues are directly related to the initial and continuing training of teachers, but also to the abrupt changes in school structure that directly interfere with teaching work.

Still on the subject of teaching work, Lessard and Tardif (2014) observe a breakdown in teaching work, an understanding that the action and professionalization that have been demanded in schools are directly related to the technical execution of teaching and, at the same time, a process of surveillance of an educational system in response to what is required of them (assessment tests carried out by third parties, directive curriculum proposals without consultation or participatory construction, among other specific aspects of each region). The authors warn of the danger of the growing commodification of education, a process closely linked to our current curriculum construction — BNCC (Brasil, 2018; São Paulo, 2020), as factors that construct teacher professionalization as a technical skill and competence.

In this regard, Nóvoa (2014b) points to the dilemmas of the teaching profession and indicates some relationships between work and the educational knowledge to be taught. The author also describes the need to reconstruct professional knowledge through reflection, recognizing that it is necessary to know how to analyze educational processes as well as to analyze oneself within them. It is also important to discuss how education is

currently organized — which correlates with the perspective of new curricular ideas — as well as to define what kind of work will be done by teachers in these new perspectives and professional trajectories.

In these issues regarding teaching work, we need to consider how to train these professionals, what school spaces we currently have, and what space there is for knowledge and learning, so that we can dialog with such knowledge in teacher training. According to Nóvoa (2014b), schools have become multipolar, disciplinary, and bureaucratic spaces that need to be revised. These issues directly interfere with teaching work and the social constructs that are established with the school and with the professionalization of basic education teachers and the knowledge linked to this training.

METHODOLOGY

In terms of methodology, we approached descriptive-analytical research which, according to Gil (2008), is developed based on the description of the characteristics of certain populations or phenomena. In this sense, we systematized, described, and analyzed information about the educational reality, deepening our knowledge about the students in the course: who they are, where they live, what they do for work, and what their expectations are for the undergraduate program.

According to Prodanov and Freitas (2013, p. 52), descriptive-analytical research:

> [...] observes, records, analyzes, and orders data without manipulating it, that is, without interference from the researcher. It seeks to discover the frequency with which a fact occurs, its nature, its characteristics, causes, and relationships with other facts. Thus, to collect such data, specific techniques are used, among which interviews, forms, questionnaires, tests, and observation stand out.

For this study, a questionnaire was administered via Google Forms, targeting students completing their course. The students answered a questionnaire with open and closed questions about the course, age, gender, shift, year of entry, and other general aspects related to personal data, as well as 13 open questions about their training prior to the pandemic and that which was ongoing during the Covid-19 period. The purpose of these questions was to understand the initial teacher training process and their possible roles as future teachers in Basic Education.

The number of students is small because they were collected from graduates of the teaching degree program who were doing supervised internships during the pandemic and consented to the use of their responses. All students digitally signed the informed consent form. The project is part of biographical reports of students in training that had to be adapted during the pandemic, for example, by collecting data via a form at a single moment in time. The project was submitted to the ethics committee.

It is important to note that the instrument presents different questions related to the pandemic and, at the same time, to the future of these teachers and their training issues. To conduct the research, we counted on the participation of 14 students and, according to the data collected, we observed that our students are between 21 and 36 years old. These students are completing one of the four teaching degrees investigated. Eight students are in the biological sciences degree program, three are in the chemistry degree program, two are in the mathematics degree program, and one is in the physics degree program. Eight students are in the morning shift and six are in the evening shift. These students were enrolled in internship classes and were completing the course.

The analysis of the information collected in this investigation will be based on an (auto) biographical approach. Therefore, we agree with Souza (2007, p. 66) that "[...] to narrate is to enunciate a particular reflected experience on which we construct meaning and give significance".

The results will be presented as follows: the first part will address the effects of the pandemic on training, the impacts of the pandemic on training, and how students organized themselves during the pandemic period; the second part will present the training knowledge developed

by students related to the actions established during the pandemic to continue their studies. From these analyses, we will conclude with perceptions of future visions for training and some notes.

One of the concerns of this research is how much the pandemic affected the studies of future teachers. It is worth noting that this sample group represents a portion of the students who continued the educational process. We were unable to measure how many students actually had access to this *email,* and we were unable to determine how many students discontinued their studies due to the pandemic (whether for health reasons, access, or space for study). Therefore, this investigation has an impact representing those students who minimally continued their undergraduate studies.

