

Research in initial teacher training: identifying problems in individual pedagogical practice

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Abstract

Degree papers in initial teacher training are an opportunity to develop reflective practice and teacher leadership, aimed at a socio-educational transformation committed to school learning. The aim of this article is to analyze the formative experience developed from the identification and understanding of a problem in teaching practice, based on the *Design-Based School Improvement* approach. The case study consisted of 14 teachers who were writing their degree work, and it explored the experiences in the last stage of their initial training through conversational instances that revealed their difficulties to identify and understand a teaching practice problem of their own, starting from an initial externalization of the problem and its causes. Furthermore, the experience based on a reflective practice and the application of this investigative approach favored the understanding of their professional work and awareness of the problems associated with pedagogical practice over other educational topics. As a conclusion, we stress the need to rethink research in training, focusing on the study of individual pedagogical practice to promote teacher leadership and impact the transformation of the pedagogical core.

Keywords: teacher training – teaching-research – teaching practice – educational problems – degree work.

Introduction

Rethinking education is a challenge centered in awakening innate abilities to learn and change socio-educational reality through practices and strategies that free the students' learning (Rincón-Gallardo, 2019). To promote this liberalization we need to focus on the way teachers develop a teaching leadership that allows them to learn freely, transform their own professional practice, and have an impact on the pedagogical core; that is, the basic unit in which

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learning takes place (Elmore, 2010; Palencia *et al.*, 2019; Perines and Murillo, 2017). Thinking of teachers' learning as a free, active, and constructive process for professional development and socio-educational transformation promotes different actions supported by the collaboration of the different actors of education (Naranjo, Guerra, 2021). In agreement with this perspective, Hargreaves and O'Connor (2020) regard collaborative research as one of the early stages of collaborative professionalism, since it helps to identify problems in the practice that are then studied systematically to improve teachers' work, not as an action isolated from teaching but as a practice integrated into daily pedagogical tasks. Likewise, intended discussion may promote the development of reflective thought in future teachers (Díaz, Núñez, 2021).

In this line of thought, educational research should not be left for the end of a teacher's training but should be a practice that unfolds as future teachers enter the socio-educational context (Marcelo, Vaillant, 2018; Perines, Campaña, 2019), using a scientific methodology that allows them to transform the reality of education (Rubio *et al.*, 2018). A recent study by Perines (2020) shows some benefits of educational research for initial teacher training, among which are reflecting upon their own practice, developing critical thought, and renewing their pedagogical knowledge. Therefore, a renewed training view of educational research involves considering premises of learning and a continued school improvement research approach that function as a very accurate lens to identify and solve practice problems. Under this prism, the research approach of the *Design-Based School Improvement* (Mintrop, 2016), (DBSI, from now on) represents a path for professional learning and development. It is used to identify and solve daily practical problems faced by school leaders in the field of school learning and management. However, its capabilities allow us to use it in improvement projects in different school settings (Mintrop, 2016). Consequently, using its principles in the field of teaching practice favors the development of critical reflexive research thought through a structured process in which teachers think about their practice intentionally. Thus, research considers the analysis of pedagogical decisions and the empirical evidence of the students' learning process linked to the needs of situated professional learning and development (Darling-Hammond *et al.*, 2017; Marcelo, Vaillant, 2018).

Taking into account the diverse challenges of teacher training, this approach becomes a scaffolding for the development of teachers' leadership since it orientates the identification and solution of problems in their practice (Mintrop *et al.*, 2018). Thus, awareness of these problems contributes to the professional development and transformation of the leadership of the teachers who reflect upon their practice; that is, upon what they do, how they conceive their role, the questions and interpretive frameworks that guide them (Cochran-Smith, 2020, Domingo, 2020; Darling-Hammond *et al.*, 2017; Villagra *et al.*, 2022). As Schön (1992) explains, reflection allows teachers to re-signify their educational role, how they work with their students, and how they understand the functioning of pedagogical interactions and learning methods and strategies. Thus, initial and ongoing teacher training faces the permanent challenge of orientating

teaching as an uncertain and complex activity so that teachers challenge their own and others' systems and structures, moving away from the technical view of teachers as reproducers (Cochran-Smith, 2020).

At the end of teachers' training it is often required that they conduct some research in order to obtain their professional certification on subjects that involve compiling bibliographical or practice papers, which reduces the possibilities of research based on their own practice since they are aimed towards subjects outside their teaching action, whether it is linked to the discipline, the didactic of it, or the implementation of a public policy program (García, Madarova, 2019). In the case of Chile, there are few studies that link the research of degree papers with teachers' reflection upon their own practice. Research findings refer to the study of reflection through the line of practical training, addressing subjects such as the benefits of reflection, the roles of tutors and supervisors, strategies for reflection, and levels or foci of reflection, among other dimensions (Díaz, Núñez, 2021; Lara, 2019; Merellano *et al.*, 2019; Nocetti *et al.*, 2019; Ponce, Camus, 2019; Ruffinelli, 2021; Sáez *et al.*, 2019; Salinas-Espinosa *et al.*, 2019).

