

**The Physics Teaching Practice course and the student-teachers' activity in the beginning of the supervised practicum at schools<sup>+,\*</sup>**

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**Abstract**

*This paper aims to present the development of the Physics Teaching Practice (PTP) course to discuss and analyze the activity of student-teachers who were starting their practicum in schools. This course, the object of our analysis, is part of the curriculum of a Physics Teacher Education Program at a Brazilian public university. This work is based on a qualitative approach and uses video recordings to record the events of the classes held during an entire academic year, when the student-teachers were initiating their practicum in schools. Our discussion and analysis are based on the Activity Theory, specifically on the concept of objectification, in such a way that we argue that the school becomes the object of the student-teachers' activity. Thus, we focus on the PTP classes at the university and on the changes in the development of the course that occurred throughout the year. The identification of changes is due to the characterization of the PTP course in three distinct moments that, following a chronological sequence, indicate that the student-teachers experienced a process of changing perspectives from student-teacher to teacher, considering the change in needs that happened due to the beginning of the practicum at the schools.*

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*Accordingly, from this discussion, we point out to the importance of the school in the process of learning and becoming a Physics teacher.*

**Keywords:** *Cultural Historical Theory of Activity; Physics Teaching Practice; Practicum; Physics Education; Teacher Education.*

## **I. Introduction**

The debates on the importance of school in the teachers' initial training became prominent nationwide in the past decade, partially due to the educational reforms and specific public policies for teacher education. On one hand, the Law For National Education (LDB<sup>2</sup>) from 1996 represents the starting point in these changes, by leading, as an example, to new National Curricular Directives for the Training of Teachers in Basic Education (NCD), published by the National Educational Council (NEC) in 2001. On the other hand, some recent<sup>3</sup> educational public policies seem to be responsible for the shift in discussions on the importance of school in teacher education, specially regarding the search for "greater interaction between universities and schools" (GATTI *et al.*, 2019, p.63). However, historically, the model that is traditionally used in teacher education in Brazil states that "prospective teachers are supposed to learn theories at the university and then go to schools to practice or apply what they learned on campus" (ZEICHNER, 2010, p. 90).

This (traditional) model for initial teacher training started in 1939 with the creation of teaching degrees<sup>4</sup>, whose curricular models became known as 3+1, that is, the first three years were dedicated to specific theoretical studies and the last year was dedicated to Didactics (PICONEZ, 2010; ARAUJO; VIANNA, 2010). In the early 1960s, for the first time, Brazilian law associated Didactics courses to a practical component in schools, a Teaching Practice under a Supervised Practicum, when then Federal Council of Teaching (FCT) issued the Resolution FCE 292/1962.

According to Goulart (2002), "from the need of preparing the future teacher for pedagogical aspects, came the idea of a teaching practice during training, associated to an practicum during which the student-teacher would have contact with the classroom and could observe the real teaching process" (p.78). However, Andrade and Resende (2010) highlight that initially, the notion of practice was "understood more as a subject in a program than as a curricular object" (p.236), at the same time that practice begins to mean training, following the perspective of the political moment when the Resolution 292 was issued (ANDRADE and

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<sup>2</sup> LDB is the acronym in Portuguese of the National Law for Education (Lei de Diretrizes e Bases)

<sup>3</sup> We can mention the Institutional Program for Teaching Initiation (Pibid, in the Portuguese acronym), launched by the federal government in 2007, a program of teaching scholarships for undergraduate students. The Program has scholarships for teachers in public primary education, which, in our opinion, is the Program's most important feature.

<sup>4</sup> In Brazil, teaching degrees are called 'Licenciatura', a four-year long undergraduate courses.

RESENDE, 2010). On the other hand, Piconez (2010) says that Teaching Practice “became an object of concern (...), especially in relation to the curricular practicum after the university reform institutionalized by the law 54540/68” (p. 15). Seven years after the Resolution 292, the FCE Resolution 09/1969 establishes, by force of legislation, the supervised practicum. Finally, after the Law 5692/71, it was established that the Didactics course would be responsible for the “exclusive task of approaching the reality of the classroom” (PICONEZ, 2010, p. 16).

Considering the set of reforms and legislations of the 1960s and their technicist perspectives, in the mid-1980s, it was believed that Teaching Practice could constitute a space for innovation in the initial training of teachers. At that time, Nadai (1985) stated that

*Teaching Practice in university curriculum has occupied the role of an integrative discipline and is in a privileged position: it can be said that it [Teaching Practice] has been created in this disordered and isolated place that are undergraduate and teaching degrees as a synthesis subject directed to the teaching of the curriculum. The student is led to reflect on the set of specific disciplines and on the pedagogical aspects that he or she is taking, while at the same time identifying the need to reflect on the school in which he or she will work, as well as on his or her own professionalization. That is the point in his or her training where he or she sees its ailments, critical points, importance, significance, and validity. Often, the professional choice is rethought. Therefore, Teaching Practice is the space for reflection for professional excellence. The transformation of the student into a professional happens frequently at this moment (p. 15).*

In 2001, as a consequence of the LDB from 1996, the National Education Council (NEC) issued the Resolution NEC/CP 09/2001 with the NCD. The document, even with all the criticism directed towards it, defends that teaching degrees have “their own identity” (BRASIL, 2001, p. 18). This identity, in part, refers to a new relationship with the school, stating that “there must be an practicum project that is planned and evaluated jointly by the training schools and the basic education schools, with clear objectives and tasks, and that the two institutions take responsibilities and help each other” (BRASIL, 2001, p. 14), where “the necessary school placement for the training of future teachers is hampered by the lack of institutional space to ensure time for joint planning between professionals in the training courses and those in the school of basic education that will receive the interns” (ibid., p. 18). This slow change becomes evident, with the increase in hours of supervised practicum<sup>5</sup> to 400

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<sup>5</sup> The 400 hours of Practice as a Curricular Component as stated in the 2001 NCD may, in general, also represent a slow and gradual change, as it appears to expand the meaning of practice in teacher education, suggesting, for example, “that practice, as a curricular component, presents an investigative dimension that allows the (re)creation of knowledge” (ANDRADE and RESENDE, 2010, p. 241). Mohr and Wielewicki’s book (2017) broadly discusses this novelty of the 2001 guidelines, available at: <[http://www.licenciaturas.ufsc.br/files/2018/05/mohr-e-wielewicki\\_2017\\_orgs\\_pratica-como-comp-curricular.pdf](http://www.licenciaturas.ufsc.br/files/2018/05/mohr-e-wielewicki_2017_orgs_pratica-como-comp-curricular.pdf)>. Accessed on: 16 out. 2021.

hours due to the Resolution NEC 02/2002 and the NCD from 2015 (BRASIL, 2015), as well as the most recent ones, from 2019 (BRASIL, 2019).

In this context, the aim of this paper is to present the development of the Physics Teaching Practice (PTP) course <sup>6</sup>, in the form of an experience report, to discuss and analyze the activity of in Physics student-teachers (pre-service teachers) who were starting their supervised practicum in schools. The Physics Teaching Practice course, which is object of our analysis, is part of the curriculum of a teacher degree in Physics in a Brazilian public university, and it occurs during an entire academic year, in which the student-teachers start their supervised practicum at the school.