RESEARCH FINDINGS

Impacts of the pandemic on education

As noted in recent literature, the pandemic has brought many difficulties to the educational process. In our research, we observed that our sample group pointed out some of these aspects. Among the impacts, we divided them into the following subcategories: impacts on access and study/methodological adaptations (clearly indicated by twelve students); emotional impacts (indicated by seven students); impacts on teacher training and pedagogical practice (indicated by nine students).

IMPACTS ON ACCESS

The issue of access was mentioned, according to the interviewee. E1: "*Sometimes we have internet signal drops. Noise too*".

Another point raised in this study is the time needed to continue studying. E3: "*Balancing homework with studies, balancing tasks related to caring for other family members with studies, noise at home, balancing work and studies, psychological problems*".

To try to mitigate these issues, students pointed out different strategies to overcome the challenge of remote learning, one of which was to take fewer courses. E3: "*I started taking fewer courses so I could handle everything I had to do. In addition, I started to organize my day better, setting fewer tasks for each day so I could get everything done*".

It is worth noting here not only the issue of access to the internet and schools, but also the issue of study and work time. The pandemic changed routines and ways of doing education, and the adaptations were noticeable for practically the entire sample group.

Emotional/motivational impacts

Some students point out different issues that hinder the learning and study process. Reports related to motivational and emotional factors are highlighted as key aspects by most students. Examples: E7: "*The main difficulties are emotional/psychological, not related to access. Lack of attention, focus, and compromised memory, increased anxiety and sadness – due to the distance from my family*"; E2: "*Willingness to attend classes, difficulty concentrating at home*". E13: "*Mood and disposition*".

It should be noted that these issues were recorded during the pandemic years, with the possibility that these students had completed a third of their education remotely. These academics were sincere in presenting different feelings about the moment we were living in and the relationships established to carry out educational activities. Among the reports were feelings of insecurity, discouragement, lack of concentration, anxiety, and hopelessness. These distressing aspects were compounded by public health issues at the time, with numerous hospitalizations, deaths, and constant waves of COVID-19.

As an alternative proposal, one student developed leisure activities that could disconnect them from the current situation. E1: "*Going for walks in places or at times when there are few people around, sunbathing, listening to music, watching TV, or doing something that distracts me from these things for a while. Then I would come back calmer and able to concentrate better*".

These other activities vary, from outdoor activities, investing in scientific research, spending time in conversation with other people—colleagues, students, and family members— among other possible aspects.

However, some pointed out an important factor: they were thinking about completing their degree.

> *Unfortunately, I haven't found any great strategies to solve these problems. Currently, much of my motivation comes from the desire to finish my degree and, in this way, overcome these problems* (E7).

> *Online study is very tiring. Fortunately, I am at the end of the course, but I imagine it must be much worse for new students. The only motivation to continue is to think about the amount of time that has already been dedicated to the degree. To stop now would be to throw all that time away* (E12).

This last statement reflects how much education has been affected during this health crisis and how much this has impacted the training of educators/teachers through their concern for students entering the program during this pandemic. It is very important to recognize that students have had to reorganize their studies based on the possibilities available to them in a scenario that is not conducive to learning and studying for teaching.

Impacts on training and teaching practice

It is noteworthy that these students point out these reflections in their textual discourses. Two students point out the relationship between face-to-face training and supervised internships – noting here that the interviewees were students nearing the end of their course.

According to Student 7:

> These experiences will most likely have a negative impact on my professional life, especially the absence of in-person internships. The lack of contact with students in the last three internships allowed me to compare and verif ly how the two internship modules I did in person were more beneficial and taught me about teaching practice. Meanwhile, these remote internships consisted much more of filling out documents, doing analyses, and planning lessons with totally compromised applicability, completely sidelining the teaching experience that is expected in an internship.

In addition to him, Student 11 also says that:

> With my (current) perspective as a teacher, I realized how important it is to organize students' lives, making guidelines, deadlines, etc. clear. But otherwise... I don't think there was anything essentially new... Except that the internships that were supposed to be in person became remote, and in that sense, it was sad because the overall picture was quite negative in public schools, and our experience could have been more beneficial in terms of improving practice when returning to in-person classes.

Contrasting these statements, a student who did the entire internship remotely points out how this can impact training and how teachers approached remote work.

> *Above all, it was a very rich experience as an education professional, doing the internships now, because I could see how different authorities act with teachers in an emergency situation... The problem that arose was realizing the extent to which professionals are undervalued. I know I talk a lot from the perspective of an intern/almost teacher and little from the perspective of a degree student... but it is impossible to dissociate these things. I can't get too upset about a subject that has been less than ideal at a distance, when I see how little support my teachers had to reform these subjects...* (E4).

