Identification of cognitive and metacognitive strategies in school pedagogues: results of a training program*[1]

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Abstract

This article aims to identify the cognitive and metacognitive strategies utilized by school pedagogues responsible for the coordination and articulation of the pedagogic process inside schools in a continuous training program. Metacognition is not usually examined in connection with teachers and/or professional development; therefore, to analyze the importance of metacognitive development for school pedagogues, attention to continuous training is essential both to attain a better comprehension of the term and to establish ways to identify it. This qualitative research taking a phenomenological and hermeneutic approach was developed based on a continuous training program with 16 pedagogues from public and private schools and different segments of activity. Semi-structured interviews and an instrument for the identification of the utilization of five cognitive strategies (reflexivity, reality conscious, verbalization, attention and thought/attitude) and three metacognitive (awareness-making, self-control and autopoiesis) were administered. The results indicate a high level of agreement by participants with the items described by the instrument; in addition, when relating verbal reports from participants to the results obtained with the instrument, it was noted that the proposed continuous training program could facilitate reflections about "learn to learn" as articulated within the activity context. Further studies are needed of school pedagogues, as well the development of training processes (both initial and continued) that promote the development of metacognitive strategies, contributing to daily activity together with the teachers.

Keywords

Metacognition—Continuous training—School pedagogue—Cognitive strategies.

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Introduction

The aim of this article was to identify the cognitive and metacognitive strategies utilized by school pedagogues responsible for the coordination and articulation of pedagogic process inside different school institutions during their participation in a continuous training program.

Pedagogy as science of practice, naming a wide range of practices considered educational, needed delimitation in this context. The term School Pedagogy was adopted as a result of the expansion of the field of intervention and study of pedagogy into social reality (PINTO, 2011). Along with this delimitation, several questions arose about the results of this context of changes in the professional identity and training of the pedagogue.

To address these issues, in the first half of 2019, a survey of articles with the theme "metacognition" was carried out on the platform of the Coordination for the Improvement of Higher Education Personnel (Capes). Of the 217 articles developed in the last 10 years, only 8 percent focused on the issue of teacher training. Of all the articles checked, none focused on identifying the development of metacognitive strategies for school pedagogues in training programs.

The importance of research with this approach lies in the fact that teachers' knowing what they know about their own teaching process can be a starting point for changing the training of these professionals (BALÇIKANLI, 2011). Thinking about thinking is opposed to mere technical conformity (DUFFY, 2005), and the school pedagogue, responsible for articulating the organization of teachers' pedagogical work, needs to provide moments of theoretical reflection on the situations of teaching practice and in mediation situations involving other actors in everyday school life.

The educational scenario and the challenges in the pedagogue's performance

Contemporaneity is marked by cultural and political changes that present education with several challenges. Criticisms are directed toward the school institution, mainly in relation to its social function in contemporary times. Nevertheless, Libâneo (2011) states that there is still a place for the school in technological society, as it will be responsible for the synthesis between experienced culture and formal culture—the student as the subject of his own knowledge. In this way, teachers are indispensable in creating the cognitive and affective conditions affording students the conditions to construct meanings from the information received.

It is necessary to emphasize cognitive skills to meet the (always) new needs for professional qualification. One cannot fail to invest in a proposal for democratic education that includes aspects for survival in the contemporary world, such as cognitive abilities and critical and creative thinking (LIBANEO, 2011).

The figure of the pedagogue and his professional identity are prominent in this scenario. According to Janz (2015), the pedagogue is seen as the professional who has

the essential characteristics supporting reflection with teachers on the perspectives they take, confronting them through theoretical and methodological postulates and the reading of the sociocultural reality of the students. Therefore, the pedagogue's role in the school context is part of a process of legitimation through a set of actions that are organically articulated, aimed at the development of learning, and able to contribute to the promotion of the intellectual and cultural development of students, as well as their social inclusion.

In order to meet the challenges inherent in this role, the professional pedagogue must have consistent training within the theoretical-investigative field so that, while assuming their role in the school context, they can delve into the field of activity (PINTO, 2011). However, it is observed that there are numerous problems that compromise didactic-pedagogical action: Such professionals have taken on attributions that are not within their competence, causing situations of frustration and dissatisfaction with their practice. These situations in turn trigger the mischaracterization of the function and their professional identity (HADDAD, 2016).

This problematization refers to the importance of the formation of the school pedagogue as a means of influencing the qualification of daily performance. Freire (1996) states that "thinking right" presupposes a willingness to accept and risk the new, which cannot be accepted or denied just because it is new. From this perspective, understanding is intrinsic to thinking because "[...] understanding, from the point of view of right thinking, is not transferred, but co-participated" (FREIRE, 1996, p. 37).

In this sense, training:

> [...] is not a response to an ideal school project, an ideal curriculum organization and an ideal profile of teachers and students. On the contrary, it has to do with the tensions, imbalances, sufferings and anxieties that reflect the confused relationships between people at school and in society [...]. These realities condition teaching knowledge to the development of metacognition. (PORTILHO; TESCAROLO, 2015, p. 275).