Our discussion and analysis are based on the Cultural-Historical Activity Theory (LEONTIEV, 1978; ENGESTRÖM, 1987), specifically on the concept of **objectification**, in a way that we argue that school becomes an **object** of the student-teachers' activity. To do so, we focus the organization of this paper in terms of the PTP course classes at the University and the changes in the development of the course that occurred throughout the year. The changes were identified through the characterization of the subject in three distinct moments that, following a chronological sequence, indicate that the student-teachers experienced a process of changing their perspectives from student-teacher to teacher, considering the change in **needs** that occurred due to the beginning of practicum at the school. Thus, from this discussion, we point out to the importance of the school in the process of learning and becoming a Physics teacher.

## II. The subject of Practices in Physics Teaching

The teaching degrees (*licenciaturas*) of the university, where this study was carried out, underwent a curricular reformulation in order to adapt to the NCD, creating a wide-ranging teacher education program. This program established that the Institutes or Centers of origin of each teaching degree should organize and supervise 100 hours of supervised practicum, with the remaining 300 hours being the responsibility of the Institute of Education. In this context, Physics Teaching Practice is a course that was created as part of the work of the University's Teacher Education Program, making it mandatory for student-teachers in the Physics teaching degree. The PTP course contains 2 class credits, 3 work credits and totals 25% of the supervised practicum hours of the total required to complete the degree.

Another of its features is the possibility of hiring educators and technicians to help university professors guide supervised practicum and its relationship with schools. Thus, in the case of PTP course, there were two of these educators (one of them is one of the authors of this paper) who worked together with the student-teacher in preparing and planning the

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<sup>6</sup> We emphasize that in a previous work (SILVA; VILLANI, 2017), we presented the analysis of the same course, based on a more specific episode on the activity of undergraduates in preparing the lesson plans that were taken to the schools for the internship.

activities that were taken to the school by the student-teachers. It is, therefore, a new course in the teaching degree curriculum, especially as it is now delivered by the Institute of Physics, and no longer by the Institute of education.

The PTP course aims to enable student-teachers to integrate contents of Physics and pedagogy with autonomy, offering them professional practices to promote, plan, organize and monitor Physics teaching activities in schools (SILVA, 2013).

Table 1 – General overview of the PTP course. Source: (SILVA, 2013).

	Context	Place	Individuals	Characteristics
UNIVERSITY	Class	Classroom	Student-teachers, educators, professor, assistants	Collective discussion on themes related to Physics or Pedagogy contents and updates on the practicum
	Workshop	Didactic-Pedagogical lab	Student-teachers, educators, and assistants	Pairs of student-teachers preparing for the practicum. Biweekly frequency.
	Planning meeting	Didactic-Pedagogical lab	Professor, educators, assistants, technician	Pedagogical planning of the PTP course as well as discussion about problems related to the practicum.
	organizing materials	Didactic-Pedagogical lab	Educators, assistants, technician	Survey of material, copy of the experiment guides, production of material, organization of the experiment kits, delivery to school.
SCHOOL	Practicum	Classroom (School)	Student-teachers, mentors and high school students	Classroom organization, distribution of the material and execution of the experiment.
	Extra-class	Beyond the classroom (School)	Principal, school personnel	Signature of practicum documents, guarantee of entry and exit at school, delivery of the kits for the practicum

Table 1 gives a general overview of PTP course, with the identification of the contexts, places, subjects, and characteristics of the actions of the subjects. However, we only describe the most relevant contexts for this paper, given that other details can also be found in Silva (2013):

(a) The **classes** (morning and evening) were the moments in which the entire class was with Professor Velma (responsible for the subject), the educators (one of them being the author of this paper) and the assistants (senior undergraduate students). In those spaces, contents related to Physics and Physics Teaching (such as the role of experimenting in Physics lessons) were discussed, as well as bureaucratic issues (such as the organisation of schedules for the internships) and student-teachers' narratives about the events in the school. These classes occurred biweekly and alternated with the practicum at the school;

(b) The **workshops** were the moment of PTP course is the time set for the preparation of the activities that would be developed during the practicum at the school and

were designed to last two hours. They were distributed over the week in a way that the undergraduates could choose a time that would coincide with their practicum schedule. The workshops occurred biweekly, alternating with activities in the schools: the student-teachers would prepare the material (experimental kits) in pairs and take them to the school. The educators would work in the workshops orienting the student-teachers during the preparation of the material, be it in the discussion of scientific content, be it in pedagogical discussions;

(c) The **practicum at the school** was the moment in which the undergraduates went to the schools every fifteen days to develop the activities they had been prepared in the workshops in the previous week. Therefore, the student-teachers would have classes and workshops in one week and the practicum in the following week. There were twelve weeks in the schools in total, four in the first semester (April to June) and the others in the following semester.

Before the beginning of the PTP course classes, Professor Velma visited some public high schools close to the university campus and talked to the mentors (in-service Physics teachers) in order to present them the practicum activities proposal, showing a list of experiments that could be taken to schools as practice for the undergraduates. Thus, each teacher who accepted working with the student-teachers chose, according to their planning, a set of twelve experiments that would be conducted in the workshops and developed during the practicum. Altogether there were seven high schools involved, with a total of twenty experimental kits that had to be prepared and presented every fifteen days.

### **III. Methodological procedures**

The methodological procedures in this study have their fundamentals in qualitative approach of social-historical character (FREITAS, 2002). In this perspective, the particular is like an instance of social totality, and the research techniques must consider “subjects as historical, dated, concrete, marked by culture as creators of ideas and consciousness who, when producing and reproducing social reality, all right the same time produced and reproduced by it” (FREITAS, 2002, p. 22).

Classes and the workshops were video recorded. Schubert (2012) states that “videography (...) as a form of observation, videography has its ancestry in the ethnographic research tradition (...), but video recordings are necessarily different in scope and focus from observations made with the naked eye” (p. 115). Regarding the use of this resource, we argue that video recording enables the “prolonged engagement of the researcher with the data, who can then revisit the investigation scenario several times and connect the observations extracted from the audiovisual medium with other records obtained in the investigative situation” (GIORDAN, 2006, p. 215). Therefore, video recordings were used because they provide more detailed information on the dynamics of classes throughout the school year.

We emphasize that the class records were made by one of the educators<sup>7</sup> of PTP course (first author of this paper), and are thus presented as narratives with descriptive characteristics, yet they retain the “concreteness of the studied phenomenon, without being in the limits of simple description or losing its richness in favor of explanation” (FREITAS, 2002, p. 23). On the other hand, we cannot forget that social phenomena occur in a process of change and transformation, giving them a historical aspect (*ibid*). This perspective gives the description the *status* of an interpretation, whose selection of events and details is always subjected to the researcher's view of this process of change and transformation. Thus, attributing this condition to the researcher is understanding that their presence in the research environment as a subject is essential to understand the development of the analyzed events, that is, it is not just the presence of the observer in the data, but we have to consider that there are data that can only be revealed and explained because the researcher is an integral part of the research (VILLANI *et al.*, 2006).

#### IV. Theoretical standpoint: some elements of the Theory of Activity

Several authors have their own understanding of the Cultural-Historical Activity Theory (CHAT); however, they agree that CHAT has its fundamentals in Vygotsky, who focuses on the relationship of the historical process with the edifying principle of the psychology of human beings (DUARTE, 2002; CAMILLO; MATTOS, 2019). Vygotskian theses have two main basic hypotheses: (i) “the psychic functions of men are of a mediated character”; (ii) “internal intellectual processes initially come from an external, interpsychological activity” (LEONTIEV, 1978, p. 164). That means that the notions of **mediated action** and **interpsychological activity** are the basis to a theoretical assumption that seeks to connect the development of psychism and the development of human activity. Thus, within the Vygotskian framework, the relationship between subject and object is always mediated by an instrument (the upper triangle in Fig. 1, subject-instrument-object, represents this idea).