Other students point to other professional issues impacted by this teaching modality. E2: "*I think my learning is being somewhat limited in this format, and this will reflect negatively on my professional life*". E8: "*Because I want to pursue a career in education, in these months I have been*

able to understand much more the importance of school and formal educational spaces in the training of students".

It is clear from these statements that there has been some educational loss and that this may in some way affect these teachers' future actions. Importantly, we note that students have a strong reflective view of the educational process. These portraits and excerpts show that students who are in the process of completing their courses are attentive to issues related to their own training and understand that demands may arise in the near future. Such reflective experiences can be seen in the following reports:

> *For training as a teacher, the remote learning experience will certainly lead to thinking about the different ways in which students are impacted by how content reaches them and that there are different ways of interacting with this content. I also think it is important to reflect on the advantages and disadvantages mentioned for each model, in addition to the reports of many friends and colleagues, with varying opinions on remote, face-to-face, and hybrid learning. It is interesting to see how the same situation reaches each undergraduate student in very different ways, how the same teacher's method works in very different ways, not only remotely, but also in person. I even think of this variation in learning according to the method as a relevant topic for research in education* (E14).

In addition, Student number 6 also reports that:

> *I have been thinking a lot about continuing education for teachers, and I think that is what will have the greatest impact—courses and the like. I think the need to have teachers who are better prepared for teaching that takes into account uncertainties, students' contexts, and ways to recover what we have lost is important. So, I think that, in general, it didn't have much impact on my professional life because I am really at the end of my undergraduate studies, but thinking about the future (as a graduate), it would be in relation to my continuing education* (E6).

Considering the uncertainty surrounding the pandemic and the possible reflections, students point out that the pandemic has brought some technological tools, an awareness of the importance of face-to-face classes, and a practical idea of adapting teaching and possibilities. E1: "*I learned that in education it is always possible to adapt and be able to teach and learn, as long as everyone involved participates*"; E3: "*I think this period helped to show the need for understanding others and ways of adapting, especially in relation to teaching, where we had to adapt to teach and learn in the way we had always been accustomed to*"; E7: "*What I learned most from remote learning, especially through internships, was how to use technological tools in a classroom, whether to develop different teaching methodologies or to make classes more universal and accessible to students*".

This view of the learning and possible adaptation procedures that took place is a portrait of the sometimes face-to-face, sometimes remote training established for these undergraduates. In addition, these students point out observations of the actions of the teachers they accompanied. These discourses present themselves as forms of learning constructed throughout the training.

> *Another thing that contributed a lot to me was learning to adapt. In the remote internship I did, I saw the teacher use many 'tricks' to attract students to the class, and sometimes they were effective. Look: I'm not trying to romanticize all the teacher's efforts, on the contrary... but it gave me an idea of what to do when everything seems lost* (E5).

It was also possible to identify that student number 4 points out that:

> [...] *and overall, my experience was good, the teachers were always empathetic and understanding. In this sense, I think the experience will also help me to be that kind of teacher in my practice, and class consciousness is more important than using certain technologies* (E4).

When considering these aspects, the discourses presented here, we encounter different types of knowledge mobilized and used throughout the undergraduate program. In the examples

above, we see that learning, by observing teachers' practices, contributed to new teaching possibilities in different ways.

A caveat should be made about technological aspects within the educational perspective. These tools have increasingly entered classrooms and, according to Lessard and Tardif (2014), one of the possibilities and educational scenarios is through these new technologies and forms of teaching practices. Of course, the tool can assist in the teaching and learning processes, but it implies formative knowledge to be included in teacher training and work. This type of impact was also recorded by Karsenti (2014) in a study in Quebec, in which teachers presented formative difficulties in the use of information and communication technologies in teaching practice.

Training knowledge built by students

As stated by our theoretical references on formative knowledge, it is important to provide the historical context of the collection and the location where the training takes place. The university to which the students are affiliated follows a four-month course schedule, and students enter via interdisciplinary bachelor's degrees. Courses are chosen throughout the training process. What are the implications of this pedagogical project? Well, to begin with, students have more freedom to set up their schedule and course duration, and can even take more than one course (three in total). This gives our students—future teachers—the opportunity to take advantage of different courses and training programs that make them unique, as each one can choose different paths. If they choose only the teaching degree for their course, they will have a more direct path – which does not happen often, as many take teaching degrees and bachelor's degrees in related areas.