This traditional research approach may arise due to the teachers' interest in training within the educational context or to a suggestion of the guiding teacher who accompanies future teachers through the writing of their degree paper. Following this rationale, methodological procedures and instruments to collect data are selected according to external criteria, since in educational research work teachers in training are not themselves the objects of study, and hence are not directly involved (Capocasale, 2015; Stenhouse, 2004).

Faced with this, it is important that teachers in their initial training as well as more experienced teachers apply not only the knowledge generated by others but also the one they have constructed themselves, through their own foundations of knowledge and their own professional practice (Tardif, 2010). In this view, teachers in their initial training must become protagonists of the production of their own knowledge to transform the field of education through critical pedagogical thought, overcoming the mere role of receptors or consumers of knowledge (Catalán, 2017; Palencia *et al.*, 2019). As Zavala (2019) proposed, the analysis of teachers' training as researchers of their own practice is fundamental and entails a new understanding of their own professional work as they acquire, as Barkhuizen *et al.* (2018) suggest, a broader and more comprehensive understanding of theory and practice, and develop their critical reflection upon the impact of their own pedagogical practices on students.

Considering these premises, this study seeks to analyze and understand the experiences of teachers in their initial training who conduct research focused on identifying and defining difficulties in their teaching practice following the *Design-Based School Improvement* approach. This research process of their own practice entails identifying their professional development needs through a critical-reflexive examination that involves a dynamic of intuition and rationality about teaching problems and their relationship with school learning.

Teachers' leadership and reflexive practice in their initial training

Reflexive practice is understood as a critical examination of the teachers' work that makes it possible to understand and improve pedagogical practice (Beauchamp, 2015; Schön, 1992) and becomes a key axis in the teachers' initial and ongoing training (Vanegas, Fuentealba, 2019). According to Domingo (2020), reflection generates new knowledge built upon the complementarity and significant feedback between theory and practice, which in turn generates a bi-directional flow between both realities. Consequently, the development of reflexive practice is a challenge for teachers' training that goes beyond the distinction between a theoretical or practical training, and that is related to the design of opportunities of learning in order to develop a professional thought that articulates both types of knowledge.

A reflexive teacher adopts a critical perspective of education to transform its purposes and processes. In this respect, reflexive practice is regarded as an attribute of being a teacher (Domingo, 2020; Schön, 1992), since "reflection allows us to rethink our professional performance, and consequently the construction of pedagogical knowledge" (Merellano *et al.*, 2019: 1). Beauchamp (2015) suggests the need of delving into the concept of reflection, which is often addressed in a simplified or technical way and does not foster an emancipatory reflexive practice that requires depth because it is linked to identity, the self, and emotion, in a dynamic and multidimensional context. Unfortunately, Chilean studies have confirmed the prevalence of descriptive reflections in which even pedagogy students claim to have had an instrumental training, which evidences the need of considering in this reflexive process the sociopolitical and ideological implications that permeate teaching (Lara, 2019; Nocetti *et al.*, 2019; Ruffinelli, 2017). Thus, adopting a critical reflexive practice as a flexible way of teaching thought that allows the teacher to continue learning requires coherent formative practices in which reflection must not become an inauthentic structured routine.

Fostering professional learning and development from a teacher's initial training invites us to adopt a broader perspective about the teacher's role that transcends the classroom. According to this view, we conceptualize the teacher's leadership as going beyond the teacher's usual duties, having an influence in the school, the community, and the profession (European Commission, 2019). In an analysis by Nguyen *et al.* (2019) several different conceptualizations of leadership came up, sharing the following features: *a*) it is a process of influence, *b*) it is exercised upon a basis of mutual collaboration and trust, *c*) it takes place both inside and outside the classroom, and *d*) it aims to improve learning at school. In this respect, educational trainers and leaders must consider modes of professional development that take into account the teacher's leadership, especially because this aspect is increasingly demanded and assessed in teachers (Wenner, Campbell, 2017).

A teacher's reflexive practice and leadership are challenges for teachers' training since they are linked to Caena's (2021) ideas about the need of guiding the training of adaptive profes-

nals who can take on different roles according to the situation and the context, among which are taking initiative, solving problems, and managing collaboration and conflicts. The idea of adaptation is linked to a view of education that defines teachers as lifelong reflexive co-learners, which shows the need of developing the key competency of learning to learn (Cabrera-Cuadros, Soto-García, 2020; Rincón-Gallardo, 2019; Sala *et al.*, 2020). Thus, this transformation alludes to what and how both students and future teachers must learn, since future teachers need to train with an approach that allows them to develop a new form of pedagogical thought to continue learning as they face challenges or problems.