The model of human activity proposed by Engeström (1987) establishes a mediational design, considering that the relationship between the subject and the object is mediated not only by instruments/artifacts, but also by the socio-historical-cultural environment (the lower part of Image 1). In his model, Engeström (1987) highlights the relationships between the subject and their community, focusing on the subject-group relationship.

The bottom of the triangle in Fig. 1, constituted by the values and rules, the community, and the division of labor, is the social/collective environment in which human activity takes place. According to Engeström (1987) “The model suggests the possibility of

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<sup>7</sup> The role of educator had the following main attributions: participating in classes, guiding undergraduates in workshops, organizing material (experimental kits) and taking them to the schools.

analyzing a multitude of relations within the triangular structure of activity. However, the essential task is always to grasp the systemic whole, not just separate connections” (p. 50).

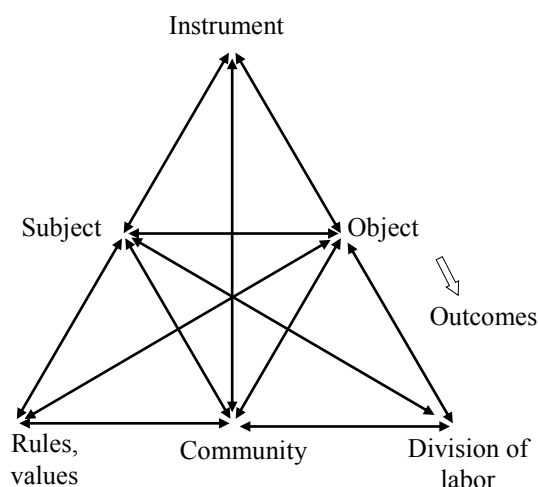


Fig. 1 – Model of human activity proposed by Engeström (1987).

The introduction of Vygotsky's ideas considers “that the main mechanism of human psychic development is the mechanism of appropriation of different species and social forms of historically constructed activity” (LEONTIEV, 1978, p. 166). Since the activity can only exist in its external expression, it is admitted that these processes, which are mediated and appropriated in the external form, are later transformed after being properly appropriated into internal, intellectual processes (*ibid*). Consequently, the basic problem of Vygotsky's investigation is “the study of the structure of activity and its interiorization” (*ibid*, p. 167).

In this sense, our theoretical framework is based on the socio-historical-cultural perspective, which means that we interpret the process of learning and becoming a teacher by understanding “the relationship between the objective structure of human activity [the school, for example] and the subjective structure of consciousness [of becoming a teacher]” (DUARTE, 2002, p. 284), thus reinforcing the “culturally mediated character of psychological processes” (*ibid*, p.283). The activity of becoming a teacher becomes, therefore, an activity characterized by constant changes and transformations within it, whose “cultural activity and psychological phenomena have a mutual relationship of dependence and support [in which] there is no clear division between them, because they are intertwined” (RATNER, 1997 *apud* DANIELS, 2003, p. 112).

Finally, we emphasize that CHAT as a theoretical-methodological framework has been gaining space in research in Brazil, as shown by the publication in number 2 of volume 1 of the Brazilian Journal of Socio-Historical-Cultural Theory and Activity Research<sup>8</sup>, released

<sup>8</sup> Revista Brasileira da Pesquisa Sócio-Histórico-Cultural e da Atividade



in December 2019, which indicates the expansion of the CHAT in Brazilian research. Specifically in Science Education, Camillo and Mattos (2019) state that “the field has appropriated the Vygotskian perspective” (p. 3) and that “leads to the expectation of overcoming the limitations found by previous [cognitivist] perspectives, especially in terms of it concerns with the processes of teaching-learning of scientific concepts” (p. 14). Thus, more complex descriptions and interpretations are achieved, since they assume that the situations analyzed are incorporated in the sociocultural contexts intrinsically that are intertwined in them (STETSENKO, 2005).

## V. Presentation of the classes

To conduct the analysis, we identified three **moments** that are representative of the various phases of the classes in the subject, considering some events that occurred throughout the school year. It is a chronological organization of the succession of these events, in such a way that we have: **moment 1**, equivalent to the beginning of the subject in the months of February and March; **moment 2**, referring to the beginning of the practicum at school, comprising the months of April and May; **moment 3**, related to the second semester (August – November), when the student-teachers began to have more autonomy in creating the experiment guides (SILVA; VILLANI, 2017). This analysis allows us to create hypotheses about the change in the student-teachers from the position of student to the position of teacher throughout the school year, in which we seek to identify the **objects** and **instruments** in each of these moments.

On Table 2, we synthesize each of these moments and the general characteristics of what happened during each moment.

Table 2 – Characterization of the classes in each moment.

Physics Teaching Practice		
Moment	Characteristics	Class
1	<ul style="list-style-type: none"> <li>• Beginning of the school year;</li> <li>• Two months;</li> <li>• The practicum had not started yet.</li> </ul>	<ul style="list-style-type: none"> <li>• Organization of the pairs of students and their schedules,</li> <li>• Study of a concept map for energy;</li> <li>• Conduction of experiments in class, simulating what would be done in the schools.</li> </ul>
2	<ul style="list-style-type: none"> <li>• Beginning of the practicum at the schools;</li> <li>• Two months;</li> <li>• 4 intern classes at school.</li> </ul>	<ul style="list-style-type: none"> <li>• Reports of events that occurred during activities at the school;</li> <li>• Student-teachers comment/complain about some difficulties, for example, the mentor did not know that they would be at school or that the school gate was closed;</li> <li>• Professor Velma gives some information and presents some solutions to the problems raised.</li> </ul>

3	<ul style="list-style-type: none"> <li>• Restarting of the internship;</li> <li>• Four months (the entire second semester);</li> <li>• 8 intern classes at school.</li> </ul>	<ul style="list-style-type: none"> <li>• Reports on the events happening at the schools;</li> <li>• Discussion via virtual platform about educational concepts and ideas;</li> <li>• The student-teachers propose texts on topics discussed on the platform as reading for classes</li> <li>• Discussion of texts on teaching-learning, theory and practice, science teaching and experimentation.</li> </ul>
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In the following sections, our analysis will be focused on each of the three moments.

### V.1 The first moment

Classes at the beginning of the year were weekly given that the practicum at the school had not yet started, so the classes were discussions of contents of Physics. Early on, Professor Velma asked the student-teachers to organize themselves into groups to prepare concept maps for energy. These should be in poster format and posted on the classroom wall for presentations on how they had created the map.

After a period of presentations of the concept maps, the professor started to bring to class small equipment to be used as low-cost experiments under the justification that the classes during the practicum at the schools would be based on experimentation. However, in one of these classes, the professor brought a more elaborate experiment, also about energy, taken from the teaching material of the State Education Department. In that same class, she asked the student-teachers to conduct the experiment as if they were high school students. Throughout this class and in her interventions in the groups, she proceeded with this idea and always reinforced the relationship that should be established between teacher and student.

Still in this lesson, when the student-teachers finished the experiment, Professor Velma wrote on the blackboard the data that each group found, with the aim of producing a wider discussion on the theme, as if it were a typical class in a laboratory. The first comment that the professor made was on the characterization of the experiment, of the qualitative type. Then, she proceeded with the general discussion of data (time of combustion, boiling temperature of water, etc.). Next, Professor Velma asked the student-teachers to reflect on the relationships (on the topic of energy) they could establish from the experiment, which led the groups to discuss what the professor had proposed.

