



Pre-service mathematics teacher: the function of assessment in pedagogical activity

Professores de matemática em formação inicial: o papel da avaliação na atividade pedagógica

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Abstract

This article aims to investigate how pre-service mathematics teachers have appropriated assessment as an element of pedagogical activity. The discussions were based on the assumptions of Cultural-Historical Theory. The methodological option was the formative experiment. The subjects were ten students enrolled in the Supervised Internship of the Mathematics course. It is noteworthy that pre-service teachers give evidence of apprehension of the assessment as a constituent aspect of the pedagogical activity. The subjects also understand that the assessment is present in the interdependence between planning and content. They also recognize it in the relationship between the teaching and learning processes.

Keywords: Assessment; Pre-service mathematics teacher; Pedagogical activity; Planning.

Resumo

O objetivo desse artigo é investigar como professores de Matemática em formação inicial se apropriaram da avaliação como elemento da atividade pedagógica. As discussões se sustentaram nos pressupostos da Teoria Histórico-Cultural. A opção metodológica foi o experimento formativo, o mesmo perdurou um ano letivo. Os sujeitos eram dez alunos matriculados na disciplina de Estágio Supervisionado da Licenciatura de Matemática. Destaca-se que os professores em formação dão indícios de apreensão da avaliação como aspecto constituinte da atividade pedagógica. Os sujeitos também compreendem que a avaliação está presente na interdependência entre planejamento e conteúdo. Igualmente a reconhecem na relação entre os processos de ensino e aprendizagem.

Palavras-chave: Avaliação; Formação inicial de professores de Matemática; Atividade pedagógica, Planejamento.

Introduction

The research that gave rise to this work (Silva, 2018) was developed in response to the need to structure teacher training that enables subjects to realize the possibility of reviewing the organization of the mathematics teacher's pedagogical activity. We believe that

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pedagogical activity should be seen as promoting circumstances that allow them to leave the role of passive observer to act in the shared solution of the formative situations experienced (Moura, 2016). For such a training scenario to occur, it is not enough to temporarily organize the teacher's formative process without a foundation to support it throughout its development. On the contrary, we must establish an adequate organization of pedagogical activity's teaching and learning process. In connection with this process, this article aims to investigate how mathematics teachers in the initial formative have appropriated assessment as an element of pedagogical activity.

On the way to achieving this objective, we sought answers to the following problem: what would be the actions of teachers in training that would indicate an understanding of assessment as a constituent element of the math teacher's pedagogical activity? In the search for answers, we created research conditions that would allow us to analyze the development process of our object of study. These conditions were a Formative Experiment developed over one academic year with a group of mathematics teachers in initial training.

To demonstrate this process, we have structured the text to discuss teacher training and assessment first, then point out how our formative experiment was set up, and then present the data analysis. Finally, we present our final considerations.

The role of assessment in the formative process of mathematics teachers

Evaluating students' academic performance has always been debated in education. Still, it is neglected when we refer to the formative processes of teachers, especially math teachers. Assessment occupies a special place in the structure that makes up pedagogical activity, especially when it is particularized in the pedagogical activity of mathematics teachers. We believe that assessment should be discussed in conjunction with teacher training. From this perspective, authors such as Niss (1993), Santos (1997), Luckesi (2002), Buriasco (2003, 2008), Hoffmann (2003), Abrantes (2005), Silver and Mills (2018), Bostic, Krupa and Shih (2019), Ortigão and Santos (2020), among others, make correlations between the role of assessment and teacher training, offering us a basis for understanding that assessment is not just about teachers taking tests to award grades to students, but rather "an essential action for monitoring student development by making it possible to analyze a qualitative relationship between the teaching activity developed by the teacher and the learning activity carried out by the student" (Moraes, 2008, p. 60).

Even though teacher formative institutions know the importance of assessment as a relevant aspect of pedagogical activity, teachers in training hardly discuss this issue during their undergraduate studies. Studies and analyses of the problems arising from the teaching and learning process and their interdependence with assessment are precariously raised. In other words, there is superficiality in the evaluation of the way it is approached in teacher formative courses, and there is a vacuum within degree courses when the subject is a pedagogical activity, receiving little attention in the curricular proposal of such classes. Most of the time, when assessment is discussed in teacher formative courses, it is related only to

student learning, failing to consider its importance as a means of assessing the teacher's teaching (Libâneo, 2003).

Vasconcellos (1993), on the other hand, believes that in an assessment process, the student should have the opportunity to show the various levels of relationships they have managed to establish with the content taught, seen here as the object of human knowledge, i.e., according to the author, assessment should allow the teacher to grasp "the movement of the subject, where it allows itself to be concretized, to a conclusive, specific synthesis, a synthesis" (p. 77).