Thus, training issues permeate this question. And, for our group of future teachers, the training aspects and their knowledge reflect these career path possibilities well. It should be noted that there was no direct question about teaching knowledge, but that this knowledge was presented spontaneously **by the participants** within the narrative constructed by the students. One example is the student who begins a master's and doctoral degree in a field related to biological sciences and, at the same time, returns to undergraduate studies to pursue a teaching degree.

> *In reality, I dropped out of the course when I started my master's degree, and only resumed after defending my thesis and starting my doctorate. I think the key factor at the time was the devaluation of knowledge related to teaching at various levels. Some things still bother me and discourage me, such as the devaluation of teachers as professionals, which is not only due to low salaries, but also to the lack of freedom in their work. I find it frustrating that there is so much quality production in education and that it is not put into practice because educational policies are made in disregard of this consolidated knowledge. At the time, I was also frustrated that teachers did not respond more energetically to guesswork and uninformed opinions in the classroom... I thought that knowledge about education needed to be treated more like the 'hard' knowledge of the natural sciences - simply correcting misconceptions. I matured in my thinking on this last point during my time away from teaching. I think that today I understand individual experiences and views as more important than passing on a very rigid and closed message. I understand tolerance for certain views better today* (E4).

This account by student 4 contains elements that indicate that formative knowledge gives substance to the analysis of teaching practice and a maturing that occurs during undergraduate courses. We highlight here aspects pointed out by Tardif (2000) and his personal and experiential knowledge from his teacher training, as presented in Chart 1. This statement itself contains aspects about teaching and about being a teacher. Some relate to the valorization of teachers, others to the approximation of theory and practice—which promotes reflection on the distance between the university and the construction of this pedagogical knowledge in schools. This valorization of knowledge for professional training in teaching is also pointed out by another student who compares how students view the teaching degree:

> *Universities in general, and in my case* [cites the university], *still treat the degree arbitrarily, as does a large part of the population, devaluing teacher training and their role in (basic)*

> *education. As a place for the creation and sharing of knowledge and science, I believe that universities still have a long way to go before teaching degrees have the same 'value' as bachelor's degrees* (E14).

The statements by students 4 and 14 point to the issue of being a teacher and seeing oneself as a teacher. At the same time, they highlight aspects that Tardif (2000) points out about the role of the institution in the training of teachers who go into teaching, from the valorization of this professional to the proposed curriculum structure.

In this study, all participants indicated that they intend to complete the course and work as teachers. And, considering this issue of practicing the profession, the students indicate that training provides a certain security or structure for teaching. As stated by interviewee E13: "*Of course! I studied hard and have the background of having classes with excellent teachers, which gives me security*". And this other statement:

> *In the presence of teachers working in schools and in situations where I put myself in the role of teacher (such as the biology class I taught at a popular prep course, private English classes, and tutoring classes at PIBID), I still feel like I am just starting out in the profession. It seems like there is some magic formula for teaching that I have not yet accessed, and I always think that I know much less about the content than I should in order to explain it. On the other hand, looking at all the content and trajectory I have in my degree and in biology, I feel that I have made immense progress and see aspects of education that I would not have noticed without this background (especially when I start a course at college and judge the entire teaching plan, didactics, evaluation process, and teaching style). Outside the specific scope of teacher training (didactics, teaching and learning methods, development theories, and the like), if I had to point out one human and social aspect that the degree certainly helped me develop, it would be empathy* (E14).

One can note different training contexts and elements that brought something meaningful to the student in training. It is clear that she restructured the pedagogical and didactic knowledge and experiences gained in her initial training to support her confidence in teaching. It is understood that, in these cases, there are reports of experiences prior to the pandemic (remembering that they are graduating students). It is also interesting to point out elements that are structured within scientific, pedagogical, experiential, and personal knowledge (relating to the affective side when mentioning empathy). These aspects are pointed out in Chart 1 as knowledge related to teaching (Tardif, 2000).

These elements were significant in this student's training and are knowledge that can structure her action as a teacher. Gauthier (1998) and Tardif (2000) point exactly to these meanings, in which the structuring of knowledge is carried out within the subjectivities of the subjects involved and that the construction of this knowledge depends on the interpretations and formative situations experienced. Thus, we can highlight these paths taken by students in the pursuit of this formative process and experiences lived through the institution:

> *Yes, I believe so. The course at* [name of institution] *is broad and covers diverse knowledge in biology and science, in fact. Something very important that I learned throughout my education at [cites the institution] was learning to think—I don't think this makes much sense outside of my head, but is it like the development of critical thinking? Perhaps. Getting involved in extension and research projects was also very important in expanding my contact with other areas of knowledge and learning about school dynamics, etc.* (E6).