The following stage of that same lesson was a general discussion on the observations of each group. Thus, one student (from each group) wrote on the blackboard what was observed by them in the group, which would then be discussed with the rest of the class. This was the dynamic in the class until the end, when the professor asked the students to leave the classroom layout as they had found it and she highlighted that this should be their stance in the school: to ask the students to always organise the classroom.

In another video from the following week, the pairs of student-teachers for the practicum were still being made, as well as their distribution to each school. While professor Velma and one of the educators was organizing this part, the other educator (one of the

authors of this work) and the assistants were in charge of working with the student-teachers regarding small equipment that, in a composition, would become a low-cost experiment. At the beginning of the lesson, the professor asked the student-teachers to elaborate a hypothetical lesson plan, based on the low-cost experiment. Then, the group that was closest to the camera was chosen to be filmed. However, some details on the audio were compromised due to interference from noise in the classroom.

Among the student-teachers in this group were Igor and Fáber. The equipment they had available was a battery, a magnet, and wires. The hypothetical lesson plan to be created from the experiment led to discussions in the group on: (i) whether the experiment should be a demonstration or should just stimulate curiosity; (ii) whether the hypothetical lesson plan should start with questions related to force and field (iii) whether high school students truly learn or memorize.

However, this discussion gave way to conceptual aspects: the existence and nature of the electric field, and Fáber commented on a class of a subject of the Institute of Physics that he had attended previously.

At another point, Bianca, one of the assistants, approached the group and asked how they would explain electrical charge to high school students. Thus, all student-teachers in the group were involved in another round of conceptual discussion. Amidst the discussion, someone from another group asked Bianca why they had to do this task, and she replied, "*It's student moment, right?*".

However, when the time came for each group to present their hypothetical plans, the time of that lesson was over, and some groups could not do their presentation. On the other hand, the student-teachers were restless, given that the professor was organising the pairs for the practicum and solving the puzzle there were the schedules in the schools, since their work at the schools were set to start in two weeks.

Not all classes of this first moment were filmed, but since one of the educators was also the researcher, it is possible to make inferences from his notes. In general, the classes in this initial moment of PTP course were more focused on Physics, that is, on the discussion of some concepts, especially energy. The very creation of conceptual maps, the experiment and the discussion about science indicate this perspective.

## **V.2 The second moment**

The dynamics of the subject changed with the beginning of the practicum in the schools. The classes started to happen every 15 days, alternating with the week of the practicum at school, that is, one week they participated in the class and workshops at the university, and the following week they went to the practicum at the schools. The routine of coming and going, however, was not immediately well understood by the student-teachers, with some mistakes occurring in the first time they went to the schools. Consequently, the class became the moment when the difficulties related to the practicum at the schools were

reported by the student-teachers and commented by Professor Velma. During this time in the PTP course, reports were common about: (i) the difficulties of the student-teachers to enter the school; (ii) the mismatch between the mentor and the student-teacher, in the sense that the former did not know about the practicum; (iii) problems with kits, such as lack of material or wrong experiment guides.

Differently from the presentation of the characteristics of the first moment, we identified 3 episodes that occurred during the classes in the second moment, here presented by the transcripts of some statements by the participants of the class: episode 1 presents the last class before the student-teachers started the practicum at the school; episodes 2 and 3 depict one class of each period (morning and evening), after two times they went to the practicum at schools.

### Episode 1:

The first episode occurred on April 5th and depicts the moment in which Professor Velma announces that the students would go the schools that week. Her announcement is eloquent and shows the dynamics of practicum activities.

Turn	Speaker	Sentence
1.1	Velma	So, guys, this is the big week when you're going to meet the classes you're working with right? Has everyone found the address? No?! What happened? I can't remember...
1.2	André	The teacher wanted...
1.3	Velma	... oh yes, the teacher in the third year of high school who teaches on the second day didn't want it. He didn't say he didn't want to, he said it was better to do it in the first year (...) yes, so I realized that not everyone is in the <i>stoa</i> . Today I went looking one by one and there are people whose names are not in the <i>stoa</i> yet.
1.4	Velma	Well, then, that's it... some ... we should first talk a little about this first visit ... all the material with the ten kits per class is in the box that goes to the school on Thursday. We're finishing the preparations and the Educator [researcher] will take them with him. We have one of each for you to train today in case you haven't done the experiment yet. So, you get the box, a big box, generally with ten kits to make groups of students, right. And two scripts per group. So, each student group, except in elementary school, gets two scripts, and they... what are these two scripts for? One is meant to stay with the teacher and the other will stay with you, for you to see what the students were able to do. An important thing, especially for those who will go in the evening, I don't know if you know, but schools lock the gate outside the entrance hours. So, two things are important: one, get there a little early, like ten or fifteen minutes, to have time to get into the school, get the stuff. In one of the schools, (...), the material is already in the laboratory. In other schools as there is no laboratory, it should be in the staff room. So, you have to get there, get into the school, get the stuff, find the room. Well, you're going there this week, so you're not going to have a problem looking for the teacher and knowing what the room is. But since they lock the gate, there aren't always people to go open the gate by the time you arrive. So, if you arrive on time, you risk staying out during class time [...]. First arrive a little early and second write down the school phone number. Then you can call the school... it's... what else do you remember, André? Oh! We're... This week I'm sending a letter to the principal with all the schedules you, your

- names and the teachers with whom you will work and also you will take a letter with you ... this general one I'm writing, and this other one that each of you takes separately. ...
- 1.5     **Researcher**   I think that's it!
- 1.6     **Velma**         Any doubts?  
[Silence in the classroom]
- 1.7     **Velma**         Oh! Another thing... for the teacher's plans, we are sending all the information about what experiment happens each week. It's been agreed on, but since he's got many classes, he needs to know. So, for this agreement of ours with the schools to work, it is important that you, the pair, right ... have a way to contact each other, don't be dispersed, one has to have the other's number, to ensure that you go to school. Don't let things accumulate, if one has a problem, I don't know... The effort we are making is this, the school is not taken too seriously by the responsible agencies, by the state or sometimes by the management, so we have to do a very serious job. That's what's critical. Seek to ensure that these twelve times throughout the year (...).  
[someone says 11 times, then André stresses that there are twelve weeks with the observation].

The set of dialogues, mostly featuring Professor Velma, characterizes this episode. The Professor sought to present all kinds of information about the practicum: regarding the arrival at school, such as arriving early and having the school's phone number; regarding the material, such as where it would be allocated, how to proceed with it, how to handle it; and regarding the experiment scripts and, finally, the report. The class remained silent during of Professor Velma's explanation.

The class April 5th had a transitional character, that is, the Professor introduced, called, or invited the student-teachers to the new moment of the subject, the practicum at the school.

## **Episode 2:**

In this episode, we present the beginning of the class that occurred on May 3rd, after the second visit to the schools. The layout of the class was in a circle, common in almost all classes. As soon as the student-teachers were already in position, the Professor asked them to comment on the events of the practicum. Tuca was the first to report on his situation, followed by Paulo.

After starting the practicum at school, the student-teachers reported a series of problems, especially due to the mismatch between what had been planned in the context of the university subject and what occurred in the school classroom. As indicated by Tuca on turn 2.2, the teacher at the school where he and his team performed the practicum did not seem to know much about the presence of the student-teachers at the school. The same occurred with another pair, as indicated on turn 2.8, in which the students at the school would take an exam, already provided for in the school calendar. Finally, the conceptual problem highlighted on turn 2.4, since the planned experiment for the practicum at the school was about vectors, but the students had not learned to use them.