Corroborating these discussions, Luckesi (2002) emphasizes that in the formative process, teachers must understand evaluation as an element of pedagogical activity that "crosses the act of planning and executing, and therefore contributes to the entire course of planned action. [It is present not only in identifying problems but also in selecting alternative means of solving them. It is part of the teacher's way of acting [...]]" (p. 85). Along with Luckesi (2002), Hoffman (2003) thinks of assessment as a process, so it must occur at various moments during the learning process of the pedagogical activity that takes place in the teacher's formative process. In this way, assessment can "guide frequent decision-making related to the treatment of content and the best way for students to understand and produce knowledge [...]" (Luckesi, 2002, p. 85).

Therefore, the presence of discussions in teacher formative processes that include assessment is justified because teachers, when developing their pedagogical activities daily, are faced with new demands that are the result of new teaching work processes and the development of the teaching and learning of school mathematics as a social need that requires another organization that points to the need to revisit and redefine the classic conceptions of assessment present in the school process during teacher formative. Only in this way will this teacher in training be able to understand that assessment is not just about the students but also involves the teacher, i.e., "learning assessment should be seen as a continuous process and carried out systematically during the execution of school activities, in the interaction between teacher - knowledge - subject" (Moraes, 2008, p. 107).

In line with the discussion brought up by Moraes (2008), we have Carvalho (2005), who shows the progress made by students when they carry out mathematics tasks in a shared manner, and this form of organization emphasizes the interaction of the triad proposed by Moraes (2008): teacher - knowledge - subject. Carvalho (2005) states that when shared tasks are carried out, opportunities are created for students to develop mathematical knowledge. However, for this assessment option to be developed in the classroom, it is necessary for the math teacher still in training also to experience this reality or for this possibility to be discussed in their formative space. Subjects can develop joint responses and reconstruct arguments, strategies, and meanings in evaluative moments developed within a collective and no longer just sustained by exacerbated individuality. They will then have the chance to experience what Santos (1997) suggests as breaking away from the idea of assessment as the end product of learning in mathematics.

Santos (1997) also agrees with the conceptions discussed. He defends the idea that mathematics teacher training is the moment when the relationship between the processes of teaching and learning mathematical concepts and their evaluation needs to be given fundamental importance because the author argues that it is through evaluation that we can see whether learning and teaching have taken place within a perception of the mathematics teacher's pedagogical activity that is based on the existence of various elements and the necessary interface between them. Santos (1997, p. 49) also points out that the model of this teacher's pedagogical activity to be promoted in math teacher formative processes is capable of being established taking into account "that mathematical knowledge is constructed continuously; that considers that such knowledge cannot be assessed exclusively by one type of instrument at the end of the educational process, but must go through several [...].

We are not arguing that students should not be assessed; after all, throughout their lives, they will be constantly confronted with assessment processes carried out by others. We want to protect them from the fact that the teacher can help ensure that evaluative situations are actions that have a formative character for the subject (Abrantes, 2005; Buriasco, 2003; Santos, 1997).

After all, the concept of assessment that we are defending, to be present in a formative process for mathematics teachers, presupposes the understanding that teachers and students have an initial social practice of knowledge before it becomes school content. The fact that the teacher's knowledge and the students' reality are theoretically shared offers elements for an assessment that can give another meaning to the teaching and learning of these school mathematical contents. By using assessment in this way, the teacher will be able to promote the changes that must take place, through theoretical and practical action, in the mental structures of the subjects participating in the teaching and learning process, as well as in their school and social practice, during and at the end of the teaching process.

In this way, in a teacher's formative process, awareness implies adopting a different way of conducting pedagogical activity and one of its fundamental elements: assessment. Our teacher training realities discuss assessment practices almost exclusively through tests. "The teaching and learning process is analyzed by its product, not its process. The worst thing about this evaluation practice is that the results are not used to reflect on pedagogical work. Their objectives are much more bureaucratic and immediate, influencing neither teaching nor learning, revealing a dissociation between these crucial elements" (Moraes, 2008, p. 110). To value the interconnection between teaching and learning processes and assessment, we emphasize that this should begin when teachers, in their initial training, elaborate and re-elaborate these interconnected processes, as was done in the formative experiment that supported the research that gave rise to this article.

Methodology: Organizing the formative experiment

We planned and developed a formative experiment during the supervised internship to understand how mathematics teachers in initial training appropriated assessment as an element of pedagogical activity. Davidov and Markova (1987) argue that the formative

experiment "is a fundamental form of realizing the particularities of the general genetic-causal or genetic-modeling method, [...] being a structure for investigating the development of the human psyche, which has its foundations in the work of Vygotsky" (p. 326). The author believed that only through experimental analysis was it possible to reveal the whole essence of the genetic process of the development of the human psyche. It, therefore, consists of an investigative structure carried out in several stages, in which the process of execution, as well as obtaining the data, presenting the objects to the subjects, recording, and analyzing the movement of the subject's thinking, takes place simultaneously.

