

The education of teachers: the process of meaning-making in teaching within Historical-Cultural Theory¹

A formação de quem ensina:
o processo de significação da docência na Teoria Histórico-Cultural

La formación de quienes enseñan:
el proceso de significación de la docencia en la Teoría Histórico-Cultural

Marina Salles Biella²

Manoel Oriosvaldo de Moura³

ABSTRACT

The article analyzes the process of meaning-making in teaching from the perspective of Historical-Cultural Theory, within the context of the Mathematics and Science Club at the School of Education, University of São Paulo (USP), a project involving supervised practicum, teaching, and outreach. Methodologically, the study adopted the Vygotskian method of investigation, defining the psychological aspects of teacher education and the appropriation of theoretical knowledge in teaching activity as units of analysis. Five potentially formative actions were investigated, centered on the principles of Teaching-Oriented Activity (AOE) and the organization of teaching through Situations that prompt Learning (SDA). Data analysis, produced through observations and focus groups, utilized formative episodes, scenes, and acts of signification to reveal the causal relationships between collective actions and changes in the subjects' motives. The results indicated that teacher education, when experienced through praxis, fosters the construction of a teaching identity and allows a new quality to be ascribed to the teaching profession.

Keywords: Teacher education; Historical-cultural theory; Activity theory; Mathematics Club; Meaning-making in teaching.

RESUMO

O artigo analisa o processo de significação da docência, sob a perspectiva da Teoria Histórico-Cultural, no contexto do Clube de Matemática e Ciências da Faculdade de Educação da Universidade de São Paulo, um projeto de estágio supervisionado, ensino e extensão. Metodologicamente, o estudo adotou o método de investigação vigotskiano, delimitando como unidades de análise os aspectos psíquicos da formação docente e a apropriação do conhecimento teórico na atividade de ensino. Foram investigadas cinco ações potencialmente formadoras, centradas nos princípios da Atividade Orientadora de Ensino (AOE) e na organização do ensino por meio de Situações Desencadeadoras de Aprendizagem (SDA). A análise dos dados, produzidos por meio de observações e grupos focais,

¹ Translator: Marina Biella. E-mail: msbiella@gmail.com.

² Graduate Program in Education at the School of Education of the University of São Paulo. SP – Brazil. Orcid: <https://orcid.org/0009-0000-8584-2917>; E-mail: msbiella@gmail.com.

³ Graduate Program in Education at the School of Education of the University of São Paulo. SP – Brazil. Orcid: <https://orcid.org/0000-0002-0431-4694>; E-mail: modmoura@usp.br.

utilizou episódios de formação, cenas e atos de significação para revelar as relações causais entre as ações coletivas e a mudança nos motivos dos sujeitos. Os resultados indicaram que a formação de professores, quando vivenciada na práxis, favorece a construção de uma identidade docente e permite que uma nova qualidade seja dada ao ofício de ensinar.

Palavras-chave: Formação docente; Teoria Histórico-Cultural; Teoria da Atividade; Clube de Matemática; Significação da docência.

RESUMEN

El artículo analiza el proceso de significación de la docencia, bajo la perspectiva de la Teoría Histórico-Cultural, en el contexto del Club de Matemáticas y Ciencias de la Facultad de Educación de la USP, un proyecto de prácticas supervisadas, enseñanza y extensión. Metodológicamente, el estudio adoptó el método de investigación vigotskiano, delimitando como unidades de análisis los aspectos psíquicos de la formación docente y la apropiación del conocimiento teórico en la actividad de enseñanza. Se investigaron cinco acciones potencialmente formativas, centradas en los principios de la Actividad Orientadora de Enseñanza (AOE) e en la organización de la enseñanza a través de Situaciones Desencadenantes de Aprendizaje (SDA). El análisis de los datos, producidos mediante observaciones y grupos focales, utilizó episodios de formación, escenas y actos de significación para revelar las relaciones causales entre las acciones colectivas y el cambio en los motivos de los sujetos. Los resultados indicaron que la formación de profesores, cuando se vive en la praxis, favorece la construcción de una identidad docente y permite que se otorgue una nueva cualidad al oficio de enseñar.

Palabras clave: Formación docente; Teoría Histórico-Cultural; Teoría de la Actividad; Club de Matemáticas; Significación de la docencia.

1 Introduction

From the perspective of Historical-Cultural Theory education plays the role of humanizing individuals by enabling them to appropriate concepts, knowledge, and insights historically accumulated and developed, so that all may become socially integrated into human culture. According to Leontiev (1978), a child does not automatically become part of the human world at birth, but rather through the relationships it establishes with others through communication. Their inclusion in the world therefore occurs through a process of education, without which access to the essential elements of the human condition becomes unfeasible. From this perspective, the relationship between education and the preservation of the world - in the sense of its historical and cultural continuity - is intrinsic and dialectical, such that one cannot exist without the other.