Therefore, if we intend to transform education we must think about how, starting in their initial training, teachers learn to think in order to face the many and emergent problems of equality and learning of the classroom and the educational community, because reflection is hindered by the university itself (Nocetti, 2016). According to this perspective, it is a social responsibility to promote teachers' leadership and reflexive practice to get past the traditional view of the mastery of professional contents and promote the shaping of a new of thinking and experiencing pedagogy.

Research on one's own teaching practice in the DBSI approach

The DBSI methodological approach for problem solving focuses on identifying, understanding, and solving day-to-day and complex problems that affect the work of the actors of education and hinder the learning of both students and the professionals involved. The methodological procedure involves four stages: I. defining and framing the practice problem, II. diagnosing the causes of the problem, III. understanding the process of change, and IV. evaluating practices and feedback (Mintrop *et al.*, 2018).

A practice problem exists when it has the following attributes: it is specific, urgent, recurrent, shared, and the actors of education can contribute to its solution (Mintrop, 2016). When a practice problem with these particularities arises, teachers become aware of its difficulty and this takes shape in a pedagogical reflection on the professional practice that is not helping the learning of students and teachers. Thus, "experiential knowledge" appears that does not emanate from educational theories or institutions, since it is practical knowledge that is interpreted and understood in order to guide daily teaching work in all its dimensions. Experiential knowledge promotes a "teaching culture in action" (Tardif, 2010: 37) focused on learning to learn about one's own professional practice, and allows us to analyze and clarify principles and beliefs that underlie one's actions, starting by identifying our own practice problems.

A proper understanding of a practice problem includes an analysis of the causes that originate it and make it persist, which may consist of a combination of internal or external factors and, since many of them are not easy to identify, it becomes necessary to explore them in depth through a diagnosis (Mintrop *et al.*, 2018) that allows us to establish a cause-and-effect

relationship between the problem and its motives, through which there can be a professional reflexive analysis grounded on evidence and its interpretation in the light of experience and the knowledge that educational research provides. In short, a well-defined practice problem understood and solved according to the DBSI may significantly influence the improvement of school learning, also generating in teachers a greater sense of autonomy, self-efficacy, and satisfaction in their work, which allows for the liberalization of learning (Rincón-Gallardo, 2019).

DBSI as a methodological approach, like that of Kemmis and McTaggart's *research-action* (1992), aims to intervene in complex educational settings in order to contribute to educational improvement through the solution of problems faced by the actors of education. Both individualize through processes of observation, reflection-introspection, and the development of proposals with solutions to performance problems in educational practices that hinder school learning and the learning of teaching itself. In the case of DBSI, in the determination of practice problems there may be an iteration of them that helps identify and understand problematic behaviors; that is, who or what causes these patterns, who is responsible for them, and who must make the changes required. In order to frame practice problems, these must be perceived and constructed through a mental capacity that makes a rational and professional reflection based on a rationale of analysis of sequences and correlations of categories that allow us to move on to the stages of the design of proposals for improvement and the evaluation of their implementation. Like in the research-action approach, there is a possible iteration of the practice problem and designs for their solution. Therefore, in both cases the training pedagogue would develop the skill of reflection proposed by Schön's model (1992), which begins with the development of intuitive processes of the difficulties presented, as in the DBSI approach, but must be supported by empirical observation and analysis grounded on theoretical knowledge. Consequently, as Schön (1992) proposes, future teachers will start on a path to become reflexive professionals. For DBSI the reflexive process must be continuous through the development of its stages, while for the research-action approach this skill is deployed in each of the introspection cycles once the stages of planning, implementation, and observation have been specified.

Methodology

This is an educational research study that seeks to contribute to solving educational problems (Bisquerra, 2004; Creswel, 2012) through a phenomenological approach with a case study design (Stake, 1999). The research context is a group of future teachers writing their graduation paper in the fourth year of the Pedagogy major. Using a qualitative methodology, we aim to explore the impressions of those who conducted the process of defining a teaching practice through the reflection and active interpretation of subjectivities and the narration of the process they experienced, since "descriptions and assertions about reality not only inform about it but constitute it" (Guber, 2011: 43).

Participants

14 students of the last year of a Pedagogy in Primary Education major of a private university in Santiago de Chile participated in this research. During their last semester, they wrote a formative paper entitled “Degree Seminar” (“Seminario de Grado”) to complete the Bachelor’s degree program in Education and obtain the degree of Teacher, as they conducted their professional practice in schools with high socioeconomic exposure where each future teacher taught for 20 hours a week in one or two Primary Education courses.