The formative experiment lasted a year, and during this period, it was necessary to change the two h/week face-to-face required at the HEI for supervised internship classes to a higher amount, which varied according to the needs of the subjects at each meeting. These meetings aimed at studying the theoretical basis underpinning our activities, planning (based on the theoretical-methodological premises of the teaching guidance activities - AOE), and re-elaborating these activities, which were developed during the period of supervision at the field school.

The experiment consisted of two primary stages: the stage that took place in the internship classes at the University and the stage that was aimed at developing the activities in the internship field school. The stage that took place in the school lasted 32 hours. The teaching activities were designed equally in three secondary school classrooms, where ten trainee teachers participated together. These classrooms comprised approximately 30 to 35 students, divided into ten groups, with each small group accompanied by one of the teachers in initial training. In this way, they were a significant help in developing the proposed activities.

The number of lessons spent on each set of teaching activities varied according to the specific performance of each class, with 14 hours being used for the first set of activities (on the content of Interest) and 18 hours for the second (with the content of Perimeter and Area of Flat Figures). The stage held at the University consisted of 36 meetings (totaling 128h\|a). We proposed each meeting's actions, objectives, activities, content, and readings. We did this based on the idea that the teacher's fundamental activity is the organization of teaching, which will be made up of the learning itself. According to Moura, Araújo, Ribeiro, Panossian, and Moretti (2016), this organization is conceived as the choice of actions, selection of content, and evaluation of the teaching and learning process so that all these elements are instituted in human activities. As data collection tools, we had audiovisual recordings of all the meetings of the formative experiment, both those that took place at the University and those that took place at the internship field school.

For didactic purposes, we organized the formative experiment into four stages:

- Beginning of theoretical appropriation;
- Understanding the need to plan activities;

- Re-elaboration of the activities in parallel with their development in the internship field school and,
- The stage for collective synthesis.

Although the experiment was didactically presented in four stages, we are interested in the way in which the stages are linked and reciprocally determine the distinct theoretical conditions necessary to achieve a formative reality that would lead the participants to an understanding of the constituent elements of the math teacher's pedagogical activity, with an emphasis in this text on evaluation as one of those elements that make it up. In this way, we don't need to reconstruct all the meetings that made up the formative experiment to understand the development of our object of study. The four stages presented here will suffice. In this way, we will gradually grasp the object's appropriation movement by the subject during the experiment and according to the peculiarities highlighted below in our analysis.

From collective analysis to individual syntheses: The process of understanding evaluation

To carry out the analysis, based on the data obtained during the formative experiment, we defined a unit of analysis which would be, according to Vygotsky (1993, p. 19), "[...] a living and indivisible part of the totality". At the heart of this unit is an episode, which can be understood as the revealed actions of the formative process. We've divided this episode into two scenes, which are composed of periods in which the subjects confirm indications of appropriation of the established formative movement. From these scenes, we highlight the flashes that would be the most significant moments, the indications of the transformation of the subject's thinking about a reality that becomes another (Silva, 2018). "Thus, removing from the scenes the parts configured as indications of the conscious and internalized reflection of reality, that is, the flashes, implies much more than contextualizing the subjects in the collective discussions" (Silva, 2018, p. 154). It would be to carry out a spiral movement in which we dialog with the theoretical basis, look for the implicit, the motives and needs, the meaning and sense expressed in language but not reduced to it. Table 1 shows the structure of the data analysis proposed in this article.

Table 1: The unit of analysis, the episode, and the scenes

<p>Unit of analysis:</p> <p>Assessment - an element of pedagogical activity capable of integrating the teaching and learning processes</p>
<p>Episode: The establishment of assessment in the interdependence between the other aspects of pedagogical activity</p>

Scene 1: The establishment of assessment in the interrelationship between planning and content

Scene 2: Assessment: a moment of analysis and synthesis about the constitution of pedagogical activity

Source: Elaborated by the authors.

This unit of analysis and its episode seek to understand that the math teacher's pedagogical activity comprises various aspects that interconnect to allow the teaching and learning processes to be interrelated, one of which is assessment. In the course of the analysis, there is evidence of an understanding on the part of mathematics teachers in initial training that assessment, as well as being an essential aspect of the pedagogical activity, is not established individually but rather in interconnection with the other elements and in the presence of the subjects: teacher and student.

