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Quantitative-Cumulative and Qualitative-Transformational Changes in the Continuous Becoming of Teachers

Erika Germanos

University of Victoria (Canada)

Wolff-Michael Roth

University of Victoria (Canada)

Abstract

Professional development is a critical concept in the literature on teaching and teacher education. However, in this literature, continuous growth (learning)—e.g., improve teaching strategies, elaborate a variety of activities or integrate new technologies into their practice—is not distinguished from (crisis-like) change to qualitatively different forms of experience—e.g., engage students in learning, implement student-centered practices, consider students' individual needs and further learning. Based on a case study of the change a Brazilian teacher experienced over the course of an 8-year period, we develop an approach based on ideas of the Russian psychologist L. S. Vygotsky that not only theorizes a distinction between learning and development but also the articulation between the two processes whereby continuous change turns into discontinuous change.

Keywords: development; learning; quantity; quality; dialectics.

Introduction

Professional “development” is an area of continued interest in research on teaching and teacher education. There are over 15,700 hits in the Thomson Web of Science database when the Boolean search “‘professional development’ AND ‘Teaching’” is used. Among the more frequently studied topics range “communities” and “communities of practice” (e.g., Vangrieken et al., 2017; Witte & Jansen, 2015; Honig & Rainey, 2014), “reflection” and “reflective practice” (e.g., Mohamed, Rashid, & Alqaryouti, 2022; Marshall, 2019; Zeichner, 2008), and “teacher collaboration” (e.g., De Jong, Meirink, & Admiraal, 2019; Hargreaves, 2019; Vangrieken, Dochy, Raes, & Kyndt, 2015; Martin-Beltran & Percy, 2014). However, an overview of these studies reveals that they tend not to differentiate between (a) *development*, which in the classical psychological literature refers to stepwise and crisis-like changes, and (b) *learning*, a cumulative form of incremental change (Vygotskij, 1984). Instead, these two terms of change tend to be used synonymously (Cole, 2009; Roth, 2017). Professional *development*, therefore, may simply refer to the continuous improvement of teaching practice rather than to the substantial reorientations in the life of a person as a teacher—such as the substantial reorganization in the consciousness when a fisherman becomes a full-time teacher (Jóhannsdóttir & Roth, 2014). The two notions that are important in psychological theories of changes over the lifespan of a person thereby become indistinguishable. As Vygotskij (2005) suggests, development is a process of “*transition from one age stage to another, as the process of reorganization of the structure of [the child’s] consciousness*”. Within stages (of life), changes are continuous; *between* stages (of life), change is discontinuous. We deem it necessary and important to distinguish continuous from discontinuous growth for those intending to support teachers because support for continuous change will differ from efforts intended to lead to qualitative changes in the teachers’ working and experiencing. In this perspective, learning and development are intricately linked but represent distinct processes. Learning involves the acquisition of knowledge quantitatively and skills through societal relations. The process of learning is not isolated but occurs within a social context where individuals engage in collaborative activities that facilitate their growth and understanding. The purpose of this study is to contribute to theorizing the continued becoming of teachers: not only by making a clear distinction between *learning* and *development*, but also by exhibiting how the two very different processes are interconnected allowing the latter to arise, often unpredictably, from the former (Vygotskij, 1984).

This articulation occurs in *leading activity*, where participation at the current level of development precipitates a transition to a new developmental level with a qualitative shift in the forms of participation in activity. In this study, we show how incremental, quantitative growth (learning) during leading activity may suddenly lead to a crisis-like qualitative change-over (development) according to what has been called the *law of transition of quantity into quality* (Marx/Engels, 1975; Vygotsky, 1997). An important part of understanding crisis-like developmental processes is the category of *experience* [*pereživanje*]—a unit spanning the practical, affective, and intellectual dimensions of an individual subject acting in its environment (Vygotskij, 2001). Change in the form of

development occurs when past experience becomes an object of present experience leading to a qualitative transformation in the individual's cognitive processes leading to a qualitative transformation in the individual's cognitive processes (Vygotskij, 1984). Consistent with the concrete human psychological approach of Vygotsky, which gives primacy to human praxis over theory, we begin with narrating part of the life history of a Brazilian high school teacher (social studies), which involves periods of learning and step-like developments at multiple levels. Using this story, we develop a cultural-historical activity theoretical approach that accounts for growth and change across the lifespan in ways that have advantages over other theories.

Background

Theoretical context: on the distinction between continuous and stepwise change

Questions of learning and professional development have received considerable attention in research on teaching and teacher education. Some studies describe models for professional development that emphasize the kind of activities (workshops, study groups, short courses, etc.) to be applied and the length of time those activities have to last to result in effective professional development. The effectiveness of those models is often related to student outcomes, when, after some training, changes in teachers' teaching can be observed (Clarke & Hollingsworth, 2002; Fraser, Kennedy, Reid & Mckinney, 2007; Garet, Porter, Desimone, Birman & Kwang, 2001; Guskey, 1986; Guskey, 2002; Kennedy, 2005; Opfer, Pedder, Lavicza, 2001; Witterholt, Goedhart, Suhre & van Streun, 2012). Other studies link professional development and collaboration, whereby teachers working with peers improve their teaching skills (Burbank & Kauchak, 2003; Butler, Lauscher, Jarvis-Selinger & Beckingham, 2004; Chen, 2012; Lewis, Baker, & Holding, 2015). The idea of community of learning has also been presented as an alternative to teachers' development in relation to the professional learning of teachers and leaders and to their community development (Aubusson, Steele, Dinham, & Brady, 2007; Mitchell, 2013). Continuous professional development (Witterholt, Goedhart, Suhre & van Streun, 2012; de Vries, Jansen, & van de Grift, 2013) is defined as an uninterrupted process of learning highlighting different types of knowledge and teachers' beliefs. Professional development also has been used to refer to an accumulation of new knowledge, such as subject matters and pedagogical skills (Borko, 2004; Hargreaves, 2000; Stein, Smith, & Silver, 1999; Wilson & Berne, 1999). Moreover, a large number of researchers since Schön (1991) has adopted reflexive practitioner as a source of teachers' skills improvement (Griffiths, 2000; Thiessen, 2000; Zeichner, 2008). Those efforts have shown distinct approaches and understandings about how teachers change and how they keep changing along their careers. However, the notion of "professional *development*" is not used consistently across the studies. The discourse surrounding "professional development" within academic literature is marked by a lack of uniformity in its conceptualization and measurement methodologies (Densimore, 2009). This variability poses a significant challenge in establishing a coherent understanding of professional development, evaluating its impacts, and consistently assessing its effects. Moreover, Borko (2004) underscores the deficiencies inherent in professional development programs designed for teachers, indicating a critical gap between existing offerings and the evolving