Teaching plays a central role in the process of human development, as it deals with the historicity and continuity of a constantly changing world. As Lopes *et al.* (2016, p. 18) state, the teacher is the one whose activity consists of “constructing symbolic instruments to enable the apprehension of reality or action upon it within

a given cultural universe.” Therefore, as a human activity, teaching mediates individuals’ relationship with theoretical knowledge and sociocultural practices, creating conditions for motivated students to understand the world in which they are inserted and to act intentionally upon it, transforming it.

However, considering that everything we are is not given to us *a priori*, but is constituted through the process of insertion into the collective, mediated by relationships with other individuals and by social meanings, those who become teachers must before doing so, undergo training. This formation occurs in a continuous process of attributing meaning to the very act of teaching and involves not only the development of professional competencies but also the formation of the individual who teaches.

As Carvalho (2011, p. 321) clarifies, students do not react only to methodologies, they “also and fundamentally react to the singularity of the person who teaches them, to their worldview; they react, therefore, not only to what a teacher does, but to who they are.” Thus, the teacher training process is not limited to the didactic and methodological dimensions, as it necessarily involves human formation.

Considering the importance of qualified teacher education that also encompasses ethical, moral, affective, social, and political aspects, this article aims to present how the meaning-making of teaching manifests itself within teaching activity. To this end, it describes the theoretical-methodological assumptions based on Historical-Cultural Theory and on the concept of activity proposed by Leontiev (1978, 1983) which grounded the master’s research that culminated in this analysis.

We begin our discussion by briefly contextualizing the Mathematics and Science Club of the School of Education of the University of São Paulo (FE-USP), the locus of the research. Next, we present the methodological procedures adopted, which enabled the analysis of the acts of meaning in teaching based on a training episode (Moura, 2004). Finally, we offer some considerations.

2 Contextualizing the research setting: the Mathematics and Science Club at the University of São Paulo

The Mathematics and Science Club at the School of Education of the University of São Paulo (FE-USP) serve as a learning space understood as a “place where subjects’ learning is realized, guided by the intentional action of those who teach”

(Cedro, 2004, p. 59). It is a supervised internship, teaching, and extension project developed since 1999 within the Mathematics Laboratory of FE-USP (LABMAT), in partnership with the Application School (Escola de Aplicação). At the Club, undergraduate students from Pedagogy and other teaching degree programs at the University collectively plan and conduct activities that are subsequently evaluated and replanned under the guidance and supervision of professors of Teaching Methodology from the Pedagogy program.

The activities are directed toward students in the early years of elementary school at the Application School and take place once a week during the morning period throughout one semester. The meetings last four hours and are divided into three moments: organizing the space to receive the children, carrying out the planned lesson, and, finally, collectively evaluating the day's activities.

As a supervised internship, the organization of the Mathematics and Science Club is grounded in Historical-Cultural Theory and recognizes that the formative activity of teachers in undergraduate programs must occur through praxis, through practical-critical activity (Marx & Engels, 2008). During each training, it is necessary to place teachers "in situations where the theory-practice combination can be experienced, so as to foster, in these teachers, the development of modes of action that allow them to cultivate a taste for knowledge capable of illuminating their practice" (Moura *et al.*, 1999, pp. 8–9).

The Mathematics and Science Club is characterized by the intentionality of its organization, having as its main objective to constitute itself as a space for formative discussions and reflections regarding teaching practice and the organization of teaching through the collective development of educational activities. In this process, the professional development triggered by the actions related to it enables those who aspire to teach to understand that, to be a teacher, one must engage in the continuous learning process of becoming a teacher.

3 Theoretical assumptions for understanding the meaning-making of teaching

To achieve a specific objective through research, it is necessary to define a method capable of ordering actions and procedures in the search for and interpretation of results. The method is, therefore, one that, through a system of standardized and rigorous rules (Kopnin, 1978) guides the subject, directing them in the interpretation of reality to transform it.

When grounding research in Historical-Cultural Theory, it is essential to understand its structuring methodological principles. The first concerns dialectical historical materialism, a philosophy and method attributed to Karl Marx and Friedrich Engels. It posits that facts cannot be considered in isolation; all units are interconnected and can only be understood in relation to others, as they are justified by their opposites and vary according to historical conditions. It is therefore necessary to analyze them within a material, unfinished, and continuous process that, in its totality, explains social organization and aims to overcome it (Marx & Engels, 2008).

Based on the studies of Marx and Engels, Lev Vygotsky developed a research and analysis method applicable to psychological studies of human development. According to Vygotsky (1991), a method grounded in historical-dialectical materialism was needed, one that considered the relationship between human development and the transformation of nature in the study of higher psychological functions. To meet these demands, he outlined three principles: analyze processes rather than objects; analyze in an explanatory rather than descriptive manner; and analyze development based on historicity.

The first principle emphasizes the dynamic relationship in the development of the phenomenon, given that the study of an isolated object does not encompass all necessary explanations. The second principle advocates for investigating the genesis of phenomena since description alone does not reveal what the author calls “real dynamic-causal relations” (Vygotsky, 1991, p. 44). Finally, the third principle opposes the mechanization and fossilization found in analytical methods, emphasizing the historical character of phenomena and the changes occurring throughout the developmental process.