Scene 1 - The establishment of evaluation in the interrelationship between planning and content

Location of Scene 1: This scene occurs during the thirty-second meeting of the formative experiment held in November during an internship class at the university.

Scene 1 transcripts

1(1)³: MARILENE⁴ – Look, students aren't the same; they have different life histories, and all this must influence how they learn, so we also have to worry about evaluating how our teaching and their learning are going because I think the evaluation is an essential part of what the teacher does, as a whole.

2 (2): JOEL – Look, students aren't the same; they have different life histories, and all this must influence how they learn, so we also have to worry about evaluating how our teaching and their learning are going because I think the evaluation is an essential part of what the teacher does, as a whole.

3:⁵ TIAGO – You can't plan a Lesson for each class.

4): YANN – At most, you can think of different strategies.

5(3): GABRIELA – And right now, our concern is how we will assess the kids and ourselves, and we have to adjust this along the way.

6: VANUSA - It's not going to do any good if we just stand here and talk about the difficulties of one classroom in relation to the others; we have to take action.

7 (5): YANN – You're right, just reflecting isn't going to give us the answer, the solution so that we can finish at least in such a way that everyone learns the same amount of things that have to do with our theoretical basis because that's what coordinated our planning, our actions and now the way we're assessing ourselves and how we're going to think about assessing the children.

8: VIVIAN - I agree that just thinking and reflecting is no use, but if we think and look to the theory we're learning for ways out, for ideas that will or can help us, as Yann said, then I think we

³ Not all speeches are flashes, so listing them within the scenes is necessary. In this way, the numbering inside the brackets highlights whether that speech has flash status, locates it, and quantifies it.

⁴ Names chosen by the teachers in training to be used in the scenes

⁵ The speeches are listed as the subjects speak. Their numbering is only intended to organize the dialogue so that the reader understands the order in which the speeches occur within the proposed scene.

have a chance of finding a way to make the three classrooms to have similar results.

9: YANN - So, nothing we planned was by chance, right guys? Everything had and has a reason; we've already seen that in our daily evaluation because here, we're not waiting for the end to evaluate; we do it every time we go there.

10: TIAGO – As much as we think they haven't learned, that they haven't changed, they have, they've even changed the way they speak, in other words, they've developed their language, now they don't say that, that, this or that, business there, when they point and say what it is on the board or in the notebook and that's what we have to assess too.

11: BRUNA - They're having more difficulties than the other classrooms, it's true, but if we reorganize, this has to do with assessing them differently.

12 (4): JOEL – What if we changed things, used other stuff we didn't use in the different classrooms, and taught them the idea of area and perimeter again? Because there's no point in trying to assess them without making changes to the activity because we've already evaluated them and seen that they haven't learned.

13 (6): LUCIANA – I think it's worthwhile, and we'll be able to assess learning in another way.

14 (7): JOEL – And we'll have to rework a large part of the activity.

15 (8): BRUNA – That's it, another way to develop it and also another way to assess it.

16 (9): VANUSA – Maybe this way, they'll be able to return to the initial idea of perimeter and area, and this will help them in this stage that we're teaching; only then will we have to rethink the form of assessment for this classroom in this activity.

According to Santos (1997), the discussion on assessment in the formative processes of mathematics teachers has currently led to lines of action that will certainly have repercussions on the teaching and learning process of school mathematics, which will undoubtedly require a reorganization of its assessment processes and, consequently, a reconfiguration of the assessment practices in place. This will surely lead to a search for ways to provide favorable conditions for teachers to build other evaluation paths. In connection with this discussion, Abrantes (1995) points to assessment as one of the most discussed topics in math teacher formative and states that it is an integral part of the teaching and learning process of school mathematics. In this way, organizing the subject-content-evaluation relationship (present in the teaching and learning processes) within the structure of pedagogical activity, considering the heterogeneity of classrooms and the unique trajectories of students' appropriation of content, is a challenging task, given the conditions set for mathematics teaching today. In Marilene's (Flash 1) and Joel's (Flash 2) flashes, there is evidence that the trainee teachers are aware of the existence and importance of another aspect of the math teacher's pedagogical activity: assessment. The flashes reveal an understanding of the need to establish different purposes for the actions belonging to the pedagogical activity in each classroom. However, it is necessary to recognize the unique path of development and appropriation of the content by the subject-student as a singular-particular expression of universal laws of their psychic development.

It is also essential for the subject-teacher to be aware of the process of psychic development, its internal logic, and its constituent driving forces. It is up to them to use this to confront these elements' heterogeneity with the singularity of the trajectories of appropriation of the content to be taught and its consequent evaluation. Beyond the general

laws and these driving forces, it is necessary to know the particular circumstances of the student's development as a possibility of individualizing the pedagogical activity and assessment as a component of this activity.