- 2.1 **Velma** Tell me what happened, when, with which teacher
- 2.2 **Tuca** So... our visits are on Tuesdays from 3:30PM to 5:30PM, two classes. We got there to do everything. And he [the teacher] said he was going to give an exam, and since he didn't have our names, he couldn't... he could not postpone the test any longer, he said that for some groups he even managed to advance the test so that the experiment could be applied later. But since we didn't know it was the last day we were going to work with that class, he needed to close the bimester, and we couldn't use his class.
- 2.3 **Velma** Ok! [she tells the educator to write this down]
- 2.4 **Tuca** There's something else too, since we were there, we talked about the theme and about the experiment, and we were a little confused by this experience of vectors to work with them.
- 2.5 **Educator** They didn't even study vectors yet!
- 2.6 **Tuca** And they said, the teacher [in the school] said that the curricular proposal of the State that they have to follow, that they are forced to follow, forced right! [makes quotation marks with his hands]. He didn't say he was forced, it wasn't that word, but that's what he hinted at. They don't use the term vector, itself, they use arrow, or something like that. But, the word vector, they don't use it, so I don't know to what extent this experience would fit.
- 2.7 **Velma** So, curricular problems, State program problems [counts the problems and writes them down] ... I am going... I think everyone should talk and then I make a general comment on these issues.
- 2.8 **Paulo** Yeah... my pair and I, when we went to the [Other] school, we also Only got to do the experiment in the first [year], because they were having an exam in the second [year].
- 2.9 **Velma** Exam?
- 2.10 **Paulo** Yeah, a schoolwide exam and the teacher said that they would have exams for the whole day, so we couldn't do the experiment with the second [year], Only with the first.  
[silence]
- 2.11 **Velma** Any comments on the first year, though?
- 2.12 **Paulo** Ah! I think... I think we got lucky... we could do everything in the plan. [...]
- 2.13 **Educator** And you went during the day, right?
- 2.14 **Paulo** We were there from 4:40PM to 6:20PM.

### Episode 3:

Episode 3 occurred on May 6th, during the morning class, related to episode 2. The following excerpt also presents an evaluation report of the second visit to the schools. Marcos and Professor Velma are the interlocutors and discuss the changes in planning in the face of contingencies in the practicum at the schools.

- 3.1 **Marcos** (...) So the class was over, and we didn't get to the game. So really, if you're going to do the activities, not only experimental, but theoretical activities as well, you have a big deficiency with some math and geometry stuff. So, we had to change the plan and improvise some things on the spot, exactly because we lacked ... I mean, we could have got to laying the game with a big knowledge gap when it came to calculating the distance between two points on the map. That's the whole point.
- 3.2 **Velma** Yes, it's a learning process, right? Now, did you come to the workshop for this activity?
- 3.3 **Marcos** Yes. But we did it the following day, the [new] proposal was to start with the map

- and go to vectors. We did the vectors on the day and just discussed the game.
- 3.4 **Velma** Right, you needed more guidance. We sent the script with the map, because we already had a big pile of ready scripts. But the orientation was not to make the map, which was even discussed with the schoolteacher. But it doesn't matter! It was good activity, regardless.
- 3.5 **Marcos** Yes, she didn't say anything about the map, and when we did the workshop, it was crossed like this. But the problem of it being crossed is that the script said, 'give suggestions', so we gave suggestions for the game, on the day of the workshop. And no one took it out of the script when we saw it, which means the suggestion wasn't accepted.
- 3.6 **Velma** But the orientation I gave to those who participated with me [in the workshop] and to some others was “the map is there, but don't do the map!”. The workshop assistant forgot to tell you that you weren't supposed to do that part. I don't know who your assistant is...
- 3.7 **Marcos** No, it's ok! I thought it was cool to do the map!
- 3.8 **Velma** I think it's amazing, doing the map. But it's my suggestion. But the teachers, the teacher... asked me to take the map out. But I think it worked!
- 3.9 **Marcos** But it's just that at the time, she herself, even when in the first class, we used the map and there was no time to get to the triangle. And we did the second and gave her time, and I asked to her 'if she wanted to take a turn and talk a little bit about this subject', she wanted me to continue in the same way. But our improvisation knocked it out of the park, we are the jazzmen of teaching! [speaks in jest and everyone laughs] We improvised everything, when the time comes... someone gives us a theme and we ... improvise.

Marcos described what happened to him during the practicum class at the school and highlighted the change he had to make in face of the unforeseen circumstances. The experiment for his class was about vectors and it included a game involving this concept. However, the guide was extensive and there was not enough time during class. In shift 3.2, the Professor's first question was whether they had attended the workshops to test the experiment guide. The conclusion in shift 3.4 shows that there was a lack of communication between the pedagogical team and the student-teachers who would work on this script in the second week of their practicum at the school. Since there were many copies left over from the previous year, the pedagogical team decided to reuse them, a fact that should have been communicated to everyone who would use this script, as well as the way of working with it. Marcos and his pair were not told about this change and arrived at the school to work with what they had planned in the workshop, which had to be changed in the end. For this reason, the theme of improvisation gained prominence in Marcos' account.

In summary, the presentation of these three episodes aims to highlight some situations experienced by the students of the subject of Practices, as a way to better characterize the second moment. The hypothesis we defend is that the object of the activity of the student-teachers in the classes is no longer Physics, having become the practicum/class in the sense of the operational problems of this situation. The student-teachers' actions are their accounts of what they faced in the practicum. Consequently, the nature of the reports was the emphasis on the problems and on statements such as 'apart from the problems, everything is fine'

### V.3 The third moment

The transition to the third moment seems to have occurred more smoothly because there was no abrupt change, that is, the routine of the subject remained practically the same: workshops and classes in one week interspersed with the practicum at the school in the other. However, during the course, some events are worth mentioning:

- At the end of the first semester, after the first four classes at the schools, the Professor proposes to the student-teachers that they themselves prepare the scripts for the last round of experiments (the activity of making the script). It is an answer to the problems presented in episodes 2 and 3, related to the mismatch between the programmed script and the teacher's program at the school.

- Before the first class of the second semester, shortly after winter break in July, the Professor received the news that the schedules of the teachers in the schools had changed, bringing changes to the practicum schedules and, consequently, to the proposed activity.

- The activity of elaborating the experiment guide is not conducted, that is, the student-teachers did not adhere to the Professor's proposal, and it was then canceled during classes on August 30<sup>th</sup> and September 2<sup>nd</sup> (evening and morning, respectively). In its place, another proposal is made, of customizing the guide, as described in our previous work on this subject (SILVA; VILLANI, 2017).

- Still in the classes on August 30<sup>th</sup> and September 2<sup>nd</sup>, the Professor made two other activity proposals: (i) discussion of topics on education; (ii) discussion of what the student-teachers were learning about Physics.

Our interpretation suggests that the classes on August 30<sup>th</sup> and September 2<sup>nd</sup> were important for the definitive change to the third moment. One of the indications of this fact is the proposal to discuss topics related to education, which was well-accepted by the student-teachers. Thus, a forum was opened by the teacher on the *Moodle* digital platform (former Stoa) with the title "Teaching – theory and practice: what are we learning?", with a significant participation from the student-teachers, who proposed some texts to be discussed in class of the remaining months (September and October).