These statements reveal the care taken with formative experiences related to projects and programs that encourage teaching, as well as research and extension activities. These aspects express how formative knowledge was analyzed and emphasized by the students. Considering this knowledge, it was pointed out as both favorable and unfavorable in the formative process. Both point to what Gatti (2010) and Pereira (2006) present in their texts regarding the importance given to scientific content in specific teaching degrees.

In the discourses presented here, we have formative aspects related to didactic and/or scientific knowledge as relevant aspects for training and, at the same time, formative absences,

superficialities of content. It seems repetitive to point this out, but knowledge depends on the scenarios of uncertainty in learning and how subjects understand and accept such knowledge.

Some omissions can be reviewed in the training processes, others are more difficult, as they are related to experience. Experiences will have a specific relationship with the school, students, and the processes and programs established in Basic Education institutions.

Thus, the teacher in training faces another challenge: understanding the formative aspects, references, and knowledge, tools, and, finally, a curriculum different from the one experienced. Tardif and Raymond (2000) present that some school knowledge is used when the teacher begins their school career. This group in training, specifically, will have to explore this knowledge from another perspective—a new school curriculum and the knowledge intertwined with it. Lima (2012) points out that this mobilization is an integral part of their training, which is built over time, and that this identification of the use of knowledge allows for the expansion of the knowledge produced by universities.

THE FUTURE FOR FUTURE TEACHERS: FINAL REFLECTIONS

As mentioned earlier, all interviewees participating in this research intend to become teachers and work in basic education (some indicated public schools or private schools). Others pointed out that they may pursue research and postgraduate studies. Some are already doing so—those who do have some specific training, since they complete an interdisciplinary bachelor's degree in order to enter the teaching degree program, and, with a completed course, they enter a postgraduate program.

It should be noted that even with a small number of students, the data show the reality of teacher training during the pandemic period and, with that, we raise the question for the future: who was able to do any activity during the pandemic? And what about internships, which involve contact with schools, schools with virtual teaching spaces, and also remote teaching? All of this reduces student participation in this study. One possibility for continuity would be to check where and how the students who did their internships during the Covid-19 pandemic are doing, as well as the formative impacts of this period on the experience of teaching.

All these paths bring us back to our discussion of the scenario of uncertainty in teaching. As pointed out in the students' statements, when we think of education as a process in motion and in the construction of formative processes that involve teacher training, educational trends, methodological innovations, temporal records of practices, the development of critical thinking, as well as reflection on school actions, among others, all of this, despite having a very significant meaning in the formative process, is part of the uncertainties of knowledge. One of the authors who discusses these uncertainties is Morin (2014), who states in his book that the teaching process is complex and that this complexity depends on the worldviews that individuals experience.

Thus, in a scenario of uncertainty, the educational process and its knowledge depend on the processes and experiences of the students. The educational context directly influences how knowledge will be perceived and produced by students, and in this study, we collected data from students experiencing a transitional education.

Even though teacher training is constantly changing, these students experienced in-person training, followed by remote training, and some may have completed their degrees remotely. In addition, these students/teachers are entering the profession based on a new national curriculum proposal, which will not be discussed here due to lack of space. Although it is clear that schools have their own functioning, organization, and elements of teacher performance that consider affective, emotional, and knowledge aspects, many choose teaching or the field of science based on educational processes and the themes and approaches developed during their school training.

Thus, from the perspective of an education based on the complexity that is school and teaching, it is clear that, still following Morin's (2014) assumptions, there is a need to go beyond decontextualized school content and knowledge to a more concrete, more critical knowledge.

This space for critical thinking and context is lost amid so many possible paths proposed in the new school structure.

Therefore, the new school structure designed by the governments in office for the training of future teachers creates a script for teaching, which not only stifles creativity but also distances students from knowledge. The pandemic period demonstrated students' ability to create survival strategies to continue their studies, corroborating the research objective, which was to highlight the study conditions during this period. These actions carried out and reflected upon by the subjects surveyed show that, at least in the training of the subjects of this research, despite the difficulties faced, they found ways to achieve their teaching degree through their experiences in university practice, thus building the future based on the knowledge produced.

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