Therefore, metacognitive development in continuing education, both for teachers and pedagogues, underlies the need for a better understanding of what metacognition is and which paths are necessary for its identification and evolution.

Metacognition and continuing training

Flavell (1979) pointed out the promising emergent character of metacognition as a concept that would significantly contribute to research on social learning theory, behavioral and cognitive modification, personality development, and, finally, education. His work came at a time when the concern with learning turned to the complexity of cognitive processes, directing research to metacognition as a way of understanding and improving learning (RIBEIRO, 2003).

The starting point for research on metacognition was Flavell's (1971) "What is Memory Development the development of?" (ROSA *et al.*, 2020), which inspired several

authors to research metacognition as arising from different epistemologies and theoretical traditions. It is important to assume that metacognition is a basic cognitive process, defined as

> [...] a knowledge about one's own cognitive processes and products or anything related to them [...] refers, among other things, to the active monitoring and consequent regulation and orchestration of these processes with respect to cognitive objects. (FLAVELL, 1979, p. 232).

The concept of metacognition used in this article is based on the metacognitive model proposed by Mayor Sánchez, Suengas, and González Marqués (1995), who conceive of metacognitive activity as comprising the two basic components of all other epistemological models—awareness and self-control—plus a third element called autopoiesis.

Autopoiesis (MATURANA ROMESÍN; VARELA GARCÍA, 1997, p. 9) arises from an attempt to "synthesize or summarize in a simple and evocative expression, what [...] seemed to be the center of the constitutive dynamics of living beings." Autopoiesis in relation to the study of living beings is based on "taking into account their condition as separate, autonomous entities that exist as independent units." Thus:

> It is this network of component productions, which is closed in on itself, because the components that produce it constitute it by generating the very dynamics of productions that produced it and by determining its extension as a circumscribed entity, through which there is a continuous flow. of elements that become and cease to be components according to whether they participate or cease to participate in this network, which in this book we call autopoiesis. (MATURANA ROMESÍN; VARELA GARCÍA, 1997, p. 15).

Therefore, as "[...] a synthesis between self-generation and interaction with the world" (MAYOR SÁNCHEZ; SUENGAS; GONZÁLEZ MARQUÉS, 1995, p. 56), autopoiesis is a fundamental component of metacognition, thanks to which the person who carries out the metacognitive activity can be aware of himself, have control over himself, and, going beyond consciousness and control, build himself.

Therefore, it is important to reflect on the role of metacognition in school learning (GÓES; BORUCHOVITCH, 2020; LOCATELLI, 2014; PORTILHO; MEDINA, 2014) and the possibility of metacognitive teaching of students, serving as a means og integrating the school curriculum (DUFFY, 2005; FLAVELL; MILLER; MILLER, 1999). However, there remains much work on the articulation between metacognitive skills and the continuing education of education professionals.

Grendene (2007) points out that some studies of metacognition were developed with school-age children. This is due to the fact that such studies focused on basic activities, such as reading and mathematics. Among several studies that correlate metacognition and its benefits for learning, Balçikanli (2011) cites a study that found the relationship of metacognitive monitoring with language learning. Most successful learners were aware of the processes within their own learning, seizing strategies to manage their own learning effectiveness.

However, it has been observed that metacognition is not normally related to teacher or professional development in research (DUFFY, 2005). When talking about teacher education, training is meant, which implies that the task of teaching is something mechanical that happens through the implementation of techniques through a given plan.

There is a possibility of greater involvement of the learner when a metacognitive approach is adopted during training, since

> In the metacognitive perspective, continuing education places the teacher at the center of their learning, as it provides an opportunity to reflect on what, how, when and where they learn. This movement leads the teacher to equip himself to meet the learning differences of his students. (PORTILHO; MEDINA, 2014, p. 236).

In this sense, the literature points out that knowing what teachers know about their own teaching process could be a starting point for a change in teacher education (BALÇIKANLI, 2011). This premise can be considered when talking about the performance of the school pedagogue, who should have the task of monitoring the students' learning processes and developing training programs in the school that contribute to the development of metacognition, to offer a promising alternative, since "thinking about thinking" is opposed to mere technical conformity (DUFFY, 2005) and approaches the development of critical thinking (LOCATELLI, 2014).

Mayor Sánchez, Suengas, and González Marqués (1995) state that two phases are necessary in training programs that aim to develop metacognitive strategies. The first concerns externally directed intervention through instruction, that is, "teaching." The second involves the more active participation of the subject, thus enabling "learning to learn" and "learning to think." These two phases, which combine the role of the intervener with the increasingly autonomous activity of the participating subject, would have as their object the development of metacognition through the use of learning and thinking strategies, the result of the multiplication between the knowledge function (first phase) with the active participation of the subject (second phase).

Thus, it appears that it is not enough to verify the importance of metacognition, but rather that it is necessary to contribute to the analysis of metacognitive activity through the construction of evaluation instruments, as well as to the development of intervention programs that aim at the acquisition, development, and application of metacognitive strategies.

Metacognitive assessment instrument

There is an evident challenge in this field of how to detect, assimilate, or even manipulate these metacognitive strategies. This problem "[...] arises from the intrinsic difficulty that exists to operationalize the metacognitive activity" (MAYOR SÁNCHEZ; SUENGAS; GONZÁLEZ MARQUÉS, 1995, p. 145), as it is not observable.