Thus, the proposed discussion on themes related to education met the needs of the student-teachers who, in this third moment, were no longer solving practicum problems at the schools, as pointed out by the episodes, but rather dealing with the teaching and learning situations that arose in their practicum classes at the schools.

As a result of the discussion of the classes on August 30<sup>th</sup> and September 2<sup>nd</sup>, three texts were chosen by the student-teachers to be the theme of the classes: one on the role of the teacher (GASPAR, 2005); another on constructivism and science education (MORTIMER, 1996), and the third on theory and practice (PIMENTA, 1995). In Fig. 2, the schedule that was established for the classes in the second semester, taken directly from *Moodle*, is represented.



In the classes on September 20<sup>th</sup> and September 23<sup>rd</sup>, evening and morning classes, respectively, the discussion of three texts mentioned above began. The Professor divided the class into three groups, and each would be responsible for one of the texts, in such a way that these groups should comment on the authors' main ideas and propose questions to be discussed.

agosto

semana de 2/agosto: aula e oficinas	discussão em aula das propostas de experimentos/atividades e questões para o bloco 3
semana de 9/agosto	<b>atividade nas escolas</b>
semana de 16/agosto: aula e oficinas	<b>discussão do texto: Novos rumos para o laboratório escolar de ciências (ver abaixo na semana correspondente)</b>
semana de 23/agosto	<b>atividade nas escolas</b>
semana de 30/agosto: aula e oficinas	apresentação entre grupos de atividade/experimento com roteiro de questões para o bloco 3

setembro

semana de 6/setembro:	semana da Pátria!
semana de 13/setembro	<b>atividade nas escolas</b>
semana de 20/setembro: aula e oficinas	<b>discussão: ensino na teoria e na prática - o que estamos aprendendo?</b>
semana de 27/setembro	<b>atividade nas escolas</b>

outubro

semana de 4/outubro:	<b>atividade nas escolas</b> <b>suspensa para o ENSINO MÉDIO</b> <b>normal para o FUNDAMENTAL!</b>
semana de 11/outubro: aula e oficinas	<b>discussão: ensino na teoria e na prática - o que estamos aprendendo?</b> <b>exposição e debate dos textos propostos</b>
semana de 18/outubro:	<b>atividade nas escolas</b>
semana de 25/outubro aula e oficinas	<b>discussão: a ser definida</b>

*Fig. 2 – Screenshot of Moodle with the schedule of classes in the second semester for the PTP course.*

In the evening class on October 25<sup>th</sup>, the Professor continued the discussion of the texts. Even after some time had passed from the initial proposition of reading the texts, some

student-teachers had not read them yet. Thus, Professor Velma divided the class into groups, allowed time for reading and discussing in the small groups, and then informed that the group discussion should be presented to the whole class. In this third part of the class, the most extensive, the student-teachers wrote the summary of the groups on the blackboard and the discussion began. Several themes emerged, motivated by the topics written on the blackboard. The student-teachers were willing to participate and expressed their opinions. In the midst of their comments, some reported teaching and learning situations they experienced in the practicum.

The type of report made by the student-teachers at this point in the course was quite different from the reports on the practicum during the second moment and even during the transition period. First, the Professor did not ask the student-teachers to problems with the practicum, that is, she did not start the class as in episodes 2 and 3 of the second moment. Furthermore, when these comments arose, the student-teachers made connections between what was being discussed and their practicum at the school.

In the last class, in November, the three texts had already been read, but the Professor had the same perspective as the pedagogical texts and brought a text on co-teaching and cogen (cogenerative dialogues) by prof. Ken Tobin. She was motivated by these themes due to Prof. Tobin's participation in the subject. Tobin. During the class, no groups were formed to discuss the text, as the Professor led the class by proposing questions and making comments based on the text itself, and the student-teachers responded with general comments. In this class, the classroom was emptier than usual, and the student-teachers seemed to be already in a mood indicating the end of the year, that is, tired and anticipating the holidays.

## **VI. Considerations on the moments in the subject of Practices**

The three reported moments indicate the changes that occurred throughout the year in the classes of the PTP course, especially when the practicum at the schools began. Thus, we can say that the graduates *started as undergraduate students* and finished as *teachers*. We will present the considerations about the moments using the Cultural-Historical Activity Theory as a theoretical-analytical framework.

Generally, the different **objects** and **instruments** of the first moment of the PTP course indicate that the student-teachers acted more as students, that is, in the sense of acquiring knowledge (Professor Velma's stance, of acting as a high school teacher, seems to be an indication of that). In that first moment, the object was Physics, that is, there was no prospect of discussing the contents to be taught. That was the *student moment*. However, when the practicum at the schools started, the **needs** of the student-teachers changed, thus, the object of the activity became the practicum itself in the schools. The result such needs was to solve the problems of logistics and mismatches between the course and classes in the schools. It was, therefore, the *student-teacher moment*. In the third moment, the student-teachers called for discussions about the teaching and learning of their students in the practicum, showing the

emergence of new **needs**, in such a way that the object of the activity was then Physics Teaching, characterizing the *teacher moment*.

Thus, the practicum at the schools emerges as the object of the student-teachers' activity in such a way that solving the problems of adaptation to the routine of coming and going between the university and the school occurs in the result of the activity in the second moment (lack of materials, dealing with unforeseen events, mismatches with the teacher), while solving the problems of teaching and learning becomes the expected result in the third moment. Thus, *the second moment has an intermediate and organizing character*, without which the emergence of the need to solve the problems of teaching and learning would not happen. In other words, solving those mismatches and providing the period of adaptation of the student-teachers is necessary for the teaching and learning in the school to emerge as a necessity for the student-teachers.

Fig. 3 illustrates the three moments of the subject of Practices and helps us to perceive the development of the activity with emphasis on the change of objects and, consequently, on the change of instruments.