Vygotsky’s method divides the whole into units of analysis to establish interconnections between all parts. Therefore, it must be experimental and allow

the attribution of a logical and historical character to the research object, understanding it as part of an unfinished process connected to other objects through what he calls “complexes”.

We associate the method of division into units advocated by Vygotsky with the idea of “isolates” presented by Caraça (2000, p. 105), which consists of “a section of reality, arbitrarily cut out from it” in which the characteristics of the whole are expressed. By defining it, a part of the whole is delimited, within which it becomes possible to analyze the dominant factors that influence what we intend to study and that facilitate the investigation of the qualitative change in the phenomenon. The whole, therefore, corresponds to a compound of isolates that are interrelated.

Our research was grounded in Historical-Cultural Theory, which itself is based on the dialectical historical materialism proposed by Marxism. We used the Vygotskian method of investigation previously presented, delineating two units of analysis corresponding to the chosen isolate (in the context of the research, teacher training at the Mathematics Club). The first unit of analysis relates to the psychological aspects involved in teacher education during the supervised practicum, that is, to the meaning-making and personal senses attributed to teacher training by the future teachers themselves; the second concerns the development of theoretical thinking, that is, teaching activity and the theoretical-methodological procedures of the act of teaching.

In this context, meaning-making is configured as a social result that consolidates human experience and practices, being recorded and reflected in language through concepts and forms of knowledge. It is the means by which people appropriate human experience and therefore has both an individual and collective character (Leontiev, 1978). In this way, awareness of reality can only be acquired through socially constructed meanings.

Considering that this process occurs through communication, the assimilation of meanings depends on the relationships established by the individual. When the subject has appropriate meanings, they attribute a personal sense to them, a particular meaning, which does not always coincide with the socially constructed meaning. As Leontiev (1983) points out, this may lead to the creation of representations disconnected from the subject’s reality, which must be

deconstructed and replaced by appropriate meanings. Therefore, personal sense is related to what guides the individual, that is, to motive. It is consequently “a relation created in life, in the subject’s activity” (Leontiev, 1978, p. 97).

Understanding that what ascribes sense to the teacher’s role is its object - namely, teaching, and that sense is constructed through the subjects’ relation to life based on their own experiences (specifically, through teaching experiences), it is inferred that the highlighted units of analysis are interrelated; since the meaning of teaching and the personal meanings attributed to it that result in what truly motivates the subject to teach can only occur, as well, in activity.

4 Methodological organization of the research

Based on the defined units of analysis and aiming to answer the research question (*how is the meaning-making of teaching manifested in formative actions within the teaching activity at the Mathematics Club?*) five potentially formative actions were selected for investigation. According to Gladcheff (2015) these actions have the potential for the development of a signification of teaching work that aligns with the social meaning ascribed to pedagogical activity, which is grounded in Historical-Cultural Theory. In our case, this social meaning is understood as school education that promotes psychological and human development.

In her study, the researcher listed twenty-four potentially formative actions which ascribe sense to the organization of teaching mathematical theoretical concepts by teachers in continuing education in a project conceived as a collective and intentional activity for learning teaching. As the context of our research was different, the actions based on Gladcheff’s (2015) thesis were adapted to suit the reality of our data collection setting. Consequently, the specificities of the Mathematics Club were considered in both the definition and formulating the actions, which were examined according to a specific objective.

The table below details the potentially formative actions investigated (identified as AC1 to AC5) and their respective objectives:

Table 01: Potentially formative actions and corresponding objectives

Potentially formative action (AC)	Description of the action	Objective of the action
AC1	Collectively discuss the formal logic of a theoretical concept related to the areas of knowledge addressed in the Mathematics Club (Mathematics, Science, and Geography).	Collective assimilation of the theoretical concept to be addressed.
AC2	Develop, in subgroups, a problem to trigger the learning of a theoretical concept.	Teaching organization, with an emphasis on planning.
AC3	Develop at the Mathematics Club a Situations that prompt Learning (SDA) for schoolchildren planned during the trainee group meetings.	Teaching organization, with an emphasis on implementation.
AC4	Report to the group the experience obtained from developing a Situations that prompt Learning (SDA) for schoolchildren at the Mathematics Club.	Sharing of experiences and knowledge for collective learning about teaching.
AC5	Collectively evaluate, within the subgroup and subsequently within the group, the development of the Situations that prompt Learning (SDA).	Reflective evaluation of teaching activity for possible follow-ups and replanning.

Source: research data

The analysis of the potentially formative actions was methodologically grounded in what Moura (2004) defined as formative episodes. According to the author, episodes may consist of “written or spoken phrases, gestures, and actions that constitute *scenes* capable of revealing the interdependence among the elements of a formative action” (Moura, 2004, p. 276, author’s emphasis). Thus, when defining the units of analysis, we selected five episodes composed of one or more scenes that reveal the meaning-making of teaching within teaching activity.