In agreement with Vuckman (2005 *apud* GRENDENE, 2007), the most common ways to validate metacognition have been observation records and verbal reports. Damiani,

Gil, and Protásio (2006) used this form of validation in a study of the application of the concept of metacognition to aid the process of initial teacher education at a Brazilian public university. Some structured instruments have also been proposed, which often focus on decision-making and problem-solving strategies or on metacognitive strategies used by participants.

According to Mayor Sánchez, Suengas, and González Marqués (1995), researchers create their own assessment instruments according to the approach and theoretical framework from which they start. Thus, building a metacognitive assessment tool involves both the theoretical assumptions and the research intention of the researcher. An example is the instrument proposed by Balçikanli (2011), which starts from the premise that if teachers know their own teaching method, it would be a starting point for changing their own development as a teacher. Therefore, the author proposes an instrument that would allow teachers to identify their own metacognitive level of teaching.

According to Portilho (2009), earlier research shows that most of the time we exercise metacognitive activity unconsciously. Thus, learning can become more meaningful and explicit if we become aware of and use self-regulation in everyday activities. This point implies the importance of metacognitive assessment, because if this use is possible, it leads learners to become aware of their weaknesses and strengths in the learning process, with a view to transformation.

The construction of the instrument used in this research started from the principle that the metacognitive assessment must be multidimensional and systemic (MAYOR SÁNCHEZ; SUENGAS; GONZÁLEZ MARQUÉS, 1995). In other words, it must facilitate the construction of instruments as exhaustive and systematic as necessary so that, based on this evaluation, it would be possible to build intervention programs to apply, develop and enable the acquisition of metacognitive strategies.

What then are strategies? Strategies are the set of procedures used to reach an objective, plan, or goal (MAYOR SÁNCHEZ; SUENGAS; GONZÁLEZ MARQUÉS, 1995). Learning strategies are therefore the sequence of "procedures used to facilitate learning" (GÓES; BORUCHOVITCH, 2020, p. 7). Therefore, it is possible to conceive that the use of learning strategies is related to an individual's ability to select the best procedure in each situation that requires a certain learning objective (PORTILHO; DREHER, 2012).

Therefore, learning involves an active posture. This premise is based on three principles:

> [...] learning is primarily a social activity; new learnings are built based on what is already known or believed; and learning is developed through the use of flexible and effective strategies that contribute to understanding, reasoning, memorization and problem solving. (HATTIE, 2012, p. 117).

Therefore, for Hattie (2012), students need to know how to plan and monitor their learning, how to correct their own mistakes, and how to set their own learning goals. Therefore, both cognitive and metacognitive strategies are necessary (GÓES; BORUCHOVITCH, 2020).

Cognitive strategies are related to "actions performed at the time when one needs to learn a certain content or perform a given task" (GÓES; BORUCHOVITCH, 2020, p. 7). They lead the individual to achieve cognitive goals, such as, for example, distinguishing in a math exercise whether a certain basic operation concerns addition or subtraction.

Metacognitive strategies are related to "planning, monitoring and regulating one's own learning" (GÓES; BORUCHOVITCH, 2020, p. 8), and can be used before or after cognitive strategies. Hattie (2012) describes "thinking about thinking" as one of the great learning strategies.

> We need to develop an awareness of what we are doing, where we are going, and how we are going; we need to know what to do when we don't know what to do. These self-regulating, or metacognitive, skills are one of the ultimate goals of all learning [...]. (HATTIE, 2012, p. 102; our translation).

Hattie (2012) makes recommendations for programs aimed at "learning to learn." Among them, to develop the ability to think and study, it is necessary to promote a high degree of activity in the learners, as well as their metacognitive awareness. From this awareness, it would then be possible to use metacognitive strategies that, according to Carrasco (2004 *apud* PORTILHO; DREHER, 2012), refer to:

> • knowing how to evaluate one's own cognitive performance;
> • knowing how to select an appropriate strategy to solve a given problem;
> • knowing how to drive, focus attention on a problem;
> • knowing how to decide when to stop activity on a difficult problem;
> • knowing how to determine the understanding of what you are reading or listening to;
> • knowing how to transfer the principles or strategies learned from one situation to another;
> • knowing how to determine whether the proposed goals or objectives are consistent with their own capabilities;
> • knowing the demands of the task;
> • knowing the means to reach the proposed goals or objectives;
> • know your own abilities and how to compensate for their deficiencies. (CARRASCO, 2004 *apud* PORTILHO; DREHER, 2012, p. 185).

The instrument used contains 15 statements to identify the use of five cognitive strategies (reflexivity, awareness of reality, verbalization, attention and thinking/attitude) and three metacognitive dimensions (awareness-making, self-control and autopoiesis; MAYOR SÁNCHEZ; SUENGAS; GONZÁLEZ MARQUÉS, 1995; PORTILHO, 2009).

To exemplify the relationships between them, Chart 1 demonstrates each of the strategies, both cognitive and metacognitive.