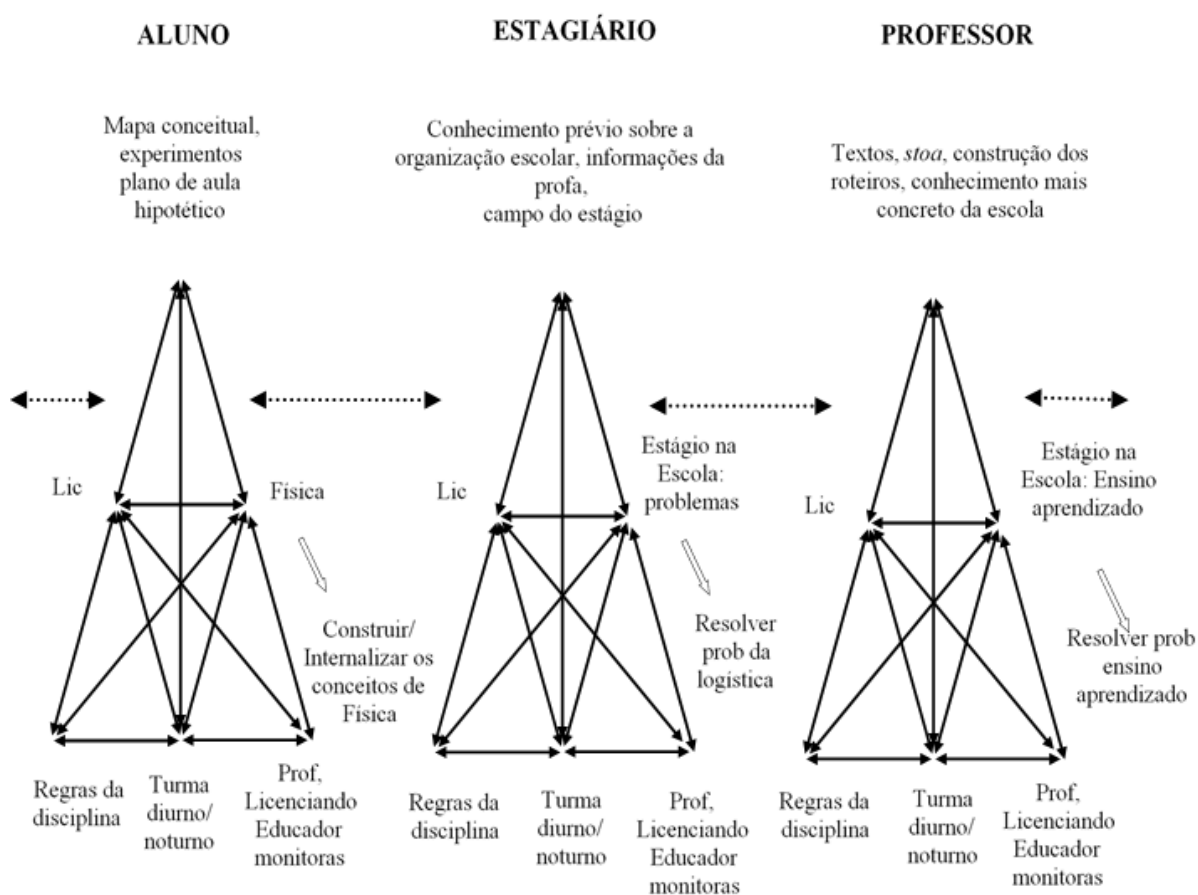


Fig 3 – Representation of the three moments (student, student-teacher, and teacher respectively) of the activity of the PTP course based on the model of Engeström (1987).

The activity in the student moment, illustrated in Fig. 3, presents the student-teachers themselves as the subject. The object of the activity is Physics, that is, the motive and content of the activity are configured within Physics and the result is to learn the concepts of Physics. The instrument was the conceptual map itself, an experiment on energy and the hypothetical lesson plan. The very development of conceptual maps, the experiment and the discussion about scientific doing indicate this perspective. In other words, the learning of **Physics** is emphasized in this moment, that is, it is Physics that puts the student-teachers in the position of students. *“It's student moment, right?”*, the assistant said.

The assumption around the moment of the intern is centered on the idea that the activity of the student-teachers in the classes changed because the object changed. The practicum at the schools began to take the place of the object in the representation of the activity in Fig. 3, that is, the practicum at the school in the sense of its operational problems. Thus, solving these problems and being able to perform the practicum at the schools is the result of the undergraduate's activity, whose position of student no longer fits them. The quote by Bianca, the assistant, could be updated to *“It's the student-teacher moment, right!”*. Learning Physics does not solve the problem of being in the school at that moment. With the change of object, the student-teachers need new instruments that allow them to complete the activity, which are the very knowledge they already had of the school organization, because as time advances, the practicum itself serves them as an instrument, as well as the information the Professor had about the school, since she contacted the secretariats of the schools.

For the third moment, Fig. 3 illustrates the model of the activity of the student-teachers, in which the teaching and learning of students at the schools becomes object, which implies that the activity of the student-teachers in the classroom is different when compared to the other two moments above. Mediation is now conducted by new instruments that try to meet the student-teachers' demand of understanding how their students learn. In this context, texts on teaching and learning and the *Moodle* platform, among other tools, are used, as well the creation of experiment guides with the possibility of changing them in particular. The classes during that third moment were not occupied by the student-teachers' reports about the problems with the practicum at the schools, which had previously been the focus of the class, without almost any kind of reflection. On the contrary, in the third moment they reported how they proceeded during the practicum to teach contents of Physics, allowing some kind of reflection on their teaching. It was as if the student-teachers were now saying to the pedagogical team *“It's the teacher moment, right!”*.

The change of object in the activity is directly related to the new needs of the student-teachers at different times, starting with Physics as an object of learning towards Physics as an object of teaching in the practicum at the schools. **New needs** of the subjects in activity imply new **activities** with new objects. According to Leontiev (2009),

*the meeting of need with object is an extraordinary act (...) objectifying need, "filling" it with content derived from the surrounding world. This is what brings need to a truly psychological level. The development of needs at this level takes place in the form of development of their objective content (p.88)*

In other words, the objective content in the activity of the student-teachers changes at each of the moments, as illustrated in Fig. 3. In this process, when the practicum began at the schools, it became the objective content for the student-teachers, to the extent that it becomes the object of the activity. Therefore, in the next section, we further explore this process of objectification of the school and its implications for the teaching-learning process.

At the base of the triangle is the rule of discipline as the rule of activity. It mediates the subjects, the student-teachers, and their community, the morning and evening groups that attend the classes. In the place of the division of labor are Professor Velma, the educators, the assistants and the student-teachers who serve as mediation between the community and the object. The details related to the bases of the triangles in Fig 3 are discussed in Silva; Villani (2017), based on the contradictions between the rules and the student-teachers that emerged in the process.

## **VI.1 The school as object of activity of the student-teachers**

Among the essential aspects of the Theory of Activity are the concepts of **objectification** and **appropriation** that mark the process of development of human activity, based on mediated action and interpsychological activity. According to Leontiev (2009),

*A basic or, as is sometimes said, a constituting characteristic of activity is its objectivity. Properly, the concept of its object (...) is already implicitly contained in the very concept of activity. The expression "objectless activity" is devoid of any meaning. Activity may seem object-less, but scientific investigation of activity necessarily requires discovering its object. Thus, the object of activity is twofold: first, in its independent existence as subordinating to itself and transforming the activity of the subject; second, as an image of the object, as a product of its property of psychological reflection that is realized as an activity of the subject and cannot exist otherwise (p. 86).*

In this quote, in addition to connecting the object to an essential characteristic of the activity, Leontiev (2009) explains how it is the constitution of the object that presents itself in a double condition, of an independent existence and existence as an image for the subject. In another part of the text, Leontiev (2009) explains that

*It is in activity that the transition or "translation" of the reflected object into the subjective image, into the ideal, takes place; at the same time it is also in activity that the transition is achieved from the ideal into activity's objective results, its products, into the material. Regarded from this angle, activity is a process of*

Thus, we have the idea that the activity develops in two processes: (i) the change of the conditions of the object, from independent existence to a subjective image; (ii) the transformation of this subjective image into a product. The first process is associated with the appropriation of the object by the subject and the second refers to the objectification process, that is, “the transition or 'translation' of the reflective object into the subjective image” (*ibid*) in a product, as a result of the activity.

In the case of the activity of the student-teachers in the PTP course, the activity consists of entering the school to start the practicum, thus, the object of the activity is the school itself. “The object appears to the subject first as in the form of tasks, problems and discrete actions” (ENGESTRÖM, 1987, p. 78) – as seen by Professor Velma’s actions in episode 1 of presenting the practicum at the schools as tasks. On the other hand, the object appears in that double object condition, as an independent existence and as an image for the subject.

Regarding the first moment, the idea of school is already established since it is part of the student-teachers’ previous experiences as students. In general, they know what the meaning of a school is, what it does and how it works, in such a way that its existence does not depend on the student-teachers. However, from the beginning, even before the practicum began, it was necessary for the group to create an image of these schools, that is, the specific schools where the practicum would be held. From then on, the school, on the condition of existing, becomes an image for the subjects, and starts to have a more specific meaning for the student-teachers. This is the process of appropriating. The activity constitutes the process of making this imaginary school in a result, in an objectified product. The thought object will become a material, objectified object.