In certain scenes, we conducted a meticulous deepening of revealing moments in the formative process of the participants of the Mathematics and Science Club, which provide evidence of how the subject ascribes sense to teaching. It was in this context that we introduced the concept of *acts of signification* (Biella, 2018), which highlight central aspects resulting from the formative actions in situations that require a careful look to understand how teaching acquires meaning for future teachers.

Acts of signification involve a in-depth analysis of the scene, objectively demonstrating how a particular situation influences individual formation. They serve as

a means of revealing the causal relationships between formative actions and the signification of teaching, expressed through discourse, reflections, or decisions that indicate the process of constructing the sense of being a teacher. This process is apprehended through the transformation of initially comprehensible motives - which merely stimulate the subject to act - into effectively efficacious motives - which orient the subject's actions toward the satisfaction of the needs that positioned them in a particular activity (Leontiev, 1988). In other words, it is apprehended through the psychological transformation of what mobilizes the subject to act.

It is important to emphasize that such acts do not occur in isolation or out of context. On the contrary, they are part of a broad and historical context: they relate to the scene which belongs to an episode organized within units of analysis. Thus, the highlighted episodes aim to compose an interdependent sequence that provides evidence of how subjects begin to perceive and position themselves as teachers. In this way, each scene of each episode reveals one or more potentially formative actions.

The data collection for constructing the episodes through scenes and the identification of acts of signification was carried out throughout 2016, based on various written sources and audiovisual records capable of supporting empirical and theoretical investigation. The study involved the weekly monitoring of two distinct groups of interns, one each semester.

Since the Club also functions as a supervised practicum project, it is common for undergraduate students from different Teaching Degrees programs (Licenciaturas) at the School of Education of the University of São Paulo to participate, depending on the Teaching Methodology course they are taking at the Faculty of Education. Consequently, both monitored groups were interdisciplinary, primarily composed of Pedagogy and Mathematics students.

In total, 32 meetings of the Mathematics and Science Club were monitored. These meetings were documented through field notes produced during observations of the planning, development, and evaluation of the activities; video and audio recordings; monitoring of group discussions through social media; reading of the final reports produced by the Club's interns; and the recording and transcription of focus groups conducted at the end of each semester with the participants observed.

Focus groups are constituted as discussion groups composed, preferably, of seven to twelve participants. These groups are guided by a facilitator who follows a previously established script that remains flexible to the inclusion of circumstantial questions (Guimarães, 2006). They differ from individual interviews by emphasizing communication among multiple interlocutors who reflect upon themselves through listening to others after a process of problematization. Since the Mathematics Club is grounded in collectivity, we considered it methodologically more appropriate to use this strategy.

Regarding the profile of each group, the first (Group 1) consisted of five participants aged 20 to 23 who were pursuing their first undergraduate degree: Pedagogy, Mathematics Education, and Geography Education. The second (Group 2), also composed of five participants, consisted of members between the ages of 30 and 50 who were pursuing a second undergraduate degree: Pedagogy, Mathematics and Chemistry.

However, it is important to emphasize that our actions in monitoring the groups were not limited to observation alone. In order to effectively analyze the interns' formative actions and their effects on the transformation of the personal meanings attributed to their own practices, it became necessary to act intentionally, guiding them whenever needed in conducting the activities and intervening with children who required greater attention.

With the objective of assisting the groups in the development of Situations that prompt Learning (SDA), we sought to discuss with the interns some of the premises of Historical-Cultural Theory that ground this research, such as the structure of activity presented by Leontiev (1978, 1983) and the concept of Teaching-Oriented Activity (AOE), proposed by Moura *et al.* (2010).

Teaching-Oriented Activity is characterized as a theoretical-methodological basis for the organization of teaching that aims at "the appropriation, by students, of accumulated historical experience, through theoretical thought and scientific concepts, aiming at the development of the psyche and higher psychological functions" (Moura *et al.*, 2016, p. 115). Within it, three central elements must be present: the historical synthesis of the concept, the SDA, and the collective solution synthesis mediated by the teacher.

Historical synthesis refers to the logical-historical movement of the concept, which allows for the apprehension of the development of human thought, motivated by a historical necessity that culminated in the collective construction of a given knowledge. SDA are developed with pedagogical intentionality and arouse in the student the need to mobilize knowledge to solve the problem present in the situation through collective action. Such situations may be proposed through games, virtual stories or through real-life situations.

Virtual stories present a character's problem-situation, inviting children to create collective solutions to help them. Thus, students become involved in the construction of answers to problems contextualized by a narrative. Games allow students to enter a meaningful learning context in which the objective of the game aligns with the child's desire to solve the proposed problems. Meanwhile, real-life situations are those that arise from the relations established in the classroom, highlighting the surrounding reality of the group of students present there. Therefore, it is necessary for teachers to be attentive to the context that manifests daily within the social group to which their students belong.

Finally, the collective synthesis considers the Vygotskian premise that the appropriation of concepts and the development of higher psychological functions occurs first at the collective (interpsychic) level and subsequently at the individual (intrapsychic) level. According to Historical-Cultural Theory it is through social relations established within a collective that it becomes possible to assimilate human experience materialized in concepts.