In regard to the ethical safeguards of the study, each participant accepted voluntarily to be part of our research by signing an informed consent form and was aware of its purpose and warranty of confidentiality.

Data compilation instruments and techniques

In order to explore the impressions of the teachers in training about the experience of defining a teaching practice problem we conducted semi-structured interviews and discussion groups. These instances of production of knowledge, based on conversation as a basic mode of human interaction, allowed us to explore how people experience and understand their world (Kvale, 2011). Thus, we prepared two questionnaires. One of them was applied with individual interviews during the training process, and the other was used to collect data through discussion groups once the training process was completed. Before being applied, the questionnaires were submitted to the validation of experts to analyze their contents in regard to our research objectives. The three evaluators consulted shared with us their comments, which allowed us to re-orientate the questions in order to conduct a more focused compilation of information.

To draft the questions in the conversational instances, we defined two categories (Table 1) that aim to delve into the experience of defining a teaching practice problem and the reflection and learning this process led to.

Table 1. General questionnaire to orientate the production of knowledge

Categories	Orientating question
Definition of a teaching practice problem	What did the exercise of thinking about the definition of a practice problem mean?
	Did you succeed in understanding and applying the DBSI concepts? Which difficulties did you encounter in the definition of a practice problem? Were there moments when you focused on problems other than your own teaching practice? Why do you think this happened? After defining a teaching practice problem, did you realize that the focus of the teaching action was your learning and that of your students rather than the teaching process?
	How did you manage to solve the complexities you encountered to delimit and define a TPP? Which competencies did you have to deploy? Were they effective?

Teaching learning and reflection	Which new (conceptual, procedural, and attitudinal) learning did you build based on the process of defining a teaching practice problem? Why do you regard it as learning?
	How do you evaluate the process of looking at your own teaching practice and applying the reflexive procedure transit from your first intuitions to a more precise formulation of a teaching practice problem? How does the process conducted help you understand that reflexive practice has an impact on your professional development and your students' learning?
	Summarizing, could you narrate your reflections and learning in the curricular activity considering four key concepts: solving a teaching practice problem, reflecting on your own practice, teaching leadership, and socio-educational transformation?

Source: own.

Data analysis procedure

The data obtained in the interviews and discussion groups were reduced through a process of open and axial encoding using the ATLAS.ti software, which allowed us to examine textual material through the two categories established and identify new relationships according to the data interpreted in their intensity rather than their frequency (Flick, 2004). In this respect, subcategories emerged that revealed the meanings that participants gave to the experience of research on their own practice, and in particular, in regard to the first stage of defining a practice problem. The data analysis was conducted through a description of the emerging categories and subcategories, which were contrasted with the referents of the study and the intended research process of initial teaching training, described below (Table 2).

Table 2. Process of defining a teaching practice problem according to the DBSI approach

Stages	Substages	Description
Delimitation and definition of a teaching practice problem	Description of low inference of problematic behaviors, attitudes, and beliefs for the identification of the professional development needs.	Individual and group pedagogical reflection between teaching pairs of teachers in training and collaborating teachers and/or supervisors on the teaching and learning process. For instance, when it takes place, how it takes place, how often, and what effects the school learning problem described causes on the learning itself and on the teachers' professional development.
	Approximation to the delimitation of a teaching practice problem.	Identification and description of the transit from early intuitions to more precise formulations of a teaching practice problem, supported by evidence. Delimitation and definition of a teaching practice problem. Description of the rationale to delimit and define a teaching practice problem: grounding by its features.

Causal analysis of the teaching practice problem	Analytic reflection to identify the problem categories that explain the origin of the teaching practice problem.	Identification of problem categories (internal or external to the individual).
	High-inference evaluative analysis of the cause of the teaching practice problem.	Analytical reflection on the impressions the teacher may have of the causes of his/her teaching practice problem. High-inference evaluative analysis of a TPP.

Source: own.

Results

The results were organized in two categories: 1. Definition of a teaching practice problem, and 2. Teacher's learning and reflection, within which we analyze the emerging subcategories that allow us to delve more analytically into the subjectivity of the teachers in training about their process of research of their own practice.

1. Category - Definition of a teaching practice problem

1.1. Difficulties to analyze one's own teaching practice

The narrations of the teachers in training reveal how difficult it was to observe their own exercise in the classroom and identify teaching practice problems that may be the subject of research based on the constant tension with school learning. The tendency to apply a traditional formative approach to degree papers makes these teachers observe educational reality from the outside, where the focus to define a research problem is education as a phenomenon of which the researcher is not part. According to the referents consulted, teachers must develop and deepen a pedagogical research way of thinking that allows them to tension their teaching practice and the school learning process.

All of that led to a conception that seemed to be very naturalized in our minds, that in the end the definition of the problem was based on a problem that had to be based on another person and not on us, and I think that change we had, that mental metamorphosis of understanding that the problem was ours ... we had to seek a way to change it, find a solution, and try to understand it (Teacher in training 1).