needs of educators. It is important to understand how a person grows as a human being to comprehend how and why people intend to change in the course of their lives.

Vygotskij (1934) charged that traditional psychology has separated affective and intellectual aspects of the person, and, in so doing, has separated thinking “from the plenitude of real life, the living motives, interests, needs of the thinking person” (p. 14); this fundamental challenge identified by Vygotsky continues to resonate within contemporary research, highlighting the ongoing need for a more holistic approach that acknowledges the intricate interplay between cognitive and affective domains in understanding human behavior and cognition. In research on teachers and teaching, “professional development” tends to be considered independent of everything else in the lives of those who teach, which significantly limits such studies. This is important because in the holistic societal-historical approach, any activity in which a person engages in the course of life—family (parent, spouse), leisure, commuting, shopping, or political citizen—affects all other activities (Leont’ev, 1978). There have therefore been suggestions to take a whole-life perspective on teaching and learning, which means also accounting for the place teaching takes in the ensemble of an individual’s life activities (Roth & van Eijck, 2010). This would differ for someone for whom teaching is superordinate to family, church, and missionary activities than for someone whose physics teaching is subordinate to family, religion and religious affiliation, and missionary activities (Roth, 2015). To understand teaching and teacher change in the case of our Brazilian teacher, we need to consider, as our case study shows, everything else in and constituting his life. What he did in school and his participation in a change-oriented group organized by university researchers alone does not explain why and how he changed.

Vygotskij (1934) suggests that research focuses on thinking, which tends to be the thinking of the individual independent of the concrete situations of the person’s activities. Thus, affect in teaching is investigated through interviews rather than in the very act of teaching (e.g., Bellocchi & Ritchie, 2014). Research also investigates teachers’ conceptions, content and pedagogical knowledge by means of interviews, as if these dimensions were attributes of the person independent of her practice. Again, we adopt from Vygotskij (2001) a holistic category, *experience* [*pereživanie*], which encompasses the entire relation of a person in its environment, and accounts for the intellectual, practical, and affective coloring shading every single act of human life .

Pereživanie

Since Vygotsky's original texts the concept of *pereživanie* has been explored in two different dimensions. Veresov (2017) points out, within the framework of cultural-historical theory, that *pereživanie* can be explored as a dynamic process shaped by cultural-historical circumstances; it also can be applied to interpersonal interactions and it represents a conceptual framework tied to developmental processes, environmental influences, and developmental laws. In this study we take *pereživanie* as a category for understanding human development. Thus, *pereživanie* serves as a theoretical instrument and analytical perspective for examining the developmental process. *Pereživanie* functions as a lens through which we can observe the impact of the sociocultural environment on one’s development, providing insight into the ways that individuals engage with their surroundings. Moreover, the concept of *pereživanie* offers a viewpoint on the dialectical

nature of human cognitive development, highlighting the interaction between evolutionary and revolutionary elements within sociocultural contexts.

This perspective illuminates how development unfolds as a reciprocal relationship between the social environment and the individual (Vygotsky, 1998, p. 198). Based on this approach we underscore how the teacher's growth is profoundly influenced by their lived experiences within their surroundings (Vygotsky, 1998, p. 294). *Pereživanje* serves as a powerful tool for examining how the sociocultural context influences not just the individual directly, but the very process of their development. As Vygotsky (1998) emphasizes, this perspective views development as the "path along which the social becomes the individual" (p. 198). It is through the individual's lived experiences within their environment that their development is shaped (Vygotsky, 1998). This framework expands our understanding of development beyond simplistic social determinism. In our case we considered Leandro's lifespan while he engaged in a study group and our research study.

In Leandro's story *pereživanje* encapsulates the profound, often tumultuous process of living through and integrating contradictions. The concept of *pereživanje* resonates with the dialectical approach focuses on reconciling contradictions to achieve synthesis, sheds light on how individuals navigate and evolve amidst conflicting realities. The study of *pereživanje* is essentially engaging in a dialectical process, where the tension between opposing forces promotes personal growth. Vygotsky's dialectical perspective intricately delves into the dynamic interplay between conflicting ideas and their resolution through rich and complex social interactions. This approach aligns with the Hegelian concept of dialectics, which perceives contradictions not as mere oppositions to be eliminated, but as essential elements that actively propel intellectual progress. Synthesis of contradictions through lived experience highlights the dynamic and transformative nature of both concepts, emphasizing that true development arises from enduring and reconciling the conflicts inherent in life.

The concept of contradictions is firmly grounded in the dialectical approach to human development. Vygotsky regarded contradictions not as impediments to be overcome but as essential components of cognitive growth. Within this framework, contradictions are intrinsic to the social and cultural contexts in which individuals function. In Leandro's story contradictions act as catalysts for cognitive development. When individuals encounter contradictions, they are pushed to reconcile conflicts between their existing knowledge and new experiences. Engeström, building on Vygotskian principles, extends this understanding through his analysis of contradictions within activity systems. He posits that these contradictions, whether within a single activity or between different activities, serve as the driving force for expansion and transformation within the system.