Chart 1 - Matrix of the metacognitive assessment instrument of a continuing education program

Metacognition	Cognition	Assertion
Awareness-making	Reflexivity	During the meeting, some [...]
Self-control		During the meeting, I utilized […]
Autopoiesis		During the meeting, when using […]
Awareness-making	Awereness of Reality	During the meeting, I realized […]
Self-control		During the meeting, I realized […]
Autopoiesis		During the meeting, when I realized […]
Awareness-making	Verbalization	During the meeting, when I spoke […]
Self-control		During the meeting, I controlled […]
Autopoiesis		During the meeting, when speaking […]
Awareness-making	Atention	During the meeting, I paid attention […]
Self-control		During the meeting, I paid attention […]
Autopoiesis		During the meeting, I paid attention in […]
Awareness-making	Thinking/Attitude	During the meeting, I've become aware […]
Self-control		During the meeting, I thought on attitudes […]
Autopoiesis		

Source: prepared by the authors.

It is noteworthy that the intention of this division does not correspond to an attempt to attribute a logic of causality between the variables, but rather to pointing out how metacognition, as one more of the cognitive activities (FLAVELL; MILLER; MILLER, 1999), is in constant relationship with other cognitive activities. In this way, cognitive functions are attributed a way of operating that is complex and interrelated, and not linear and fragmented.

"Reflexivity" is conceived as the subject's ability to use reflection in their daily lives, seeking to go beyond the data presented. On the other hand, "awareness of reality" refers to the cognitive activity that makes it possible to relate knowledge to their professional context, envisioning articulations of how the self projects itself in the world.

"Verbalization" indicates the cognitive activity of exposing ideas and knowledge through speech, externalizing what is thought, felt, and expected. "Attention," a more familiar characteristic, is the cognitive activity of being present in a certain subject or moment, giving priority to such situations to the detriment of other occurrences around. Finally, "thinking/attitudes" refers to the cognitive activity that makes it possible, in addition to the awareness of reality, to transpose content to reality in order to feel motivated through the idealization of actions aimed at transforming the reality of action.

Methodology

Qualitative research with a phenomenological-hermeneutic approach aims to interpret what reality communicates while seeking its transformation. This approach makes it possible to search for the "sense of the text by penetrating the past, the tradition, the other, the different" (TAQUETTE; BORGES, 2020, p. 127). This implies that there is no neutral participation or impartiality, with researchers being central figures in the process of describing and interpreting data.

Soon,

> The continuing education of teachers and their pedagogical practice are based on three dimensions that characterize an emerging paradigm—identify, analyze and operationalize their action—taking into account the variables located around the system (political, social, economic and cultural contexts) [...]. This finding assumes the use of effective instruments for the description and interpretation of social realities based on phenomenology, as a method of description, and hermeneutics, as a technique of interpretation, dialectically structured. (PORTILHO; TESCAROLO, 2015, p. 272).

This study started with the identification of the problem, followed by the analysis of data from the chosen research instruments (interviews with a semi-structured questionnaire and a metacognitive assessment instrument) via the exercise of understanding the relationships between subjects and its context of action, tracing possible interpretive readings of the phenomena presented in the form of text and quantitative responses. From this, it was possible to move toward an understanding of possible means for the qualification both of the measurement of cognitive and metacognitive strategies, and of the practice and training of the participating pedagogues in the context of action.

Data were collected during seven meetings of a continuing education program developed by the Learning and Knowledge Research Group in Teaching Practice at the Pontifical Catholic University of Paraná (PUC-PR). At the end of each meeting, the metacognitive assessment instrument was given to each participant, with a view to identifying the strategies used during the meeting. Table 1 presents the number of participants and the topic per meeting.

Table 1 - Number of participants and topic per meeting

Themes and participants by meeting		
Meeting	Theme from meeting	Number of participants
1	Continuous training and self-training	20
2	Professional Identity	19
3	Innovative and integrative communication	14
4	Cultural expression in educational enviroment	14
5	Group: A unity in function	7
6	Mediation in the learning and teaching process	13
7	Assesment and registration	15

Source: prepared by the authors.

Of the 20 initial participants, 16 pedagogues continued until the end. These professionals came from municipal and state public schools and from private schools in different segments of activity (child education, elementary school I and II, and high school).

First (in the interview carried out through the semi-structured questionnaire), two questions were used in this study: "How do you make your action plan and how do you organize your pedagogical work?" and "What challenges do you find in your daily routine?." The two questions were selected to identify the pedagogue's perception of the importance of pedagogical planning and the way he deals with challenges in the school context. Such perceptions brought elements of analysis that could elucidate metacognitive strategies and knowledge used by the participants.

The metacognitive instrument had 15 situations referring to the encounter experienced in continuing education, each of which was scored on a 4-point a Likert scale ranging from *never* to a *few times*, *many times*, and *always*. In this way, it was possible to identify how the pedagogues understood their performance in the use of cognitive and metacognitive strategies through the total score for each of the questions. From the result, it was possible to perform a percentage comparison of the group results by encounter in the cognitive and metacognitive categories, allowing them to be compared.