Therefore, the class in episode 1 performs the transformation of the object, the school, into an image for the undergraduate, to the extent that Professor Velma explains how the kits are to be taken to the schools and the school schedules, as well as saying that it is important to have each other's and the school’s phone number. All this information is an instrument for the student-teachers to build an image of the school. When the practicum begins, the school becomes a materialized object, that is, the students, the bureaucracy the mismatch with the teacher and the lack of material provide the objectification of the school. Thus, the objectification of the school is the student-teachers’ activity that leads to the change from student to intern and from intern to teacher.

Awareness of the change of objects is another important aspect of the transformations of activity. Leontiev (1978) describes the awareness through the perception that the subject has of the connection between the object and the reason. Whenever this connection occurs, the activity gains new meanings. The awareness of the subject is then associated with the meaning attributed to this activity and the approximation between the

individual relations of the activity and the relations of the collectivity. To be more precise, we bring Leontiev's own quote (1978):

*From now on, the subject is present with the connection that exists between the object of an action (its end) and the generator of the activity (its reason). It arises (...) as the work activity of the human collectivity. This activity is now reflected in the head of person, not yet in subjective fusion with the object, but as a practical-objective relationship between the subject and the object. Of course, ... the subject is always collective; because of this fact, the relationships of the individual participants of the works are initially reflected by them, to the extent that only their own relationships coincide with those of the work collective. (...) Human consciousness will henceforth distinguish between activity and objects and also begin to become aware of these two by their relationship (p. 86-87).*

Initially, the new object appears to the subject as a new task. Thus, the difficulties of dealing with the situations of the practicum arise as a new object, seen as a task, that is starting to guide the activity of the student-teachers. Once the problem is solved, other objects that will guide the new moment of the activity appear. It followed this pattern from the first to the second, then to the third moment. Awareness of this change is the fundamental aspect of the passage from student to teacher, observed in Fig. 2 and in the suggestions of texts for discussion proposed by the student-teachers themselves.

## **VII. Final considerations**

We presented in this paper the development of the PTP course, in which we emphasize the process of objectification of the school in the student-teachers' activity of during the practicum. To do so, we chose the reports to describe, analyze and discuss the different moments of the process in which the student-teachers were inserted. This is a longitudinal perspective, throughout the school year, of the analysis of the activity of the student-teachers, differently from the analysis of our previous work (SILVA; VILLANI, 2017) in which the emphasis was on the analysis of a more specific episode.

The analysis and understanding of the process presented here leads us, then, to discuss and better understand the importance of the school in the initial teacher training. We argue that it is not only about have space to practice the theory, on the contrary, it is the space for the *process of objectification of the student-teachers' activity during the supervised practicum*. This process becomes an object when it becomes a necessity for the student-teachers, with a set of specific instruments for their satisfaction, which, in our case, refer to socially established instruments used in teaching practice. The usage and appropriating of these instruments related to teaching practice enable the student-teacher to approach his or her new object, the classroom at the school.

By looking once more to the last quote in the previous section, Leontiev (1978)

offers us a perception of the process of becoming a subject by the distinction that this subject can make between the activity and the object, as well as the relationship between them. This notion seems to us to be the most fundamental, because it expresses precisely the most human aspect of the activity: the process of being and becoming a subject and belonging to a group of subjects. The awareness of being and becoming oneself as subjects necessarily relates to the consciousness of belonging, therefore, to the consciousness of the other.

We cannot fathom it being any different in teacher education. The different models of teacher training (GATTI *et al.*, 2019) produce different ways of being, becoming and belonging to the group of teachers. The model of technicist rationality, for example, indicates that being a teacher is obtaining mastery of a set of techniques and applying them in the classroom. Therefore, becoming a teacher in this perspective means being trained to apply teaching techniques. The result is the creation of a community of teachers who come to recognize themselves in this set of practices, whose recognition of their peers and their society is conditioned to the success (or lack thereof) of the application of these techniques. Thus, each rationality – technicist, practical, critical, and collaborative – will provide different ways of being and becoming a teacher and belonging to a community of peers. The different models are not always harmonious, causing crises in subjects who seek to be and become teachers: “*I do not know how I can be a constructivist teacher; I think I am a traditionalist*” (Igor, on the class of March 22<sup>nd</sup>) is an example of these multiple of ways of being, of becoming and belonging. If there are so many ways, it is worth asking: is there one that is correct?

The relationship with the school emerges as fundamental to processing of ways of being, becoming and belonging. The student-teachers, upon arriving at the schools, find well-established practices, whether more general or specific to that school. However, it does not seem to us that only the school provides this process. On the contrary, it lies in the articulation with the university, that is, the process is not about only being in the schools, regardless of the number of hours spent there.

Thus, in this paper we sought to present the changes that occurred in the classes of the subject of Practices, indicating the changes of objects of the student-teachers’ activity that required different instruments. The objectification of the school seems to us to be the maximum point of our argument for the bridge between moments. Nevertheless, it must be made clear that our conclusion that the student-teachers became teachers cannot be considered outside the context presented here and be made into a general formula. First, because the type of theoretical-analytical approach we perform does not allow us to investigate the dynamics that are established among student-teachers, who are heterogeneous in the different senses that are attributed to their practices. Moreover, the report presented in this paper cannot ignore other levels of the subjects’ education, since the subject presents itself as a very specific and, in a certain way, restricted context. The purpose of our work was to report and discuss some aspects of teacher training concerning the relationship between university and school, limited



to this Physics Teaching Practice course. In this sense, the Cultural-Historical Activity Theory gives an account of the aspects considered in this work.

In summary, in this paper we present Physics Teaching Practice course in such a way that we emphasize the change of the student-teachers' activity: the activity of the student (undergraduate) to a student-teacher and the activity of a student-teacher to a teacher, whose development occurred throughout the year. We argue that the process of objectification of the school in the student-teachers' activity was the main aspect for the changes, because the experience in the school introduced new elements, in an institution with its values, rules, division of labor and community different that were from the university. However, while the most important part of the work is the presentation of a change in the perspective of student-teachers, who include the school as the object of the activity, the schools had no participation in this process to the extent that the teachers did not have access to the discussions and planning conducted in the classes of the subject at the university. In other words, the relationship between this university and schools is still historically characterized "more by clashes and mutual ignorance than by mutually beneficial collaboration" (VAILLANT; MARCELO, 2012, p. 87), even with some advances in educational reforms.

Finally, we state that the contemporary discussion about the curricularization of Teaching Practice becomes even more important for the understanding and establishment of new relationships between the university and schools, considering both teaching institutions. In the teaching of practice, it is necessary to make advancements regarding discussions for overcoming history, so that the school would no longer be a place where theory is applied, instead acting collaboratively as a co-educator. Therefore, if 50 years ago (considering the resolution of 1969) "the educational ideas around the Teaching Practice connected to a historical moment in which it was believed that this activity was conceived as a privileged space in the struggle for improvement in teacher education" (PICONEZ, 2010, p. 17), we can say that currently this idea of teaching practice turns to the recognition of the importance of basic education schools as a locus (GATTI *et al.*, 2019), for which a better understanding of this formative aspects of the school and its professionals is necessary. Thus, our subsequent research is precisely in this perspective, especially investigating the school and its professionals in order to better understand them as co-educators.

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