Contradiction in the context of cultural-historical activity theory is a versatile concept that can be applied to multiple levels of analysis. It can be utilized to explore contradictions within a single activity or between different activities (Engeström, 1987). Additionally, this concept is valuable for examining abstract, high-level human activity systems, and concrete, everyday life activities. Engeström also discusses how these contradictions can manifest as breakdowns or discoordinations within the activity system. Breakdowns refer to instances where the system fails to achieve its goals or perform its functions due to unresolved contradictions. Discoordinations occur when there's a lack of harmony or

coordination among the various elements of the system, leading to inefficiencies or conflicts. In the course of this investigation, Leandro encountered different levels of contradictions—in the form of discoordination and breakdown—across his endeavor. Subsequent sections delineate instances of breakdowns and contradictions observed within distinct phases of Leandro's developmental trajectory.

Empirical context

In the next sections we describe the changes in and of the life of our protagonist Leandro at two levels, a macroscopic and a microscopic one. At the macroscopic level, we take a whole-life perspective that situates Leandro's teaching. This involves examining how activities in his life are organized hierarchically, playing different roles in leading his personal learning and development. For example, to make ends meet and to address the needs of his (growing) family, Leandro also works other jobs, including, at certain stages, being a full-time police officer. These other aspects of his life reach into his life as a teacher, so that continuity and change in teaching can be understood only by considering his whole life. At the microscopic level, our study focuses more specifically on teaching methods and teaching strategies, which, in one particular, research-related activity comes to be viewed under a radically new light leading to a turn-over in consciousness and a radical shift in teaching strategies. We articulate the theoretical rationale for the depictions—which are related to the law of the transformation of quantity and quality that Vygotsky (1997) uses to conceptualize the distinction of learning from development.

The case study is offered to exemplify the kind of theory required to distinguish between continuous growth and qualitative reorganization of experience in the lives of teachers. In our account, we draw on an extensive 2-year ethnographic endeavor. This study forms a component of a research initiative by the Faculty of Education at the Federal University of Uberlandia-Brazil conducted between 2012 and 2016. The research was carried out at a public high school situated in Uberlandia, Brazil with data collection spanning two entire school years (2013-2014). Positioned within a broader project aimed at instigating changes in pedagogical practices and fostering professional development among educators, the larger study sought to elicit transformative shifts throughout the entire data collection process. The research group comprised PhD student from the Faculty of Education, two high school in-service teachers (a sociology teacher, Leandro, and a science teacher), alongside 12 undergraduate students, pre-service teachers, from the Faculty of Education and Biological Sciences. By the time the research team started work the pre-service teachers had begun their Teaching Initiation Scholarship Program (PIBID) for secondary education under the science teacher supervision while they also participated in our weekly discussion meetings. The empirical research was designed to investigate the development of in-service teachers, particularly focusing on transforming their practices.

Both in-service teachers participated enthusiastically as volunteers in this research, driven by their individual desires to understand and change their own praxis. The relationships were cultivated in a horizontal fashion, allowing everyone to freely express themselves without concerns of judgment or categorization. As the collective took shape, these relationships strengthened.

Method of analysis

This study encompasses Leandro's development. Our narrative underscores the relational nature of human development. A relational framework highlights the role of the cultural-historical context that both shapes and is shaped by Leandro. His individuality, subjectivity, and his societal interactions activities are intrinsically intertwined with the contexts in which he exists both as a subject and as subject to various influences. In our approach to the data, rather than importing (pre-existing) concepts, we focus on the analysis of relationships when research participants co-elaborate (discussions, reflections, lessons planning, teaching, etc.) in practice while participating in the research. Therefore, it allows for the emergence of diverse positions among participants throughout the research, as a result of societal relations. Their statements, in essence, are not determined as in a simple cause-effect relationship. In this investigation, the process of overcoming the concrete reality experienced by the teachers in school generally and by Leandro specifically is possible when confronted with the external and internal contradictions inherent in phenomena, in the context of the totality, that is analysis by unit. The analysis by units involves relying on the minimal unit that contains all its properties as the only possible means to comprehend the whole (Vygotsky, 2001). To differentiate between cause/effect-based analysis and unit-based analysis, we considered the practice in the beginning of the study group and the entire situation Leandro was immersed in—all activities his was involved in life, the pedagogical practice, the transformation, and the interactions between these entities—as constituting the minimal unit (Roth, 2015). Unlike reductionist analysis, which examines complex events by breaking them down into independent elements, unit-based analysis considers all aspects (the pedagogical practice and the dynamic of change) as an integrated whole. This analysis aims to capture the change itself. The entire situation, including all aspects, both objective and subjective, forms the minimal unit in a holistic approach. This unit focuses on processuality to consider the whole process.

The present research starts from the concrete material reality, the practice of teachers, as a guide in forming consciousness as a reflection of reality. The idea of consciousness as a reflection of reality does not imply that it is passively constructed, as a mere reflected image or in a static manner. On the contrary, it is in a dynamic process. Thus, more than just an accumulation of information is expected; there should be a change in consciousness, that is, teachers' awareness regarding their pedagogical work. However, changes in consciousness, in the Vygotskian sense of awareness, are not predetermined, predictable, or pre-planned. The data was linked to the analysis of the essence of the phenomenon, it does not reveal itself immediately but through the unveiling of the inherent internal contradictions.