Finally, the description of the phenomena made it possible to develop interpretations that related bibliography, data, and analysis, in order to identify the perception of pedagogues about their learning, providing opportunities for reflections on the importance of the ability to manage learning from metacognitive strategies. Therefore, to indicate which of the 16 pedagogues is quoted, –an indication of P1 to P16 will be appended to each quote described in this article while seeking to identify the particulars of each speech, while preserving the confidentiality of the participants.

The research was approved by the Ethics Committee for Research with Human Beings of PUC-PR, through Opinion No. 2,632,541.

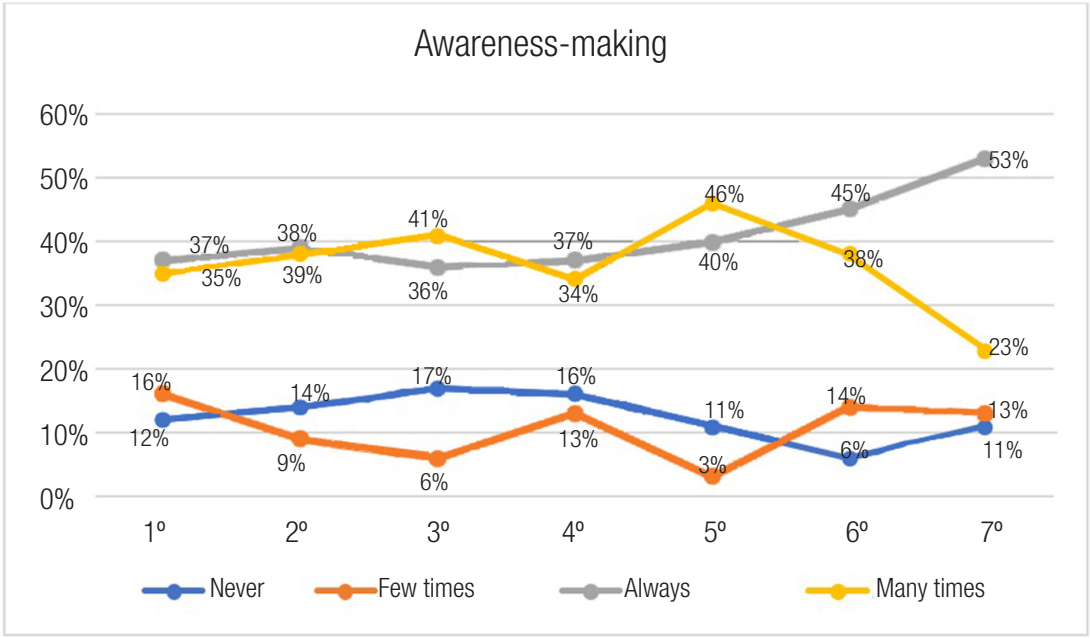
Description and interpretation

The results will be explained below for each of the metacognitive strategies (awareness-making, self-control and autopoiesis) and their relationship with the cognitive strategies, all of which were analyzed for each meeting, based on the percentages of the answers of the pedagogues to each statement in the questionnaire.

Awareness-making

Graph 1 presents the percentages related to awareness-making.

Graph 1 - Percentage of responses, per meeting, related to the metacognitive strategy "awareness-making"



Source: prepared by the authors.

It is noticed that the responses *many times* and *always* were chosen the most by the participants in all the meetings. The highest percentage for *many times* occurred in the last meeting (53 percent), which addressed the theme "evaluation and recording." The highest percentage of *always* occurred in the fifth meeting (46 percent), whose theme was the group process. The responses a *few times* and *never* had higher percentages in the first (16 percent) and third meetings (17 percent), which had continuing education and communication as themes, respectively.

This result may indicate that the participants identified themselves with statements related to awareness, implying that they used such strategies during the training meetings. Despite this, it is noteworthy that in this category, the highest percentages were for a *few times* and *never* in relation to the categories that will be presented later.

When analyzing the cognitive strategies underlying the statements present in the questionnaire related to awareness, it is clear that "awareness of reality" received the highest number of *many times* and *always* responses (99 total), followed by "thinking/attitudes" (98) and "reflexivity" (93). The cognitive strategy that received the highest number of responses of *never* and *few times* was "attention," with a total of 88 responses.

However, this phenomenon must be analyzed from a critical point of view, since the high rates indicated by the results are affected by the subjectivity and voluntariness inherent to the self-application characteristic of the Likert scale instrument. According to Pasquali (2010), this scale serves to measure the participant's level of agreement with a

series of psychological objects, which may indicate that the subject takes a favorable or unfavorable view of these objects as represented in the instrument. Thus, it can be said that the level of agreement of the participants with the metacognitive strategy "awareness-making" is notably high, especially when this strategy is related to reflexivity, to the awareness of reality, and to everyday thoughts and attitudes.

These data may suggest an approximation to the process of assimilation and accommodation proposed by the Piagetian model, in which the cognitive system adapts reality to its own structure and, simultaneously, adapts to the structure of the environment, thus moving toward awareness (FLAVELL; MILLER; MILLER, 1999). If the participants recognized themselves in such cognitive strategies, which are often confused with metacognition itself, may indicate that the training facilitated the participants' adapting—from a cognitive point of view—to new possibilities, indicating how pedagogues can collaborate with their teaching staff in promoting metacognitive skills.