This knowledge will guide the selection of content capable of identifying and assessing how to promote psychological development at each moment. It is worth noting that these relationships (content and assessment) are not only presented to teachers in training during planning. They are also present during the development of the activities and, consequently, in their reworking. At this point, interventions must be made to request and guarantee, also through assessment, that the different students appropriate the content.

Marilene's flash (Flash 1) embodies her perception that assessment should "be part of the didactic teaching-learning process, as one of its constituent elements" (Luckesi, 2002, p. 12). Flash also points out that teachers in training understand that assessment is an indispensable element of pedagogical activity, and the teacher must carry it out in such a way as to require the humanization of the subject who learns, paying attention to their development. In this process, the teacher mediates the historical appropriation of knowledge, transforming it into scientific knowledge and causing changes in the cognitive development of the subjects involved. "A change in thinking, in the understanding that, through the appropriation of socially elaborated knowledge, man humanizes himself, that is, integrates himself into the historically humanized world." (Moraes, 2008, p. 46).

The interdependence of the planning-content-evaluation elements was essential for the teaching activities to develop satisfactorily and for this interface to be established as a passage from the empirical state to the rational state of knowledge of objective reality by the teachers in training. This interconnection is understood here as a relationship put in place by the subject-teachers in training to make their understanding of the formative reality they were experiencing concrete.

Thus, the immediate spatiotemporal conditions and their appropriateness cannot be thought of in themselves but rather in terms of who these student-subjects are, who were always about themselves and the activities they were teaching. As a result, it is notable that the subject-content-evaluation triad is not presented to the teacher in a disconnected way but thought of within interrelationships that involve a process of reciprocal conditioning. We see signs of this understanding in the flashes of Gabriela (Flash 3), Joel (Flashes 4 and 7), Luciana (Flash 6), Bruna (Flash 8), and Vanusa (Flash 9). Based on the flashes, we should consider that the subject-evaluation relationship is not direct or linear, nor can it be thought of in itself, since it is permeated by the content to be appropriated by the student and, at the same time, subordinated to the objective of claiming this content.

In this way, assessment is understood as an object that plays a specific role in teaching and learning content. This object, in turn, should be highlighted from the start and not just emphasized at the end, that is, in the results, as Gabriela suggests (Flash 3). The flashes show evidence of the idea that, in the act of assessing the student, the teacher is also assessing themselves "because if the student does not achieve the objectives set by the teacher, it is up

to the teacher to ask themselves if they have acted in the best possible way" (Lauschner & Cruz, 2012, p. 10). From this perspective, assessment would be a respectable aspect of pedagogical activity. When organizing this activity, the teacher must be challenged to "relate the organization of teaching so that the school educational process is constituted as an activity for the student and the teacher" (Moura et al., 2016, p. 96).

In Joel (Flash 4), we have signs of the subject's movement towards understanding what Santos (2005) says when he states that there should be a greater diversity of assessment situations in the process of teaching and learning school mathematics so that we have an interdependence between the individual and collective experiences of the students in the search for the construction and appropriation of the mathematical concepts studied. Santos (2005) considers that the direction of assessment in the process of teaching and learning mathematics should be formative for the subject in various senses and no longer create inequalities but rather create the means for all students, even those with difficulties, to have objective learning conditions.

According to Buriasco (2003), one of the possibilities for promoting an assessment process in mathematics according to the assumptions advocated would be to allow students the opportunity to be part of a group where they can expose and exchange their points of view, discuss resolutions, verify that the same activity can have different solution paths and, in this way, the individual development of others can be valued in understanding this path of building a typical result. Abrantes (2005) confirms the efficiency of this type of proposal, considering that "students' evaluative work is not definitive, it can and should be corrected or improved" instead of being evaluated only as right or wrong because in this way, "there will also be many new opportunities to learn and different students will learn in different ways on different occasions" (Abrantes, 2005, p.72). Marilene (Flash 1) confirms this understanding.

The flashes also show that the research subjects are willing to organize teaching activities by interconnecting the elements of pedagogical activity: planning, content, and assessment, thus promoting the intellectual development of the students at the field school. To do this, they need more than just to reflect on their actions; they need a theoretical basis to support them, as Yann points out (Flash 5). In this movement, the research subjects strive to create means of appropriating (and evaluating) the school content they teach. They do this intentionally and consciously - not spontaneously or thoughtlessly. Their actions have a direction that comes from the clarity of the need for students to learn at school' because this process is not natural but historically constructed, and its development depends on the appropriation of human culture. Therefore, it is the object of educational processes.