In the narratives it also became evident that reflecting pedagogically to identify weaknesses in teaching practice is a complex challenge, and that the iterative persistence in the imaginary to find a problem outside the teachers' practice and without a solution is revealed. Likewise, it became clear that training reflective teachers is a complex, human, and less technical task, since it aims to strengthen the teacher's professional and personal development (Domingo, 2020).

I found it to be a great challenge, as my classmates said ... because we had the idea [that] our paper was research, someone else's problem [that was] almost impossible to solve, and it was challenging to reflect on what is hard for us, our weaknesses. So at the beginning it was complicated and we often paid more attention to external problems rather than to our own, and that is our weakness, not to see our own problems or search into ourselves. It was confusing at the beginning but it has been good because it has kept us evaluating and looking into ourselves after a class and asking ourselves if we have been improving or not. It's still hard for us, and for me it has been a great challenge (Teacher in training 2).

However, in order to analyze their own practice teachers in training must have different types of knowledge so that they can reflect on their pedagogical exercise in the classroom and so that their reflection becomes a habitual experience in their professionalization processes. "If we had been trained in reflection skills, perhaps identifying our own practice problems wouldn't have taken so long" (Teacher in training 8).

Under this premise, it is imperative to develop an initial training with a reflexive-critical view of the teaching practice, taking as a horizon the pedagogical decision-making for the continuous transformation of teaching in order to guarantee school learning. Schön (1992) underscores that the professional act manifests itself in the practice; in it, a teacher in training learns from his/her pedagogical exercise, which is oriented towards action and not only towards knowledge (Cantón-Mayo, Tardif, 2018). Precisely, the testimony of the teachers in training alludes to this professionalizing component: "The most important learning in this definition of the problem was the moment of defining a practice problem; it forced us to reflect upon our own practice to realize where we had to make improvements" (Teacher in training 3).

Another factor that makes it difficult to observe one's own teaching practice was detecting and clearing up previously initial intuitions (Mintrop, 2016) about which could be the difficulties of the teaching exercise.

I feel that when they are abstract concepts and we all have different interpretations of it [...], for example, intuitions, because we all have different intuitions, meanings, and we understood it differently, and so we clashed because we didn't know who was right in the group, because each one had the reflection of his/her practice in his/her head (Teacher in training 1).

There is an emphasis on limitations due to the use of intuition and rational thought to explore and identify a practice problem through intuitions that evolve into conscious decisions that aim to solve problems.

1.2. Identification and objective definition of a practice problem

The teachers in training coincided in the prevalence of the difficulties to determine and define a teaching practice problem, since the observation was linked to an external educational reality,

before they learned about the *Design-Based School Improvement* approach, which structures a new learning experience whose research subject is the teachers in training practice themselves: "It was a whole process, because at the beginning one always visualizes the problems in the others and in the interpretations that one sees, not the ones of which one is part" (Teacher in training 7).

They also underscore the subjectivity present in the interpretations or explanations of the other teachers' practice problems. According to the DBSI perspective, in order to describe problematic behavior, attitudes, or beliefs, limits for personal interpretation personal or the subjective inferences that may emerge in the stage of identification and delimitation of practice problems must be established. Hence, problematic actions are described following a low-inference observation rationale (Mintrop, 2016). In fact, even when the problem resides in one's own practice, the observable description of the action must be as objective as possible to isolate personal biases. The aim is definitely to describe "what I see, what is happening": "The act of discussing and delimiting a problem with your peer, I think that it's hard, especially in this process of reflection that must be profound to arrive at a common point." (Teacher in training 10).

The narrations make it evident that in the process of identifying and defining a teaching practice problem the future teachers had constructive conversations to determine in each of the working groups a common teaching problem in their professional work. However, our research findings show that during the process of identification of the problem the symptoms of the difficulty that make it more complex to understand the problem begin to emerge. In this respect, a positivist way of thinking about what "must be" emerges that hinders inductive thought about the socio-educational context. This tension is caused by a permanent idea between what is and what should be (Mintrop, 2016).

1.3. Complexities of externalizing the causes of the problem to assess teaching practice problems

The causes that originate and reinforce the persistence of a practice problem may be many and may respond to external and internal factors of the teachers who experience such difficulties (Mintrop, 2016). In order to carry out a good diagnosis, we must recognize those motives that are closer to the difficulty in question. As Mintrop *et al.* (2018) point out, asking questions like which causes come from the individuals or which causes come from the individuals' environment allow us to approach answers that might be the cause of the problem.

The narratives describe how these fundamental aspects to detect and analyze the cause of the teaching practice problems are addressed. First, the motives are linked to the research problem itself through reasoning and action, thus reinforcing the coherence of the research line (Mintrop, 2016).