In this way, the participants' understanding of their own awareness-raising process was closer to their perception of the importance of thinking about their own attitudes in order to plan change from there. Such understanding was present in some of the answers they gave to the question about how they plan their daily work, which showed how the motivation for pedagogical action is hampered by everyday variables:

> P1: So, we make the schedule, but we are not always able to follow it because of the unforeseen. Sometimes it is planned for that week to really sit down with the teacher, monitor the planning, look at student activity, monitor how this process is going, see the evaluation issue. But sometimes that week something happens and we end up having to attend to parents, doing other things besides what we had planned...

> P3: We seek to meet the needs of the school, outline the objectives in view of the needs of the school that we find here, but we find a very large distance from our action plan for our effective action at school.

It can be seen in the quotes that the pedagogues understand the importance of planning, but that daily demands end up frustrating such planned actions, leading them to feel that their functions are mischaracterized. Pedagogues recognize the importance of the metacognitive strategy of "awareness-making"; however, there challenges to this may arise from the daily tasks that calls them much more to bureaucratic tasks and decontextualized interventions of their function than to the pedagogical accompaniment proper to their function.

Therefore, if we take reflection as "[...] the mental process of structuring or restructuring an experience, a problem, existing knowledge or insights" (KORTHAGEN; WUBBELS, 1995, p. 55 *apud* RISKO; ROSKOS; VUKELICH, 2005, p. 321; our translation), or, as stated by Alarcão (1996, p. 175), for whom "[...] to be reflective is to have the ability to use thought as a giver of meaning," this cognitive strategy was very important for assimilation and accommodation aimed at raising awareness. However, it is evident in the reports of

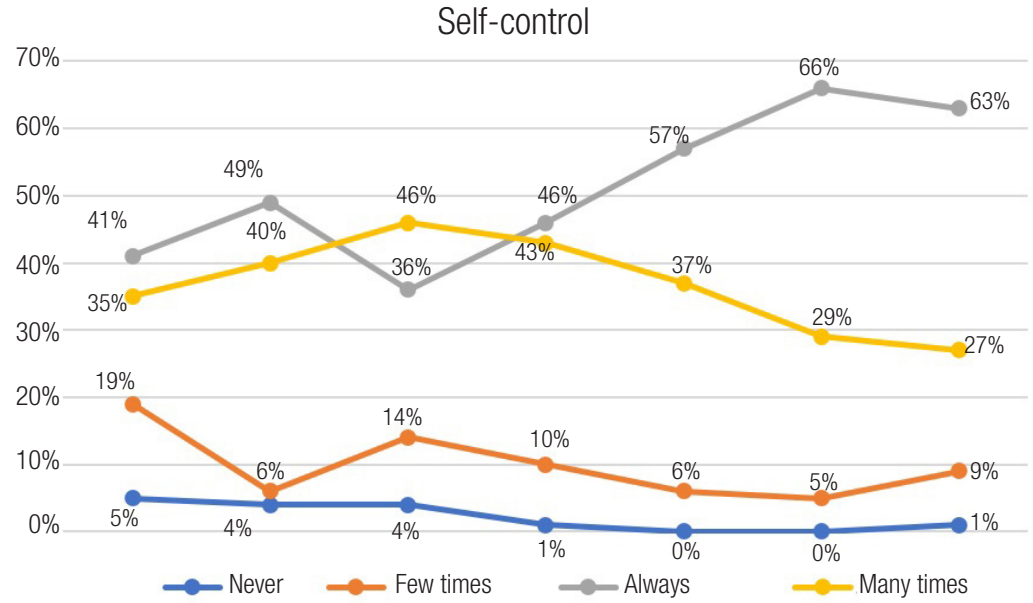
the participants how challenging it is to deliberately and consciously use metacognitive strategies, since bureaucracy and other challenges lead school pedagogues to fall into automatism, making it difficult to determine whether they know the demands and means for the fulfillment of tasks and objectives inherent to the pedagogical performance, as well as knowing their own capabilities (PORTILHO; DREHER, 2012), going beyond complaints.

It is correct to say then that training programs that privilege reflexivity and the articulation between knowledge and the reality experienced with their participants can also contribute to the promotion of metacognitive strategies for awareness. Such a contribution can be extended to the way in which teachers and students deal with their learning, since the more aware the pedagogue is of the use of metacognitive strategies, the greater the chances of using metacognitive development in everyday life to support learning and the assessment of learning (DUFFY, 2005; FLAVELL, 1979; HATTIE, 2012).

Self-Control

Graph 2 illustrates the percentages related to the responses given by the pedagogues in relation to the metacognitive strategy "self-control."

Graph 2 - Percentage of responses per encounter related to the metacognitive self-control strategy



Source: prepared by the authors.

It can be seen that *many times* and *always* were the most common responses the participants in all the meetings, more frequently so than in Graph 1. The highest percentage

of *often* responses was for the penultimate meeting (66 percent), which had mediation as its theme. The highest percentage of *always* occurred in the third meeting (46 percent), which had communication as its theme, as also held for the "awareness-making" strategy. On the other hand, a *few times* and *never*, which were, had the highest results in the first two meetings (19 and 5 percent, respectively).