Throughout the analysis of the flashes of this scene, we tried to show that, when conducting the development of teaching activities, the teachers in training dealt with the complex and dynamic relationships between subjects (subject-teacher in training and subject-student of the field school) and the constituent aspects of this subject-teacher's pedagogical activity: planning, content, and assessment. We have seen that cognitive development is a product of the relationship the subject establishes with the content, the object of their

thinking. Planning and evaluating teaching as a product of this is therefore necessary. In this respect, the teacher's evaluation allows him or her to "ensure that his or her activity is appropriate to the proposed goals" (Moraes, 2008, p. 18).

The analysis of this scene showed that the relationship between the aspects of pedagogical activity planning-content-evaluation is not presented to the teacher in a pure form and cannot be thought of in itself but within interdependencies in a reciprocal conditioning movement, a process that continues in the next scene.

Scene 2: Assessment - the moment of analysis and synthesis of the constitution of the pedagogical activity

Location of Scene 2 - This scene occurs during the seventeenth meeting of the formative experiment in June. This meeting took place during an internship class at the University.

Scene 2 transcripts

1: BRUNA – I had a hard time waiting to get here today for our internship class to talk about my concerns.

2: TIAGO – Are you talking about us being the ones to assess the boys on the interest rates content, Bruna?

3: BRUNA – That's right.

4 (1): GABRIELA - Guys, we can't just get there with a test full of interest rates exercises for them to do. We've organized the activities in such a nice way that we can't go back and just give them a test at the end.

5 (2): TIAGO – So, since we're reworking the activities, we can see what they're learning and what they're not learning, and we can make decisions about what we can improve so that they can learn more.

6 (3): YANN – And you can already see that there's a big difference between the classes, so they have to be assessed differently.

7 (4): VANUSA – Have you seen how much better 2B is than the other two?

8 (5): ALINE – There's no comparison.

9 (6): LUCIANA – It is important to see that 2B has it easier, but the other two have to learn the same things.

10 (7): VIVIAN – The three grades must be standardized, even if we spend more time on additional classes.

11: BRUNA – We won't be able to conclude them together, and I honestly don't think they should be standardized.

12: YANN – If the classrooms are different, then we have to worry about each one in other ways too.

13: JOEL – Our way of assessing will have to resemble our way of teaching.

14 (8): MARILENE – Sometimes, I take a look at the tests we used to do, and the kids still do the same tests, so aimless.

15 (9): VANUSA – Some tests seem like the teacher does not even know the content properly.

16 (10): MARILENE – Wow, that's right; remember last semester when we helped administer the assessments, there were some matrix questions in there, which frankly were useless; why put that in a test with so much to assess.

17 (11): JOEL - That's what we're talking about; they don't seem to know exactly what they want to teach with that content.

18 (12): ALINE - The assessments had to follow the lesson plan because I saw the kids complaining that they were taught one way and the assessment came differently.

19: VIVIAN – Let's think together, let's decide everything together, calm down, and we'll have an idea.

20: LUCIANA – Calm down, everyone.

21 (13): GABRIELA - Joel said it, and I agree, our way of assessing will have to resemble our way of teaching, in the same sense, and they'll have to have a direction, know precisely what we want to see if the kids know, let's share with them what we know, so they'll want to do the math stuff.

Amid the problem concerning the need for discussion during mathematics teacher training about promoting improvements in the assessment of content, authors such as Abrantes (2005) and Buriasco (2003) suggest that the process of teaching mathematical concepts should develop an assessment that meets the effectiveness of their learning (Fini, Oliveira, Sisto, Souza, & Brenelli, 2009) and that it should be able to guide the student so that they can situate their difficulties, analyze them together with the collective to which they belong so that they can operationalize the procedures that allow them to learn. Thus, we start from the assumption that the essential element of the math teacher's pedagogical activity - assessment - is linked to the process of teaching and learning mathematics and that teachers in training should have opportunities to understand this.

During the development of the formative experiment, the trainee teachers showed that they had grasped this understanding. In addition, they bring the consequences of these understandings, now embodied in the theoretical concept offered to them, to the school context, especially the school seen here as a privileged space for human education. This conception allowed them to look at other issues, such as the teacher formative process, the teaching and learning of school mathematics, the constitution of the aspects that make up pedagogical activity, and the evaluation of school performance.

Since the evaluation standard used in our school reality is concurrent with our social-political model, i.e., the conservative-liberal social standard, this, in turn, underpins the principles suggested by traditional and technicist pedagogies, which, in general, have the common objective of keeping society as it is. The school assessment experienced by trainee teachers during their school life is based on this model. It is "authoritarian because this character belongs to the essence of this perspective of society, which demands control and framing of individuals within the previously established parameters of social equilibrium" (Luckesi, 2002, p. 32). Despite many controversies and disparities, assessing students' school performance is a topic of education debate, even if it occurs uncertainly and discreetly.