In the following section, we will present one of the five episodes analyzed. Subsequently, we will discuss one of the four scenes that compose this episode and further examine the acts of signification related to the presented scene.

5 Formative episode: teaching organization with an emphasis on planning

The episode discussed here is part of the unit of analysis: the development of theoretical thought. It is organized into four scenes that capture the process of teaching organization, considering aspects that permeate teaching practice before, during, and after the lessons. These aspects relate to planning and include study activity, pedagogical

intentionality in the elaboration of proposals, unexpected events, and the necessity of replanning based on evaluation and the readjustment of objectives.

Considering teaching as “the system of organization and the means by which socially elaborated experience is transmitted to the individual” (Dávídov and Márkova, 1987, p. 322, our translation), in which conditions are created for students to assimilate historically produced theoretical knowledge in learning activity, it is inferred that planning holds a central role in the teacher's activity. In the act of planning teaching activity, the teacher must refer to the logical-historical movement of the concept, establish teaching objectives by determining actions to address them, and evaluate their general mode of organization, re-evaluating, replanning, and reflecting on their own practice.

However, for planning to constitute an action that encompasses all these stages it is fundamental that it possesses an authorial character. Based on the premise that activity is a psychological process motivated by the satisfaction of human needs and, consequently, intentionally directed toward an end (Leontiev, 1988), we can say that teaching, when understood as activity, also constitutes a conscious and intentional process.

In this sense, planning emerges as an expression of these intentions, composed of actions organized according to the existing objective conditions. Therefore, it is the teacher's responsibility to organize, plan, and systematize their actions, with the clarity that one of the greatest goals of teaching is to generate in the student the necessity of learning. As reinforced by Moura *et al.* (2010, p. 213), “the teacher's teaching activity must generate and promote the student's activity; it must create in them a special motive for their activity: to study and learn theoretically about reality”.

The scene narrated below shows the collective process of teaching organization using the concept of SDA as a reference, grounded in the theoretical-methodological principles of AOE, during teaching planning:

During the planning meeting for the activities that would take place in the three subsequent meetings with the children from the Application School, the members of Group 2 of the Mathematics and Science Club debated which content would be addressed. After some considerations regarding the relevance of certain concepts, the group decided

to introduce the study of time measurement. The following excerpt is a transcription of part of the debate related to the proposed activities involving the use of an hourglass and other measuring instruments. Present are the interns E6⁴, E8, E9 and E10, the professors of the Pedagogy program at USP (DC1 and DC2), and the researcher.

E6: *I think we have to start thinking about the Situations that prompt Learning (Situação Desencadeadora de Aprendizagem). I think in meeting 1 [with the children] it would be the construction of the hourglass. Is that the triggering situation? Because we ask them to build the hourglass and then we work on the issue of the passage of time. If we add more sand, it takes longer, but how much longer? If you put in less... We can ask them to try to build one of 30 seconds.*

E10: *That doesn't seem like a triggering situation to me.*

E6: *But then what is a triggering situation? Isn't that it?*

E10: *I see a triggering situation as a problem for them to take and think about and come up with a solution. To think about it.*

E6: *So, building the hourglass.*

Researcher: *But why?*

E10: *Yes, why? Exactly. And do they all know what an hourglass is? Because if we start from the principle that they don't know, we need to figure out how to introduce it to them.*

E8: *I think it could be: we count time with a stopwatch, what are the other ways to measure time?*

E10: *I don't know, I'm just problematizing.*

DC1: *That's right. I mean, it has to start from a necessity.*

E8: *Without a stopwatch, how do we measure it?*

DC2: *There are different ways to count [inaudible].*

DC1: *Counting to 30 for you is different from counting to 30 for her. And so, there are ways to count time. So, what would we use to count time in a certain game? Then they will say: clock, cell phone, stopwatch...*

Researcher: *And then you can even ask: but what about when the clock didn't exist?*

DC1: *That's it, exactly. That's what I was going to say. To go back to the context of history.*

⁴ The names have been omitted in order to preserve each participant's identity.

Then yes. And when the stopwatch didn't exist? I mean, this becomes a problem, in a way. The problem doesn't have to be yours, exactly.

E10: *Yes, but someone's at a certain moment.*

As can be seen in the dialogue presented, the concept of SDA - understood at the time as the guiding principle for the development of students' study activities - was not yet assimilated by the group members, who were discussing its meaning. Thus, although there was an understanding of its central role in teaching organization, the intentionality with which the activity was being planned was not fundamentally focused on learning objectives, but on the development of a lesson that could be challenging. The object, therefore, was not the theoretical concept of time measurement, but the physical challenge of building an hourglass.

Two weeks later, still concerned with the organization of activities and dissatisfied with the previous planning, intern E6 shared the following reflection during the second meeting with the children:

E6: *I continue to question myself, and we need to discuss this as a group [...] I still think we're not hitting the mark regarding the challenge. We need to work on things that are challenging beyond just physical challenges; otherwise, we will just have them [the students] running around, and that will be it. We need to find forms of concentration activities that truly engage them. I believe it is up to us to find a path, and we have not found it yet.*

When mentioning the "challenge" that the group was unable to develop, E6 was referring to the problem embedded in the SDA. As her statement reveals, she realized that the group should engage the children through activities centered on the concept itself, guided by pedagogical intentionality, since the objective was not simply to present children with any random problem.