The data presented in this article were collected on a weekly basis over a span of 24 months. The sources encompass audiotapes recorded weekly 3–4 hours meetings held at school during the evenings, interviews conducted with our case study protagonist, Leandro, classroom observations, field notes, materials generated by the teacher—such as lesson plans, unit plans, and photographs—as well as personal communications from the teachers.

Policeman and/or teacher: a whole life perspective

To paraphrase Marx: the psychological nature of man is the ensemble of societal relations shifted to the inside, having become functions of the personality and forms of its structure. (Vygotskij, 2005, p. 1023).

In this section, we take a whole-life perspective to describe change in and of becoming as a teacher from a macroscopic perspective. Who Leandro is as a teacher today has arisen, as Vygotsky suggested, from his participation in societal relations with others. Participation in any one activity depends on the plenitude of life, motives, interests, and needs of the person. In the following account, we focus on periods of continuous (incremental) change, which we distinguish from other periods where there are qualitative changes in *experience* (understood in the terms of *pereživanie*, i.e., the Leandro-environment unit). Sometimes change arises out of events/phenomena at the person pole of this unit, Leandro, whereas at other times change arises out of events/phenomena at the environment pole of the unit. The environment pole encompasses the cultural and broader societal contexts in which the protagonist, Leandro, is immersed. This includes his family's emotional and financial conditions, the whole aspects of the school community, police force structure and relationships, along with all his everyday life activities. Vygotsky viewed the environment not as static or external but as dynamic and constantly evolving, shaped by cultural and historical aspects. We begin by presenting an ethnographic description of Leandro's trajectory into and out of teaching over a decade and then provide an analysis that focuses on the transition from quantitative to qualitative change, and from qualitative to quantitative change. By exploring the microscopic level, we gain insight into the nuanced and complex processes through which Leandro, person-pole unit undergoes quantitative changes.

Becoming (as) a teacher

Early years

To make our case about the changes in Leandro's life, we start by describing how and why he became a policeman and a teacher (Figure 1, 1). In 2000, Leandro entered a university program in social sciences teacher education. He also took classes to obtain a bachelor's degree in social sciences. To make ends meet, he began to teach courses in a private school, preparing high school graduates for university entrance examinations (in 2003). The following year, his girlfriend became pregnant. They married; and their (first) child was born in 2005. In this context, he started to work in addition to teaching, for a telemarketing company to provide for his family. A breakdown arose: Working two jobs made it difficult to keep working towards both the bachelor and the teacher education degrees and he stopped the bachelor program. In 2005 his contract with the private school ended.

In 2007, there were indications that he might get fired from his telemarketing job. (Anticipating that he might be finding himself without an income, Leandro started to take admis-

sion exams to enter the police force. After 9 months, just about the time when he received his examination results at the beginning of 2008, Leandro was fired. Almost immediately, he began to work as a police officer. However, in this job, his income was insufficient to provide for all his family's needs. For his wife, these needs included continuing her university studies, which she had abandoned with the arrival of their child. In response, Leandro returned to teach in 2010, but now in a public school. The career in the police force initially had attracted him because of the better pay and greater stability than teaching. But Leandro repeatedly expressed, as per the data analyses, that juggling roles as both a police officer and a teacher leaves him with not sufficient time to prepare and reflect on his lessons. The work also was more stressful and dangerous, which turned into frustration and disappointment as time went by (contradictions at the person pole). Moreover, even though he had received good evaluations as a police officer, he had not advanced career-wise in the course of five years of work. At this stage, therefore, we may characterize a large part of Leandro's experience in terms of his *police-officer-and-teacher* career. Figure 1 constitutes an abstract representation of Leandro's life from 2000–2015, including the depiction of the qualitative changes in experience associated with a case study.

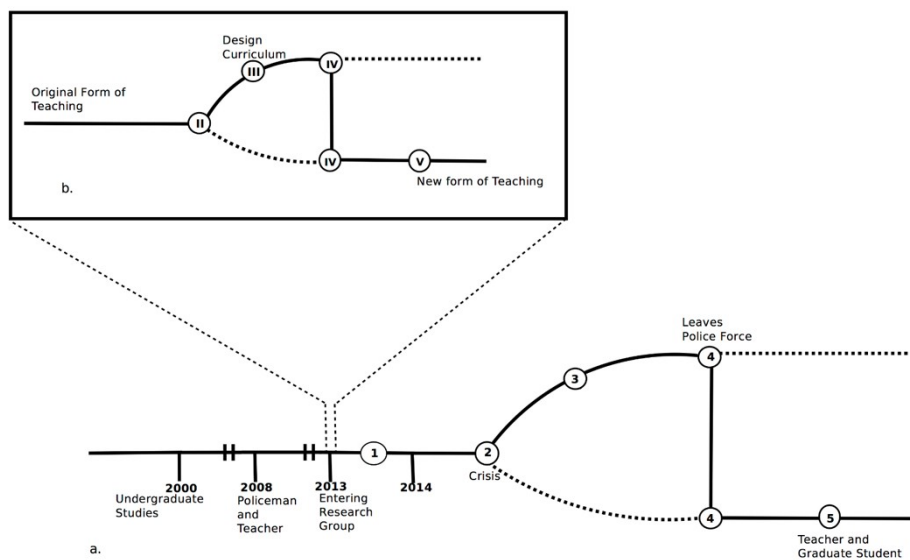


Figure 1. a. Phases of continuity and discontinuity in the life of a person who moves in and out of teaching. b. Continuities and discontinuities in the methods of teaching.