At the beginning it was difficult to find the problem in me, but at the end I managed to understand it properly. However, I believe that particularly the causal root design in the diagram, for instance, was complex not to fall into placing underlying problems on others and not in ourselves as a priority because, when we ordered, we saw that it was in others and we came back and said no, there's a problem here, we discussed it and we realized that it was wrong without falling into a justification (Teacher in training 14).

In the view of another group of teachers in training, it became evident that in order to diagnose and understand the nature of the practice problem they applied a categorization that entailed a greater linkage and deepening of the relationship between causality, effect, and the difficulty of the practice being studied, so they focused on those causes related to the subjects of the problem. It is necessary to understand the patterns that interact with the problem; that is, analyze one's ideas about who or what causes the patterns, who is responsible, and who must make changes, as Mintrop (2016) indicates. This rationale becomes evident in the description of a group of teachers in training through the development of their research process, which shows the differences between the diverse understandings developed in the professional learning process.

First, we had to find the causes, which had to do with the dimensions we had to comprehend, namely the issues closest to the problem we had to solve and which were related, for example, with the students' knowledge, their reality. Then, we began to see aspects such as the teacher's own knowledge of himself, of his/her teaching, his/her collaborative work, and then circumstances that were related not so much with the students but with the teacher's work became apparent (Teacher in training 5).

2. Category Learning and teachers' reflection

2.1. Learnings of those who inquire, analyze, and reflect upon their own practice

Following Mintrop's approach (2016), the route to define a teaching practice problem becomes a powerful cognitive experience for pedagogical reflection upon the needs of professional development, since it questions the effectiveness of the teacher's work in regard to the students' learning. In this respect, it is important to recognize that the conception of practice is broad and not linked to one form of know-how, but also involves what teachers think about their work, the interpretive frameworks that guide their actions, and the ways in which they relate to students, families, and communities (Cochran-Smith, Lytle, 1993, as quoted in Cochran-Smith, 2020).

I completely agree that the focus should be on us as teachers and not our students or other people's problems that might occur. I agree because the change starts in us, in order to generate changes in greater problems one must start by oneself, and therefore, the learning has to be through us (Teacher in training 11).

I think that if we compare at the beginning and now, our perspective is totally different because, of course, it was easier to blame the system, the school, the children, and then you realize that you yourself have the tools to change things through your actions. (Teacher in training 12)

Beginning teachers recognize in their narrations some self-knowledge about the cognitive skills developed to define a problem in their teaching practice, when they point out that they should have applied some reflection and comprehensive critical analysis of the pedagogical actions conducted in order to determine their needs of professional development. For Mintrop (2016), this is an intellectual effort that implies deploying analytic, synthetic, and creative thinking to study the behavioral patterns, the attitudes and the beliefs present in the data collected throughout the process of defining a practice problem.

I hadn't weighed the importance of having to see where my weaknesses were when I paid more attention to my actions than to those of others, so I believe that reflecting on and making a critical analysis of my own practice were a learning experience because, although I knew it, I had not put it into practice nor taken the time to reflect on each of the decisions and practices I did not have, and therefore this learning was built now (Teacher in training 13).

Nevertheless, although the narrations underscore their learning about their own practice as a new learning constructed, they did not delve into the concrete way in which they carried out their meta-cognitive strategies, as can be inferred from their narrations.

2.2. Individual reflection as an experience to transform educational practice

As can be seen, the teachers in training established a link between their teaching practice and their pedagogical reflection, which allowed them to interpret situations in their practice "through observation and reflection upon our actions, describing the tacit knowledge implicit in them" (Schön, 1992: 35). Thus, practice is a dynamic activity conducted upon the basis of knowledge in action. Korthagen (2017) points out that both experienced and beginning teachers have the ability to reflect upon their teaching work, which makes reflection an essential element for professional learning: "Reflection is something that is misunderstood, when people believe that it is only giving an opinion, but it is a complex process ... I believe that reflection is this movement, this mental noise that shows something is happening, and we have to see why." (Teacher in training 2).

Following this line of reasoning, reflecting upon action implies that teachers question their actions in regard to the achievement of school learning (Korthagen, 2017). On the other hand, the narratives also show the progress of the teachers' cognition through their inquiries, analysis, and reflection upon their practice, in which the teachers transform their action as an object

of reflection and think about what they have done to find out how their knowledge in the action may have contributed to a given result. "I analyzed my context in depth, inquired why this happens, inquired into those details, and they change everything, even my whole planning." (Teacher in training 1).

In the two modes of reflection shown, the teachers' professional practical knowledge is experiential and built in a situated way in each context (Marcelo, Vaillant, 2018). On the one hand, the awareness of the link between the teacher's learning and the transformation of the educational practices can be inferred, and on the other hand the way in which that transformation of the educational can translate into the improvement of school learning can be considered.