This result may indicate that the participants identified more with statements related to the metacognitive strategy of "self-control" during the meetings. When analyzing the cognitive strategies underlying the assertions present in the questionnaire related to "self-control," it is clear that "thought/attitude" received the highest number of responses of *many times* and *always* (98), followed by "awareness of reality" (95) and "attention" (93). The cognitive strategy that received the highest number of responses of *never* and a *few times* dimensions was "verbalization," with a total of 26 responses, followed by "reflexivity," with 22.

The fact that the cognitive sub-strategies that had the highest number of responses regarding metacognitive self-control were "thinking/attitude," "awareness of reality," and "attention" indicates a relationship between the way pedagogues perceive their participation in the meetings and the need to develop such strategies for a greater appreciation of "[...] experience as a source of learning [...]" and of "[...] metacognition as a process of knowing one's own way of knowing [...]," recognizing the need to "[...] the learning management itself" (ALARCÃO, 1996, p. 175).

In addition, metacognitive strategies of regulation or control are used to modify or maintain behaviors through monitoring that allows an indication of whether such a way of dealing with a certain task or cognitive objective is positive or needs change (GÓES; BUROCHOVITCH, 2020). They approach the concept of self-learning, where students can improve their learning through the use of tactics that contribute to the selection of the best cognitive and metacognitive strategies, including creating environments conducive to motivation (MAYOR SÁNCHEZ; SUENGAS; GONZÁLEZ MARQUÉS, 1995).

This conception is in dialogue with Portilho (2009, p. 113) because, when we talk about control, we talk about the ability to direct action to reach goals, pointing to the "[...] selection of strategies to be used so that the proposed objective is realized." However, in the responses of pedagogues about their own planning, as well as about how they deal with challenges in their daily lives, the use of self-control as a metacognitive strategy aimed at achieving what the school pedagogue needs to follow in their role is most often an issue in the background due to the number of demands and lack of time:

> P7: We make an action plan together with the other pedagogues, aiming to serve the teachers, the students, our work in this daily care for the parents, as well as looking at all the documentation that governs the school's rules... not always we manage to take this action plan correctly, but we try.

> P11: My God, the daily grind! Action plan, even for us to get together on a daily basis is difficult, time is our enemy, but it is via WhatsApp and it does not materialize, you know, it never ends, always remembering and recording and changing through WhatsApp, and sporadically the pedagogical team of school meets and we draw up some action plans there, but they are not always implemented. The reality we have is very difficult.

From these quotes, as well as the responses to the metacognitive assessment instruments, it is clear that there is a gap between what pedagogues perceive of their metacognitive process and their ability to apply such self-control strategies in their daily work. Libâneo's (2011) notes the importance of cognitive aspects for professional development, as well as for a proposal for contemporary education, in understanding these results. The greater the demand that leads the performance of school pedagogues away from their expected functions, the greater the probability of needing to act in emergencies, which impairs the daily planning essential for performance that privileges metacognitive monitoring aimed at regulating conduct.

Metacognition is shown to help in the identification of possibilities for awareness and self-regulation in the face of complex situations like this. It can promote the creation of strategies to overcome such challenges through an adaptive expertise that defines what it is to be metacognitive, indicating a feeling of being in control (DUFFY, 2005), which raises the importance of knowing oneself.

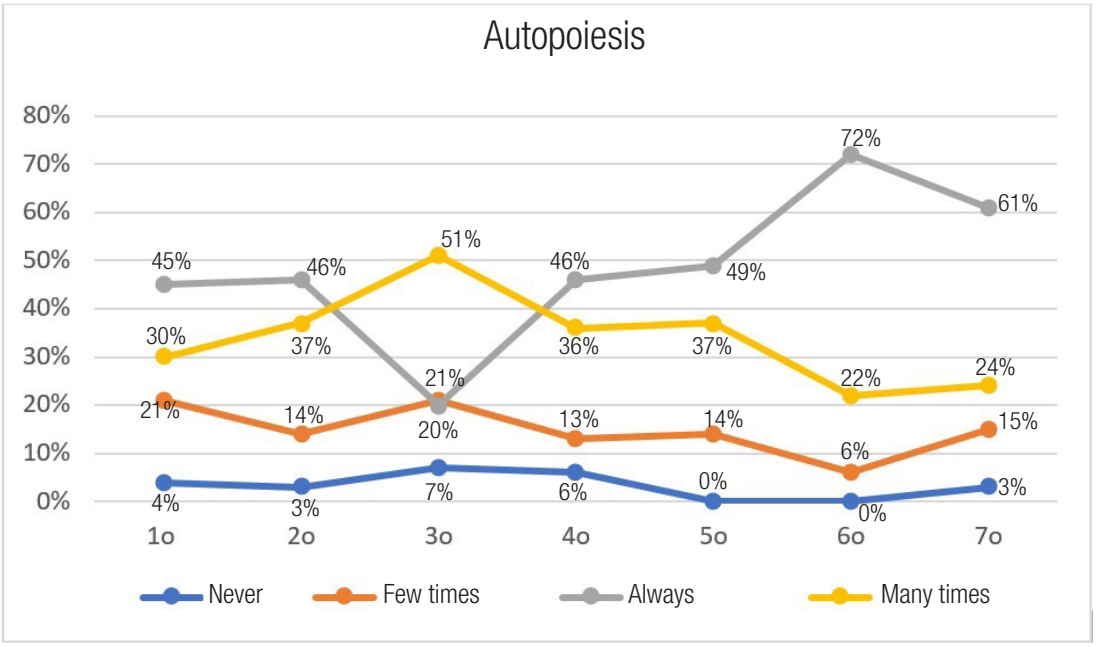
> [...] how this control is exercised and how one can learn to do it better. This refers to the procedural aspect of consciousness, which implies that we learn to perform certain tasks with our own cognitive resources, in a strategic way to reach the determined goals. (PORTILHO, 2009, p. 112).