Figure 1 – Phases of continuity and discontinuity

Emergence of the possibility of an alternate life: A first qualitative change

In 2013, at a point when Leandro was somewhat dissatisfied with his work in the police force, he accepted the invitation to participate in a teacher research group that had continuous teacher education as its main goal (Figure 1, a and b). At about the same time, in the context of a very violent episode with a colleague in the police force, he was having thoughts about leaving it. But, during that same year, his wife also was pregnant again, and their son was born in November. This increased the family's financial needs, which were better met by continuing to work both jobs. That is, although he was actually

working as *policeman-and-teacher*, the alternative of working as a teacher full-time became an object of his consciousness, a *qualitatively different* form of thinking (about) his life. Our data show that during the second half of 2013 Leandro was no longer excited about the police force and explicitly expressed a willingness to focus on his career as a teacher. That is, the possibility for a qualitative change in his life condition emerged, existing as an alternative to his current life.

Transitions

In mid-2014, working two jobs and being part of the research group took his toll. Leandro felt overwhelmed and fell ill (Figure 1, 3), a contradiction in the form of discoordination (between the two jobs) in the way Engeström (1987) articulated it. Leandro took a sick leave from his work in the police force. But he continued working at school during part of this period to meet his commitment—to students and other teachers—to participate in a school event. One day, a colleague from the police force saw him working at school and reported it to their chief. The chief threatened Leandro to relocate him to another city. This situation contributed to a breakdown existing in the work conditions, which created the double threat of being relocated, and the other one in no longer being able to work at the school. On the personal side, he now had to support his family in addition to supporting the studies of his wife, whose graduation from law school was scheduled for the end of 2014.

Leandro continued taking medical leave from his police work while continuing to work at school and participating in the research group. It was in the latter that the idea emerged to take up graduate school. One way of making such a step financially possible would be to apply for and obtain a scholarship. Given the looming possibility to be relocated in the police force, Leandro applied to take the admission examinations for a graduate program. He took and passed the examinations towards the end of 2014. While exclusively focused on his role as a teacher Leandro's practice has shown significant quantitative changes. He emphasized several crucial points regarding the significance of honoring the concept of the "horizontalization of knowledge," particularly as it represents a novel concept for the group under discussion. The discussions were meticulously crafted and structured to ensure that the training endeavors to transform the teaching profession, with educators positioned as both the object and subject of this transformative process. This initiative aimed at acknowledging and elevating the diverse knowledge and experiences of education professionals, acquired throughout their life trajectories, which inform their teaching practices. It involved facilitating a horizontal exchange of knowledge to foster personal and collective re-evaluation.

Regarding the interactions with his students, Leandro acknowledged his oversight in not giving students a chance to voice their perspectives, failing to recognize the unique background each student brings to the classroom. Reflecting on these insights during weekly meetings, Leandro altered his approach to class introductions and lesson planning, incorporating opportunities for discussion when introducing new subjects or concepts. After two months of dedicated work during our training meetings, Leandro revised his units/lessons plans for the 10th grade of high school. They observed that the approach to teaching classical theories appeared overly traditional or conventional, primarily consisting of top-down frontal lecture classes. These sessions focused on the oral

presentation of subject matter, with the teacher delivering organized explanations of scientific concepts. He recognized the limitations of this approach, particularly its reliance on memorization and its failure to establish connections with other scientific concepts or disciplines. Confronted with the realization that there might be alternative methods to engage with subject-matter content, he redesigned the unit he was teaching using concept diagrams. Exposure to successful examples of this tool under similar instructional conditions sparked an internal contradiction for Leandro. Previously, they had viewed the incorporation of this tool as didactically unfeasible. However, being exposed to these diagrams' success prompted a reevaluation of his teaching approach, leading Leandro to quantitatively modify his instructional unit/lessons plans and class activities during the subsequent weekly sessions.

An additional significant aspect of our protagonist's journey was the evolution in their perception of classroom management when implementing "new methodologies." Initially, there was apprehension regarding maintaining control while fostering collective discussion. However, this concern was assuaged as he witnessed increased student engagement with the collaborative learning approach. Transitioning from a solitary instructional approach to one of co-elaboration marked quantitative change, both in terms of didactic method and overall pedagogical practice. What had previously been a solitary endeavor transformed into a collaborative process, reflecting a shift towards more inclusive and student-centered teaching practices. During this year, therefore, with a leave from the police force and working only as a teacher, Leandro was experiencing what it means to be a teacher rather than a *policeman-and-teacher*. That is, he was already experiencing an alternative professional life. But a complete change—from being policeman-and-teacher to being teacher-fulltime—was mitigated by the financial situation that the family would have occurred.

A second qualitative change

At the beginning of 2015, Leandro was asked to provide a medical certificate to his superiors in the police force (Figure 1, 4). At about the same time, he received notice that he was eligible for a graduate fellowship. In the face of the contradiction of having to provide a medical certificate for being ill and being relocated all the while continuing to work as a teacher, and having an offer to receive a scholarship to pursue graduate work, Leandro decided to leave the police. In his letter of resignation, he pointed out that he wanted to start a new life, perhaps with a lower income but with peace. In this phase of his life, therefore, we observe a second qualitative change from *being policeman-and-teacher* to *being full-time-teacher-and-graduate-student*.

A new horizon for continuous growth

By mid-2015, Leandro's life was shaped by the fact of being a *fulltime-teacher-and-graduate student* (Figure 1, 5). Associated with this new dominant form of life are new possibilities of growth distinct from those while he was policeman-and-teacher. Leandro's teaching has changed to a qualitatively new form, and new forms of awareness concerning teaching have arisen with his life as a graduate student. That is, out of the qualitative change in his life, a new trajectory for continuous growth as a teacher has emerged that

differs from the growth trajectory that was possible while he was in the teacher-and-policeman form of life.