The topic we cover comes from our own vision and analysis that would finally result in the students' learning. Thus, it was a consequence of our action, and of seeing what kind of improvements we could make in our work and how that would translate into our students' final learning. So I think that they are small links that come together and generate a concept of mutual learning, which I believe is an important factor to consider (Teacher in training 5).

Trying to improve our own practice under the different reflexive and improvement aspects has an influence on the students' process, because I believe that this process is like a scale: as one of them is strengthened the other one is strengthened too (Teacher in training 10).

We see that the teachers in training linked their practice with school learning from a cause-and-effect perspective; that is, a relationship between teaching practice and student learning, which led us to the challenge of fostering an inductive pedagogical thought that focuses on the student's learning to rethink and transform teaching practice. This way of conceiving pedagogy leads us to rethink training from the perspective of the students' learning, which constitutes a change in the conception of professional development (Marcelo, Vaillant, 2018).

2.3. Teaching reflection between peers as a bridge for collective learning in a professional practice community

Teachers in training understand that in a reflexive discussion between peers there is a convergence of different perspectives on teaching that allows us to generate a social knowledge of it.

Well, being able to work collaboratively to define the problem, because discussion between peers helps, besides looking at yourself, and gives you another perspective, it helps a lot (Teacher in training 1).

Collaboration helps to strengthen ourselves, see our weaknesses, and support each other. That is where teacher leadership comes in, how we create links with other teachers in order to transform education and solving these problems. I feel that it was one of the challenges in the exercise we did. We had narrative sessions where we saw our problems, presenting for others, and that generates reflection on how we would like to change education (Teacher in training 3).

From the same perspective, Hargreaves and O'Connor (2020) recognize the relevance of collaboration, since it is key that professionals discuss and deal with relevant common issues. However, it would be important to consider how to carry out this process efficiently and how to conduct our profession in a more collaborative way. For instance, we would have to include deliberately both individual and collective reflection in teacher training programs (Noffke, Brennan, 2005 as quoted in Beauchamp, 2015) to understand and solve practice problems that hinder learning and the comprehensive development of each student in the school.

2.4. The teacher's leadership and its meaning in educational work

Teachers in training need reflection upon their teaching to allow them to address difficulties in order to understand them and solve them, and to do that they have to do to become teaching leaders. Accordingly, Muijs and Harris (2007, as quoted in Bush, 2016) define a teaching leader as one who usually contributes to the school's improvement through initiatives and good practices.

Reflection on one's own practice involves looking at myself and my actions in the practice, which allows me to lay out a problem and look for a solution to that problem, and that brings me to the teacher's leadership: since I have a problem, my goal is to solve it, and how do I do that? In general, through team work, reflection... understanding, and when I find that objective and its solution I can achieve the socio-educational transformation (Teacher in training 1).

We become empowered teachers, applying methodologies according to the present context and the century we live in, considering our students' real needs. Also, we are already able to recognize weaker elements in our practice in order to apply strategies and generate changes that aim to improve the quality of the educational system in the short term, without depending on external changes or people to generate transformations (Teacher in training 4).

The narrations also show that the new teachers' actions, destined to reflect upon and solve practice problems between peers without depending on other actors of education of higher rank, imprinted a sense of autonomy, self-efficacy and commitment in their professional work. All these manifestations are qualities related with the attributes of teacher leadership proposed in the Nguyen *et al.* (2019) study, particularly those regarding collaboration and trust to improve school learning and the school.

In short, we may draw from the analysis the following central category: Strengthening of the learning and reflection of the teachers in training, through understanding teaching practice problems (TPP). Thus, Figure 1 presents the learnings and complexities that arose throughout the process of identification and understanding of a teaching practice problem.

peers based on the empirical observation of the teacher's work. Observing, reflecting on, and inferring to identify and define teaching practice problems and understanding their causality creates new knowledge situated between knowing what, knowing when, and knowing why they occur. This also helps with evidence to clarify specific patterns of action linked to strongly maintained experiences or conceptions, which fosters the resignification of deeply rooted cognitive constructs, asking the teacher how his or her pedagogical decisions impact on learning by making it clear who is responsible and who must make the changes required (Mintrop, 2016).

The complexities of the process are associated with the "Difficulties to analyze one's own practice". Therefore, the challenge is deconstructing the old paradigm of "Traditional research approaches centered in others", which bring as a consequence the "Complexities of the externalization of the causes of the TPP". Inductive reasoning also deals with questioning initial assumptions that must be refined through objective observation of teaching that triggers reflection and opens new scenarios before the "Need to solve in order to change". Thus, "Strengthening the teacher's leadership" and sense of self-efficacy are fostered in order to advance professionalizing development as a continuum where the only permanent thing will be change itself.