As a result, the group's interns replanned the following meeting and collectively organized a proposal entitled "Mission to Space,," which involved the concepts of weight and mass through a virtual story: a NASA astronaut had sent a recorded message to the Club students explaining that an intergalactic war had taken place and that, in order to

establish peace among the planets, NASA was organizing a reconciliation dinner on planet Earth. However, for the dinner to take place, the children would need to calculate the weight of the guests arriving from each planet.

After class, this proposal was evaluated by the Group 2 interns as the best activity planned and executed, since it encompassed different areas of knowledge (such as Physics and Mathematics) and created a need for children to calculate weight, distinguishing it from the concept of mass. Such an activity was configured as an SDA, as it mobilized knowledge and was organized intentionally.

In the scenes described here, the following potentially formative actions occur: developing, in subgroups, a SDA for a theoretical concept (AC2); implementing, at the Mathematics Club, the SDA planned during the intern group meetings (AC3); and collectively evaluating, within the subgroup and subsequently within the group, the development of the SDA (AC5). These actions correspond to the moments of development, implementation, and evaluation of the proposals, reinforcing the need to plan teaching based on the theoretical assumptions underlying the research.

The following acts of signification show how formative actions influenced the participants' teaching practices.

6 Acts of signification and causal relationships between formative actions and the meaning-making of teaching

At the conclusion of the Club's activities at the end of the semester, during the focus group conducted as a methodological resource for data collection, the members of Group 2 reflected on the way they planned the meetings with the children. When questioned about the development of SDA, they highlighted the centrality of the problematization of concepts as the starting point for the proposals, specifically, the challenge that would be presented to the students, as evidenced by the following dialogue:

Researcher: *Did you try to develop Situations that prompt Learning? Did you keep that in mind, having that as a goal?*

E6: *I think that, in some way, when we thought about developing the activities, we also thought about the challenge as well. To me, when I thought about a triggering*

situation, I thought of a challenge, how we can stimulate these children so they can do the activity in a way that isn't boring or completely meaningless. And I think the "problematizing" situation leaned toward the challenge side. I think the "problematizing" situation permeated [our thinking].

E10: *I also had this idea that this type of situation was, in fact, a challenge. And then later it became clearer that the ideal is to propose a situation to the student where they have to step in and help with the resolution. I'm not saying it's easy. But I think we do think about it. [...] I think that permeated.*

E9: *Not in all of them, but in the [activities] where we managed to, we did [a triggering situation]. Because it's hard to have this context in every situation. Sometimes the "light" just doesn't come.*

E6: *I think that at all times we thought from the child's perspective. Theirs. [...] it would have been much easier for us to just take and replicate [a ready-made sequence of activities], but we weren't satisfied with that because it didn't match the children. So, I think we took the children into great consideration. The child was always at the center of the process.*

E9: *[...] Maybe the activities would come out more easily when you are super-appropriated of everything. Now, we were thinking about the activity and perhaps not about the theory [the concept]. [...]*

As the excerpt shows, E9's statement indicates an emerging awareness of the importance of appropriating the theoretical concept in order to achieve clarity regarding both the objectives of the activity and the means of organizing teaching ("perhaps the activities would come together more easily when you're fully familiar with everything"). This is because teaching activity implies

[...] a process of attributing meaning to the teaching content, which requires attention to the genesis of concepts, to the historical processes of their development throughout humanity, to their interdependence with the formation of other scientific concepts at the historical moment of their emergence, to their presence as symbolic instruments in the current context, and to the relevance of their learning for the development of the potentialities of the subjects participating in this activity (Moura, Sforzi & Lopes, 2017, p. 87).

The lack of clarity regarding the logical-historical movement of the concept - which can be developed through study activity - compromises teacher planning insofar as proposals aimed at children's appropriation of theoretical concepts tend to present diffuse objectives. This is evident in the analyzed scene, in which the members of Group 2 demonstrated greater concern with the development of the lesson itself (the construction of the hourglass) than with the concept of time measurement, as reflected in E9's statement: "we were thinking about the activity itself, and perhaps not about the theory."

E6's statements emphasizing the centrality of the child in the teaching process ("the child was always at the center of the process") and rejecting the possibility of simply reproducing ready-made materials disconnected from the students' reality ("it would have been much easier to just copy and replicate things, but we weren't satisfied with that because it didn't correspond to the children"), indicate an awareness of the teacher's role: transforming the object of teaching into an object of learning for students. Thus, when E6 explains that she sought to develop activities that were not "something boring, completely meaningless," she reveals a concern with creating proposals capable of awakening in students the desire to learn.