Analysis and discussion

As the ethnographic description illustrates, Leandro became a teacher over the course of different experiences. Being a teacher is not an isolated fact in his life or in any teachers' lives. We show that in the course of our protagonist's everyday life he did not participate in just one form of activity, but in multiple activities characteristic of society. Those activities were all interconnected and related to each other. Some of the changes in his experience were of continuous nature; i.e. Leandro's classes were no longer lectures where students' voices were not considered; instead, he started to allow students participation by posing questions and encouraged them to answer based on their previous knowledge. Others involved discontinuities and qualitatively different forms of experiencing. This kind of change (qualitative) modified the developmental trajectory of an individual in the context of a person-environment unit.

Our case study exhibits continuous change in Leandro's life. First, he worked at a telemarketing company and teaching, and then he entered the police force and returned to teach. Although Leandro studied to be a teacher, teaching provided him with a complementary salary rather than constituting the primary activity in his life. We note during the interview and the weekly meetings how working as a policeman and attending to his family did not give him the time required to do more in preparing lessons. Working as a police officer was his primary activity.

A contradiction arose from having two different jobs to keep out of financial woes. However, it became difficult for him to keep these two jobs. He did not have enough time to attend properly to all school's demands and also being a police officer, a father and a husband. When Leandro took a medical leave from his police work, he was experiencing the possibility of being nothing but a teacher. Additional affordances arose from his being part of the research group. It was out of this contradiction that the first crisis arose. This emergence of a shift from being a *police-officer-and-a-teacher* to becoming a *full-time-teacher* reflects the first qualitative change in his development. Leandro's changes in personal characteristics were a reflection of changes in the environment, and the cultural and historical context he was immersed in. A new option for living his life arose in Leandro's consciousness.

Once a new form of activity became Leandro's dominant activity, continuous quantitative change followed. He was less overworked and happier. During that period, we observed that was becoming a better teacher. In this stage of his life, therefore, a new form of continuous change was observed. But there existed a contradiction: he was less well off financially. To deal with this new contradiction, his wife started to look for a job and also studied to take admission exams for public service.

Incremental and transformational changes of ways of teaching

In this section, we provide a microscopic level account of quantitative-incremental and qualitative (crisis-like) developmental changes in Leandro's teaching. Leandro became a teacher in a very specific context: teaching courses for university admission exams. However, his teaching career has changed since then. We present in this section quantitative changes that set up the condition for qualitative changes to occur. During 2013 while he participated in the activities of a research group, some cumulative changes in Leandro's teaching could be observed: his didactical approach changed from a content-centered to a learners-centered teaching method. This constituted a qualitative leap in Leandro's teaching that contrasted the cumulative changes his teaching underwent while teaching.

From teaching for examinations to teaching for social impact

A period of continuous growth

During the first years of his teaching career Leandro taught students who prepared for the compulsory university admission examinations (Figure 1, i). When Leandro shifted from teaching in private to teaching in public schools, he realized that his new students had different goals. Public school students often have to work to help their families. Only some go on to university. He asked senior colleagues for advice on how to plan lessons until he could adapt to new conditions and improve his skills. Leandro explained during the interview and mentioned repeatedly while participating in the weekly meetings that he did change the focus and the content of his lessons. But he did not change the organization of the materials in lesson-length bits, with few or any connections to other topics of the curriculum. Moreover, working two jobs and having a family limited the amount of time that he considered feasible for spending on preparing for his courses; and, being happy with his teaching (feedback was positive), he felt no need to make changes. Thus, from his first foray into teaching in 2003 until 2012, Leandro's teaching changed incrementally by continuously refining what and how he had been teaching in the beginning. He changed the focus and the content of his lessons however had not changed the organization of the materials in lesson-length bits, with few or any connections to other topics of the curriculum which is evident in his lessons plans and could be observed in his teaching approach in the classroom.

An alternative teaching method emerges as a possibility

By 2013, he experienced considerable stress in his work as a police officer. Leandro joined a research group in part because he thought that he would be able to learn a few more teaching strategies and approaches to plan his lessons. In one of its meetings, the research group discussed an article based on Paulo Freire's theory: "Poop on the beach, no! Environmental education, science teaching and grassroots movements" (Saito, 1999).

The article describes how a science teacher articulated science lessons and a discussion about an environmental problem in a poor community in Rio de Janeiro. The article describes a rally of elementary school students who opposed the construction of an outfall near their school. Initially, the teacher did not join his students' movement. But choosing not to be with his students led the teacher to a self-reflection: as a teacher and as a citizen. The engagement with the article deeply disturbed Leandro. After a second reading, he announced being even more disappointed with his teaching than after the first reading. At the end of a collective reading, he said, "Congratulations, Leandro. First, I realized what I have planned does not have a theoretical-methodological connection with my practice. Then I became aware that I do not do any of that. 'Literally' two slaps in my face." In the past, he had blamed the structural problems of the public-school system for his pedagogical choices. It was in that moment of reading the article that he saw his teaching next to a different type of teaching (Figure 1, ii). He became aware of a contradiction: instead of offering students learning opportunities, he actually had not contributed effectively to their admission examinations; and he had not met their expectations as citizens. He highlighted the importance of political and social justice commitment to create a more inclusive and equitable learning environment. He summarized his newfound awareness by saying, "I am not actually the good teacher I thought I was. I thought I was planning classes for them, but I can see now how I haven't been considering the students in the learning process." The ways of the teacher in the article came to stand as a radical alternative to his own teaching.

Back and forth: Between the old and the new ways of teaching

Leandro no longer was comfortable with his teaching; and his engagement with the research group (being part of the discussions) had made him conscious of his practice that he did not consider effective anymore. (Figure 1, iii). Leandro, drawing on his reading of Freire (1987), began to change the focus of his lessons from being content-centered to gearing it towards students' concrete reality, needs, and interests. In 2013 there were many popular protest marches in Brazil where citizens were asking for social justice and actions to end the corruption in politics. Leandro reformulated some of his lessons inspired by those protests. He invited his students to manifest their discontentment also at the school through posters and banners during breaks and recess time. A contradiction emerged for Leandro: He had blamed the school structure in the past and he had been unable to let go of the control of the students; and there never seemed to be enough instructional time. He now confronted such challenges head-on by reconfiguring his approach in qualitative ways. For example, whereas he had lectured before, he now encouraged student participation. He had them work in groups instead of setting assignments and library research to be done individually. A new form of teaching was emerging. However, we also noted that there was continuity, as some of his lessons retained the previous form of teaching. Both forms of teaching co-existed for a certain period (Figure 1, iii).