Contrary to this reality, we made it possible for assessment to occupy a special place in the structure that makes up pedagogical activity, especially when it is particularized in the pedagogical activity of the math teacher. We tried to dispel the empirical image of student performance assessment at the various levels of education so that it wouldn't just be seen as

an element at the end of a teaching and learning process that is often disconnected from the reality of the school and the student in particular.

In this way, we could review the concept of assessment at a new level of use in everyday school life, different from the one usually understood as a test taken by students. We have indications of these understandings in the following flashes: Gabriela (Flash 1); Tiago (Flash 2); Yann (Flash 3); Vanusa (Flash 4); Aline (Flash 5); Luciana (Flash 6); Vivian (Flash 7). These flashes are directed at the concept of evaluation, which is understood as " [...] a value judgment on relevant manifestations of reality, with a view to decision-making" (Luckesi, 2002, p. 33). According to this author, we can say that assessment is a value judgment on relevant data compared to an ideal standard for decision-making. With this criterion in mind, we can ask ourselves: in our reality of teaching mathematics, how should teachers assess the process of teaching and learning content? In the following flashes, we have traces of answers: Marilene (Flash 8), Vanusa (Flash 9), Marilene (Flash 10), Joel (Flash 11), Aline (Flash 12), and Gabriela (Flash 13).

The subjects point out that teachers should focus their assessment on studying the content they are going to teach, as well as defining the objectives they have as teachers and what they want their students to achieve. This means that "school assessment becomes an essential action for monitoring student development by making it possible to analyze a qualitative relationship between the teaching activity developed by the teacher and the learning activity carried out by the students" (Moraes, 2008, p. 107).

The flashes from Joel (Flash 11), Aline (Flash 12), and Gabriela (Flash 13) also show that teachers should be concerned about selecting the actions and operations they will use to develop their activities and how they will assess their teaching and the student's learning. From this perspective, assessment is the way for students who are appropriately situated in the school environment to appropriate the school content as elementary knowledge for their intellectual and social, i.e., human, formation.

When Gabriela (Flashes 1 and 13) points out the fact that they can't just apply a test as an assessment to the students at the internship field school, she is defending the concept of assessment that she has appropriated and understanding that it can happen in various ways, even though she may have only experienced tests, exercises, and activities that are almost always written, solving mathematical questions. However, what is advocated in these Flashes would be an assessment in which the benefits can come from the teacher sharing "mathematical knowledge with the students; encouraging them to reason and do things more independently; creating an environment in which students want to do mathematics; and using innovative forms of assessment" (Santos, 1997, p.8). To reiterate, we can say that assessment should be part of every moment of teaching activity. It must be shown in the development of content teaching so that the teacher can make decisions about the mediation process. "In an evaluation process, the student must show the various levels of relationships they have managed to establish with the object of knowledge, its meaning as well as generalization, application in situations other than those studied" (Vasconcellos, 1993, p. 77).

Thus, the flashes of Aline (Flash 5), Luciana (Flash 6), Vivian (Flash 7), Marilene (Flash 8 and 10), and Vanusa (Flash 9) show that all the time they were concerned with the students' assessment process, the teachers in training were analyzing and summarizing their teaching processes. Both stages, fundamental dimensions of pedagogical activity, occur as a whole. Even though they are distinct, it is difficult to say where one ends and the other begins. When dealing with this issue, Vygotsky (1993, p. 66) says: "[...] it is equally important to unite and separate: synthesis must be combined with analysis". This also applies to the assessment process, where it must always be considered a synthesis, the basis of which is analysis.

The flashes of this scene show signs that the teachers in training see themselves as subjects facing a new approach to the practice of educational-school processes, including assessment. They show that they understand that the course taken to learn their pedagogical activity was not neutral but was part of a theoretical context that allowed for a different organization of the pedagogical activity as a whole and, consequently, for the approaches to assessment. Corroborating the ideas emphasized in this scene, Luckesi (2002) points out that: "Assessment does not take place, nor will it take place in a conceptual vacuum, but is dimensioned by a theoretical model of the world and of education, translated into pedagogical practice" (p. 28). In this way, it can and should be seen as possible to "guide pedagogical practice daily in the planning and execution of teaching actions (p. 42).

The idea of assessment that has gradually come to the fore in this scene is still far from being implemented in today's school reality. As a result, it is necessary to review the concepts of assessment that have traditionally been used. From the perspective presented, the assessment indicates that it should not be the center of the process. The essential thing is not to change how students' academic performance is assessed but to transform the teaching and learning process because how we teach and the theoretical assumptions underpinning our pedagogical activity will tell us how we evaluate.