This perspective aligns with Masschelein and Simons (2013, p. 99), for whom teaching involves opening the world to students, that is, "bringing them into the vastness of the world, presenting them with the things of the world [...] and, quite literally, persuading them into contact with these things, placing them in their company, so that these things - and, with them, the world - begin to become meaningful to them."

The decision to develop proposals capable of mobilizing the knowledge of the children with whom they worked, while recognizing the singularity of the group, also reveals a desire for authorship and protagonism throughout the formative process. This indicates an understanding that planning is neither static nor universal, but rather requires adjustments and modifications throughout a sequence of meetings based on students' profiles and their responses to what is proposed, thereby highlighting the importance of constant reflection on pedagogical practice. Such reflection demonstrates both an awareness of the complexity of planning - as

expressed in E10's statement ("I'm not saying it's easy") and E9's ("sometimes inspiration just doesn't come") - and the value attributed to the development of meaningful lessons. For this reason, even in the face of the difficulty involved in constructing a SDA, the interns remained motivated to develop one.

The continuous reflection on pedagogical practice demonstrated in the interns' statements reveals the complexity involved in teacher planning. This process requires commitment to adjusting proposals according to students' needs while maintaining focus on the objectives of teaching activity. However, reflection alone is not sufficient: it must be articulated with theoretical knowledge and strategies that help "improve the reflective capacity regarding what and how to change" (Libâneo, 2004, p. 138).

Teacher planning must include moments of collective synthesis, in which it becomes possible to systematize the concepts addressed and reflect upon the development of the proposals. Planning thus constitutes one of the most important formative actions, since it is through collective planning that future teachers exercise the organization of teaching with a focus on students' appropriation of theoretical knowledge. In this process, teaching work becomes intentionally and consciously structured (Moura et al., 2010; Libâneo, 2017), directed toward the construction of meaningful learning experiences.

Furthermore, collaborative planning enables exchanges among interns that, according to Moura et al. (1999, p. 11), "go far beyond knowing how to do something. It involves decision-making regarding educational objectives and, therefore, implies commitment and an ethical stance." Planning activity, and the actions derived from it, thus assume a central role in teacher education, not only with respect to didactic-pedagogical aspects, but also in relation to the ethical and human dimensions of the profession.

In this context, the act reveals that the meaning-making of teaching manifests itself through the new quality attributed to the aspects arising from the planning of teaching - namely, through the valuing of the child within the learning process, the appropriation of concepts by those who teach them, clarity regarding the objectives of the proposals, and the understanding that the elaboration of SDA capable of mobilizing students toward the appropriation of theoretical content requires intentionality.

7 Final Considerations

Within Historical-Cultural Theory, the process of teacher education is understood as a dialectical, historical, and continuous process that integrates ethical, affective, social, and political dimensions. It is not merely the learning of technical and professional aspects but also the constitution of a subject within the activity they perform. This process unfolds between coming to be a teacher and becoming a teacher. The distinction between these two states is intrinsically linked to the sense ascribed to teaching, produced in and through activity, as conceived by Leontiev (2021).

The research data reveal that the meaning-making of teaching manifests when subjects are integrated into intentionally structured learning spaces where the organization of teaching constitutes the central motivation of the teaching activity, such as the Mathematics and Science Club. These spaces must allow future teachers to experience reflexive theoretical activity linked to transformative practical activity, that is, praxis, through the act of teaching connected to theoretical study and critical reflection on their own practice.

The methodology adopted in the study enabled the apprehension of transformations in the modes of acting and thinking of the subjects in formation, evidencing that such changes cannot be understood descriptively or superficially. Instead, they require an explanatory and historically situated analysis, as proposed by Vygotsky (1991). To this end, acts of signification were used as the central analytical category, making it possible to identify, within lived experiences, revealing signs of the attribution of meaning to teaching.

The potentially formative actions analyzed, inspired by Gladcheff (2015), revealed formative moments in which reflections on planning, the intentionality of teaching, and the centrality of the student in the educational process were mobilized. These moments express the transformation of the motive that guides the teaching activity.

However, although meaning relates to individual aspects - such as the motives that mobilize future teachers, the personal objectives of each group member, and the senses ascribed to their own pedagogical experiences - the meaning of teaching is also collectively constructed through communication processes (Leontiev, 1978).

Thus, since teaching practice is carried out through collective actions, the meaning of the teaching profession is also linked to the relationships established among the individuals involved in the activity.

This movement can only occur through experience, through what happens to us, through what affects us (Larrosa, 2002). It is experience that allows us to appropriate singular knowledge, which will directly influence our professional and, above all, our human formation. Thus, teaching activity necessarily involves the formation of personality, constituted by the appropriation of human knowledge during social relations established between the subject (singular) and the human species (collective). This is one of the greatest specificities and responsibilities of the teaching profession.

8 References

BIELLA, Marina S. *Formative actions and the meaning-making of teaching in teaching activity*. Master's Dissertation in Education. São Paulo: School of Education, University of São Paulo, 2018.

CARAÇA, Bento de J. *Fundamental Concepts of Mathematics*. Lisbon: Gradiva, 2000.