The second crisis: Changeover to the new form of teaching

Leandro began trying out new lessons, designing a new curriculum, and discussing his experiences and the results during the research group meetings (Figure 1, iv). Toward the end of 2013 he planned lessons together with other members of the research group. There

were then at least four aspects of collective activity within the group: planning lessons, observing lessons, analyzing lessons, and re-planning lessons. Doing the collective work uncovered a breakdown, as he realized that his lessons were not helping his students to grow. During these instances of collective work, a second qualitative change happened, which led to a complete shift to this new form of teaching. Becoming aware of his practices, he said, “I need to re-plan all my lessons. I used to focus on the content, which does not work for the students’ growth. I need to focus more on the students’ participation, lessons with different objectives, and I also will offer new kinds of tasks for students to do at school. I am going to discuss with the research group those changes.” Leandro started to plan new lessons looking to change his praxis. Our data showed significant qualitative changes in Leandro’s teaching. For example, he used to fill the chalkboard with notes without talking to students, and then started the lessons explaining the concepts expecting the students to be quiet and listening. After the new planning, he used different strategies: He tried to dialogue more with students from the beginning of the lesson and write on the board while explaining the concepts, accessing students’ previous knowledge, instead of just talking and expecting the students to be quiet. The changes were noted by others, the school supervisor, the school coordinator and the students as well, who were more engaged in the classes.

New ways of continuous improvement

After Leandro joined the research group, and mainly after reading the article “Poop on the Beach. No!,” his teaching practice changed qualitatively. Once his teaching had changed, a new trajectory of continuous growth emerged (Figure 1, v). Leandro used to plan in advance the whole lessons at the beginning of the school year. But after the turnover to a different way of teaching, this kind of strategy was not helping him to adapt to the emergent needs of his students. Whereas he used to follow a step-by-step script for each lesson, he now plans the lessons to allow for new and interesting things to emerge while teaching. He commented: “Now, after all this time in the research group, I believe that students want to learn and that I can trust in their commitment to knowledge and school.” In the context of teaching practice, he became more involved in his school, Leandro took the lead in advocating the new form of teaching and advised supervisors and coordinators on more student-centered teaching methods.

Analysis and discussion

There were possibilities for change in the objective conditions of life, as we exhibit in the previous ethnographic description (macroscopic perspective). In this section, using a microgenetic lens, we pay close attention to how such objective conditions led to a qualitative shift in Leandro’s consciousness about his teaching first and then in his teaching. As he continued his usual teaching practices, a novel approach to teaching began to take shape. That is, the origin of a qualitatively new form of teaching was an earlier form. He understood his teaching and what he had been doing in a new light as the result of comparing it with another way of teaching. In the process, a contradiction emerged between what his lessons were and what his lessons could indeed be.

We describe changes in the external conditions (environment pole) the enrolment in the research group functioned as the stimulus that changed his teaching in different dimensions. When Leandro decided to change his practice acting in the face of the manifested contradiction, the cumulative experiences following a qualitative transition

from lesson-by-lesson teaching to a new form of teaching practice emerged. Both forms co-existed similarly to the two different forms of conceptions or reasoning that may coexist during child development. In our account we highlight the qualitative changeover when the dominant form of teaching (lecturing) was replaced by a more participatory approach. A qualitative new form of teaching had become the new dominant form. The ethnographic description, therefore, reveals how a new form of consciousness arose from contradictions within the person and within his environment.

Towards an integrative theory of teacher change

Professional growth—distinguishing continuous from discontinuous change

The preceding case study shows that there are two distinct types of changes in the becoming of teachers: quantitative-incremental and qualitative (revolutionary). In the teacher education literature, however, the term *professional development* is used to refer to both (Wite & Janssen, 2015; Chantal et al. 2015; Graue et al., 2015). When Leandro was working in these two jobs (policeman and teacher) some forms of changes occurred, an incremental one (quantitative) referred to as learning, for example when he realized that his lesson planning did not attend his students and planned them again, which were continuous and incremental teaching. In this time there was not a turnover, just subtle modifications, quantitative ones.

In both macro- and micro-level accounts of Leandro's teaching and life, five types of events are observed: (a) a dominant form of experience that changes incrementally (Figure 1, 1 & i); (b) a first crisis, where the individual becomes aware of a new form of experience (Figure 1, 2 & ii); (c) a period during which two alternative forms of experience co-exist, but where the older form is dominant (Figure 1, 3 & iii); (d) a changeover from the initial to the newly dominant form of experience (Figure 1, 4 & iv); and (e) a period where the new form of experience changes incrementally, but on a trajectory and in form different from the incremental changes of the previous form of experience (Figure 1, 5 & v). Critical to the second and fourth events are contradictions, which first appear externally to consciousness and then are reflected in the consciousness of the individual. We observe continuous, incremental changes (learning) prior to, between, and following the qualitative changes (development). Any account that aims to show how qualitatively new forms of experience arise from existing forms of experience requires documenting these five types of events in Figure 1 and described above, and needs to account for the contradictions that give rise to the genesis of new functions and to the change in dominance from older to newer functions (Holzkamp, 1983; Roth, 2016). In the sections Policeman and/or teacher: a whole life perspective and Incremental and transformational changes of ways of teaching, we provide accounts of teacher change at two different temporal scales, each containing descriptions of the five types of events and each articulating the contradictions that precipitated a qualitative change to occur.