Final considerations

To organize and promote the relationship between the content they wish to teach, their planning, and assessment, teachers need to grasp the student's current state, understand the internal logic of their development process, and master the internal logic of this content. In this complex structure, assessment, in turn, becomes an indispensable element in the constitution of pedagogical activity, allowing the teacher to glimpse the student's development. "School assessment becomes an essential action for monitoring student development by making it possible to analyze a qualitative relationship between the teaching activity developed by the teacher and the learning activity carried out by the student" (Moraes, 2008, p. 60).

However, we have seen that the action of evaluating should not exist in isolation but in the existence of the planning-content-evaluation relationship. This relationship was, in fact, a guiding principle for the actions of the teachers in training. In general, the subjects of the

research realized that the school should promote the autonomy of the students at the internship field school and their social and psychological development. However, this is not always fully or effectively achieved.

In this respect, it can be seen that the trainee teachers understood that the act of assessment must be present at all times during pedagogical activity, i.e., assessment must take place during the teaching and learning process, immersed in the dynamic relationships of the classroom. It should be seen as an element that guides decision-making related to teaching school mathematical content. This interaction will create objective conditions for teachers and students to be able to assess themselves, evaluate the teaching and learning of school content, and make decisions. However, this is only possible with teachers' awareness, adherence, and participation; without this, any attempt at different approaches to pedagogical activity will fail, which is one of the reasons we advocate discussing such issues during the development of initial teacher formative processes.

Along the way, we sought answers to these questions: what are the actions of teachers in training that would indicate an understanding of assessment as a constituent element of the math teacher's pedagogical activity? What contributions does this study make to assessment in initial teacher formative courses? What can be said beyond the results obtained?

The actions highlighted by the analysis and materialized by the flashes revealed the understanding that the teachers in training see themselves as subjects facing a new approach to the practice of educational-school processes, including assessment. These actions shaped the organization of the content offered to the students. They showed that they understood that the course taken for learning their pedagogical activity was not neutral but was inserted in a theoretical context that allowed for a different disposition for the pedagogical activity as a whole and, consequently, for the approaches to assessment. Corroborating these ideas, Luckesi (1996) says: "Assessment does not and will not take place in a conceptual vacuum, but is dimensioned by a theoretical model of the world and of education, translated into pedagogical practice" (p. 28). In this way, it can and should be seen as possible to "guide pedagogical practice daily in the planning and execution of teaching actions (p. 42).

In this way, this study has contributed to the field of initial teacher formative by showing the possibility of discussions and the organization of content teaching where assessment is also seen as a way of proceeding that is present in the human trajectory, leading man, most of the time, to solve problems posed in his objective reality (issues that were addressed when the history of mathematics was used to understand which human needs were related to the emergence of the mathematical concepts contemplated in the activities planned during the formative experiment developed). Another contribution would be the understanding that such a theoretical approach to assessment should be brought to the school context, especially to the school understood here as a privileged space for human education. This conception allowed them to take a fresh look at the teacher's formative process, the teaching and learning of school mathematics, the constitution of the aspects that make up pedagogical activity, and assessment.

Beyond the data obtained, the final defense is that we must eliminate teacher alienation, which aggregates various aspects of pedagogical activity: planning, content, and evaluation. To do this, we must avoid the lack of understanding and mastery of these aspects. We realize that the teacher's lack of clarity concerning the reality in which he lives, not understanding, for example, how facts and phenomena got to where they are today (sociological, historical-procedural dimension), makes it difficult for him to see the purpose of what he does, in our particular case: to teach mathematics for what, for whom, against whom, what kind of man and society to form (political, philosophical dimension) and, finally, his more specific activity in the classroom lacks discernment (pedagogical dimension).

By embarking on a path that does not allow them to see these conceptions, this teacher will develop an alienated pedagogical activity, which becomes a mere automatic operation of endlessly repeating content and mechanically reproducing what is in the textbook (Vasconcellos, 1995). The alienation of pedagogical activity can only be addressed if we consider teaching work's objective and subjective conditions as a dialectical unity. According to Basso (1994), the objective conditions that maintain the alienation of pedagogical activity include long working hours, low salaries, and a lack of material resources in schools, among others. The subjective condition for this support is the teacher's theoretical formative. This status quo, in turn, creates a great distance between the content learned in the degree course and the reality of the school and its teaching organization.

In this respect, we still have to ask: what are the formative possibilities for reducing the alienation of pedagogical activity so that social meaning and personal meaning coincide in this activity? We point to the possibility of teacher formative such as that undertaken here, which aims to discuss the organization of this activity itself. In such a way, the formative process is characterized as a privileged space for action, presenting itself as a field of possibility, a space for negotiation and learning, and making explicit the intentionality of the pedagogical activity.

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