CARVALHO, José Sérgio F. de. "Theory in Practice Is Different? Considerations on the Relations Between Theory and Practice in Educational Discourses." *Revista Brasileira de Educação*, v. 16, n. 47, pp. 307–322, 2011. DOI: <https://doi.org/10.1590/S1413-24782011000200003>. Accessed on: 08/08/2025.

CEDRO, Wellington L. *The learning space and teaching activity: The Mathematics Club*. Master's Dissertation in Education. São Paulo: School of Education, University of São Paulo, 2004.

DAVIDOV, Vasily; MÁRKOVA, A. "The Conception of Study Activity of Schoolchildren." In: *Evolutionary and Educational Psychology in the USSR. Anthology*. Moscow: Editorial Progreso, 1987.

GLADCHEFF, Ana Paula. *Study actions in the teacher education activity of Mathematics teachers in the early years*. Doctoral Dissertation in Education. São Paulo: School of Education, University of São Paulo, 2015.

GUIMARÃES, V. S. "The Focus Group and Knowledge About Teachers' Professional Identity." In: PIMENTA, S.; GHEDIN, E.; FRANCO, M. A. S. *Research in Education: Investigative Alternatives for Complex Objects*. São Paulo: Loyola, 2006.

KOPNIN, Pavel V. *Dialectics as logic and theory of knowledge*. Rio de Janeiro: Civilização Brasileira, 1978.

LARROSA, Jorge. "Notes on Experience and the Knowledge of Experience." *Revista Brasileira de Educação*, Rio de Janeiro, n. 19, Jan./Mar., 2002. Available at: <https://www.scielo.br/j/rbedu/a/Ycc5QDzZKcYVspCNspZVDxC/>. Accessed on: 09/08/2025.

LEONTIEV, Alexei N. *The Development of the Psyche*. Lisbon: Livros Horizonte, 1978.

LEONTIEV, Alexei N. *Activity, Consciousness, Personality*. Havana: Editorial Pueblo y Educación, 1983.

LEONTIEV, Alexei N. *Activity, Consciousness, Personality*. Bauru: Mireveja, 2021.

LEONTIEV, Alexei N. "A Contribution to the Theory of the Development of the Child Psyche." In: VIGOTSKI, Lev S.; LURIA, Alexander R.; LEONTIEV, Alexei N. *Language, Development and Learning*. São Paulo: University of São Paulo Press, 1988.

LIBÂNEO, José Carlos. "School Learning and Teacher Education from the Perspective of Historical-Cultural Psychology and Activity Theory." *Educar*, Curitiba, n. 24, pp. 113–147, 2004. Available at: <https://www.scielo.br/j/er/a/hd8NXbRPrMqkY6JLMW3frDP/>. Accessed on: 09/08/2025.

LIBÂNEO, José Carlos. *Didactics*. São Paulo: Cortez Publishing, 2017.

LOPES, Anemari R. L. V. et al. "Collective Work and the Organization of Mathematics Teaching: Principles and Practices." *Zetetiké – FE/UNICAMP & FEUFF*, v. 24, n. 45, Jan./Apr. 2016. Available at: <https://periodicos.sbu.unicamp.br/ojs/index.php/zetetike/article/view/8646526>. Accessed on: 13/08/2025.

MARX, Karl; ENGELS, Friedrich. *The German Ideology*. São Paulo: Martins Fontes, 2008.

MASSCHELEIN, Jan; SIMONS, Maarten. *In Defense of the School: A Public Issue*. Belo Horizonte: Autêntica Publishing, 2013.

MOURA, Manoel O. de; SFORNI, Marta S. de F.; LOPES, Anemari R. L. V. "The Objectification of Teaching and the Development of the General Mode of Learning in Pedagogical Activity." In: MOURA, Manoel O. de (org.). *School Education and Research in Historical-Cultural Theory*. São Paulo: Edições Loyola, 2017.

MOURA, Manoel O. de. "Collaborative Research: A Focus on Formative Action." In: BARBOSA, Raquel L. L. (org.). *Trajectories and Perspectives in Teacher Education*. São Paulo: Editora Unesp, 2004.

MOURA, Manoel O. de *et al.* *The Practicum in Shared Teacher Education: Portraits of an Experience*. São Paulo: Faculdade de Educação, 1999.

MOURA, Manoel O. de *et al.* "Guiding Teaching Activity: Unity Between Teaching and Learning." *Revista Diálogo Educacional*, Curitiba, v. 10, n. 29, pp. 205–229, 2010. Available at: <https://www.redalyc.org/articulo.oa?id=189114444012>. Accessed on: 10/08/2025.

MOURA, Manoel Oriosvaldo de *et al.* "Guiding Teaching Activity as a Unity Between Teaching and Learning." In: MOURA, M. O. de *et al.* *Pedagogical Activity in Historical-Cultural Theory*. Campinas: Autores Associados, 2016.

VIGOTSKI, Lev S. *The Social Formation of Mind: The Development of Higher Psychological Processes*. São Paulo: Martins Fontes, 1991.

Recebido: março/2026

Aprovado: junho/2026