A whole-life perspective

Our case study illustrates how different aspects of Leandro's life mediate his becoming (as) a teacher. When we take the whole life as the unit of analysis, these mediating relations become not only visible but also integral to a theory of teacher change. Prior research taking such a perspective has shown that experiences do lead to developmental shifts in a person (teaching) trajectory (e.g., Jóhannsdóttir & Roth, 2014). This study exhibits how qualitatively new forms of living (full-time teacher and graduate student) arise from the quantitative changes (write the content of the lesson on the board while expecting students to be quiet and copying, have all content locked in a plan instead of encourage students to participate and have lessons evolving according to students previous knowledge and interests) that had led to contradictions in the person and his environment. To understand the changeover in Leandro's life, it is necessary to look at the real environmental conditions, which include the contradictions that arose and led to crisis-like changeovers, where one trajectory (police-officer-and-a-teacher) came to be replaced by another (full-time-teacher). Simultaneously, there existed, as both external and internal conditions, the possibility to change his teaching and offer better classes to his students that have different goals in life.

Leandro's changed qualitatively from being a *policeman-and-teacher* to being a *full-time-teacher-and-graduate-student*. The experiences he has passed through shaped and changed his teaching. He no longer is the teacher that he used to be. Leandro's case, thus, suggests that, to understand where he is at in his career's development, we cannot just focus on isolated events in his (professional, private) life. Yet, research usually studies teachers while they are in the classrooms, or while they participate in activities at school. In the context of the cultural historical activity theory, however, the individual is the result of an ensemble of societal relations (Vygotskij, 2005). Therefore, we cannot consider teachers just during the lectures when they are at school or through interviews separate from their environment. We would not have been able to understand Leandro's development process if we had not followed others (e.g., van Eijck & Roth, 2010) by considering him within the totality of his life.

The present study exemplifies how contradictions arise both within a teacher and in his environment. Although each type of contradiction is the result of continuous change, together they produce the conditions for qualitative change. When participation in some form of activity contains the seeds for qualitative change, we may denote it by means of the concept of *leading activity* (Leont'ev, 1978). The adjective "leading" denotes the fact that the activity comes before and leads to a developmental change to a qualitatively different form of experience. We thereby have a concept to denote the condition for different kinds of teacher change: some activities lead to continuous change but only leading activities provoke qualitative life-changing transitions—such as one Leandro begins teaching in new ways after becoming conscious of the limitations of his old ways of teaching.

Conclusions

This study was designed to articulate and exemplify a differentiated theory of the professional growth of teachers, changes in the way teachers actually teach not in what

they say that they are doing, which may considerably differ from the former (e.g., Tobin, Espinet, Byrd & Adams, 1988). Our macro- and micro-level accounts show that there are distinct forms of change: one quantitative, incrementally improving some aspect of the person and his practice, which is identified as learning, and one qualitative, leading to reorganizations in the forms of a person's experiences. In the literature we observe many descriptions of change that are of the quantitative kind. These, if we follow Vygotsky, do not deserve the term *development*. The theory elaborated here is concerned with the real, material practices of teaching and life rather than with the discursive changes that occur in a person's life.

Our study has implications for thinking about pre-service and in-service teacher change. Teacher education programs tend to focus on techniques; in-service programs often are understood in terms of incremental change (e.g., Leandro wanted to improve on what he was already doing). In our account, change occurs when internal and external contradictions are revealed, leading to opportunities for truly transformative (qualitative) change. Importantly, if there are possibilities for qualitative change to occur, teachers likely will require support. In this study, support existed within the research group, which assisted him in designing, implementing, and evaluating new forms of teaching. This support provided the conditions for the eventual changeover to student-centered teaching and learning.

Teacher education programs should address the qualitative changes of each teacher by recognizing the importance of internal and external factors in the professional growth process. The findings from our study suggest several key implications for enhancing teacher education. Teacher education programs need to move beyond generic techniques and consider the unique contexts and challenges faced by teachers by offering personalized professional development plans that allow for reflection, experimentation, and adaptation based on individual needs and experiences. Encouraging teachers to engage in reflective practice is crucial for revealing internal and external contradictions in their teaching methods. Teacher education programs can incorporate structured opportunities for reflection, peer discussions, and mentorship, to help teachers critically analyze their practices and identify areas for transformative change. Creating collaborative communities while participating in research groups might seem idealistic, but the underlying principle of collaboration can be widely implemented. Teacher education programs that foster collaborative communities, where teachers can share experiences, have a safe environment for confronting their own contradictions, co-design solutions, and support each other's growth, are more likely to promote teachers' development.

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About the authors

Dr. Erika Germanos is an Assistant Professor in Science Education in the Faculty of Education at the University of Victoria, Canada. Her interests include initial and continuous teacher education. Her research underscores her commitment to improving pedagogical practices and nurturing critical awareness among educators. Dr. Germanos has extensive experience in science and environmental education grounded in transformative pedagogies. Her work aims not only to disseminate knowledge but also to empower students to critically analyze and engage with pressing ecological challenges. She also is interested in encourage students alongside community members to explore the interconnectedness and interdependence among life forms and non-living constituents on Earth. This relational approach aims to foster a holistic understanding of environmental issues recognizing the significant connection between working for a sustainable future and principles of social justice.

Wolff-Michael Roth is Lansdowne Professor Emeritus of Applied Cognitive Science in the Faculty of Education at the University of Victoria. His past research concerned knowing and learning across the lifespan and in many different contexts, including schools, work, and leisure. He developed and applied different theoretical frameworks, generally depending on the journals in which his work appeared, including in the fields of education, sociology, social studies of science, and cognitive science.