Conclusion

In this study we have seen that the teachers' research process is a relevant action that marks the last stage of the teachers' training. This unveiled, first, a traditional conception of research linked to the study of educational problems external to the subject-researcher. This idea is very different from the approach of the teacher-researcher who observes, analyzes and transforms his/her professional work from the perspective of the students' learning (Domingo, 2020; Darling-Hammond *et al.*, 2017). The experience lived by of the teachers in training shows a new awareness of the need to look at their teaching practice according to what they know and can do in their socio-educational context. Along these lines, Lara's findings (2019) conclude that the superficial nature of reflection limits the possibility of understanding their socio-educational reality and see themselves as professionals who can influence the educational process.

The results of our research show that learning about their practice and learning to analyze it through the DBSI approach helped them to identify a specific, urgent, shared, and relevant problem that hindered school learning. Likewise, the testimony makes clear how the problem-solving strategy based on school improvement allowed us to understand the nature of the difficulties of the teaching practice, fostering, as Mintrop *et al.* (2018) point out, the transformation of the problematic attitude, behavior, or belief, toward desired practices.

Our findings are coherent with the empirical experience systematized by Mintrop *et al.* (2018), who point out that in order to foster socio-educational transformation in favor of an ongoing school improvement the actors of education need to explore and reflect pedagogically on the difficulties of their own professional practice and iterate in the identification, definition,

and nature of practice problems, as well as their solutions, in order to change those behaviors, attitudes, or beliefs that hinder educational quality. Accordingly, training teachers as researchers of their own practice is fundamental because it implies developing a critical thought about their teaching actions (Huber, Kuncel, 2016), and therefore renewing their pedagogical thought about their own professional work. As Nocetti *et al.* (2019) mention, the reflexive approach in initial training reinforces the professional identity that is co-constructed insofar as its development moves away from an “applicationist” training practice of pedagogical knowledge.

According to this renewed perspective of the teacher’s work, this study aimed to address in a comprehensive and coherent way the association between research and practice, overcoming the traditional conception that the praxis is just an opportunity to apply theoretical-didactic knowledge studied in the pedagogy courses (Buendía *et al.*, 2018). In this respect, the research process linked to the teacher’s action in authentic educational contexts allows us to develop reflection and understanding through learning from practice, in accordance with the foundations that support pedagogical decisions (Marcelo, Vaillant, 2018). With this proposed integration between practice and research, the goal is that the degree papers be based on identifying difficulties or problems in their teaching work, which besides hindering the students’ learning also affect their own professional development.

The challenge of rethinking ways to conduct initial teacher training implies, as mentioned, the need to review the approach from which learning is conceived and oriented. We recognize that training based on school improvement is a tendency included in efficient professional development programs (Guskey, 2003 as quoted in Marcelo, Vaillant, 2018), so it is possible to see the teacher as a researcher in the context of the early practices of his/her professional training, and to strengthen an inductive way to learn about the different socio-educational realities through the practice of reflection and collaborative inquiry with his/her peers, in order to develop a situated and flexible pedagogical way of thinking that goes beyond the application of strategies or techniques predesigned in college.

Finally, this study also shows the need to strengthen the teacher’s reflexive practice and leadership to change the traditional pedagogical way of thinking, based on the paradigm of the mastery of professional contents, and move towards the transformation of a new teacher who acts with pedagogical flexibility on the basis of a reflexive practice that involves critical and systematic observation of the students’ learning, in order to rethink his/her own teaching strategies. Here, it is important to remember that reflection on teaching practice is achieved through the analysis of the pedagogical core; that is, the encounter between the teacher, the student, and the curriculum (Elmore, 2010). It is not possible to reflect without linking the teacher’s work to the educational goals in order to question, understand, and solve problems derived from the teaching-learning processes.

We may conclude that a renewed pedagogical way of thinking fosters a profound and critical understanding of the teachers' leadership and socio-educational commitment to promote situated, democratic, inclusive, and comprehensive learning experiences that respond both to the children's and youths' right to education and to collaborative learning and professional development among peers, and ultimately, to the wellbeing of the educational community to which they belong.

Regarding the educational research of their practice, teachers need to go beyond the horizon that limits the observation of their own teaching work and leads them to externalize educational problems in which they do not recognize their involvement. This form of pedagogical thought requires approaching the meaning of what, how, and why students learn. This challenge invites teacher trainers to develop reflexive practice as a habit that entails making a deep intellectual commitment that allows them to question their initial teacher training (Villagra *et al.*, 2022), so that future teachers develop a pedagogical thought born of a critical, permanent, and situated reflection, and an awareness of their leadership as teachers to identify, understand, and solve pedagogical problems that hinder the professional and school learning process.

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