Therefore, it can be considered that the challenges they experience arising from the metacognitive variables of context and activity tend to distance them from the process of monitoring their own pedagogical work, which consequently makes it difficult to conduct self-control and planning intended to achieve a sense of new learning and established goals—characteristics related to the subcomponents motivation and will (MAYOR SÁNCHEZ; SUENGAS; GONZÁLEZ MARQUÉS, 1995). In other words, there is a relationship between the challenge of using metacognitive strategies of awareness and control, since one of the steps to establish goals is precisely "to become aware of and evaluate the plans to achieve the goal" (GÓES; BORUCHOVITCH, 2020, p. 35).

Autopoiesis

Graph 3 illustrates the percentages of the responses given by the pedagogues in relation to the metacognitive strategy "autopoiesis."

Graph 3 - Percentage of responses per encounter related to the autopoiesis metacognitive strategy



Source: prepared by the authors

It can be seen, following the trend of the answers in the other metacognitive strategies, that the responses many times and always were those most chosen by the participants in all the meetings, with the highest percentage for many times in the penultimate meeting (72 percent) and for always in the third meeting (51 percent). Conversely, a *few times* and never were most common in the first and third meetings (21 and 7 percent, respectively).

When analyzing the cognitive strategies underlying the statements related to autopoiesis, it is noted that "attention" received the most responses of many times and always (92), followed by "thought/attitudes" (89) and "reflexivity" (83). The cognitive strategy that received the most responses of never and a *few times* dimensions was also "verbalization," with a total of 29 responses, followed by "awareness of reality," with 23.

Regarding this incidence of responses to the "attention" strategy, as well as in "thought/attitudes," it is possible to infer that the pedagogues, when completing the questionnaire, identified with the statements that were related to the change or transformation of their reality. The statement "During the meeting, I paid attention to something and was motivated to transpose what was discussed into reality," which corresponds to autopoiesis and attention, is related to the way the participants deal with their daily work, where they do not necessarily overcome all challenges but rather demonstrate a willingness to improve their practice in the school context:

> P15: At the beginning of the year, the school group sits down and collectively defines the year's actions; together with the manager and the coordinator, we see what activities will be developed,

> how the work will be carried out, how the monitoring of student learning will be, so it is defined at the beginning of the year, outlining a plan based on what was done in the current year, we evaluated what worked and what did not.
>
> P11: (about daily challenges) I think that every day indiscipline, the social factors, turned to the social, these social maladjustments of the family, which reflects on the student. The difficulties that students bring from previous years, from where they graduate, is a constant challenge... Behavior that does not bring understanding until we seek, investigate what happened. So, the school is also a space for that, for daily news, and we have to search, stop, think and search....

Thus, the participants indicated what they aim to develop and use in their daily lives, in addition to the way they viewed their performance in learning during the meetings. This is spurred by thinking about their own practice, as proposed by the training process (ALARCÃO, 1996; DUFFY, 2005; MAYOR SÁNCHEZ; SUENGAS; GONZÁLEZ MARQUÉS, 1995), which, as evidenced by the lack of familiarity on the part of some participants with the process of reflecting on their own way of learning and carrying out tasks and activities, also allows self-construction based on an internal movement that is articulated with external reality. This characteristic is related to the meaning of the word autopoiesis: "self-making, the production of oneself or the self-organization of an organic system" (PORTILHO, 2009, p. 113), which is defined as

> [...] a component of metacognition as basic as consciousness and control: Thanks to it, not only is metacognitive activity aware of itself, not only does it control itself, but goes beyond consciousness and control, building itself. (BRUNER, 1987 *apud* MAYOR SÁNCHEZ; SUENGAS; GONZÁLEZ MARQUÉS, 1995, p. 59, our translation).

In other words, this process of recognition of limitations evidenced in the reports, as well as the questionnaire responses, demonstrate an opening of the participating school pedagogues that contributes to the continuity of the metacognitive process in a sense of the transformation, and not the maintenance, of ducts. This movement is preponderant in autopoiesis as a dimension of metacognition, which would be represented in the opening, adaptation, and regulation by interaction promoted by formative lived experience (MAYOR SÁNCHEZ; SUENGAS; GONZÁLEZ MARQUÉS, 1995).

In this sense, metacognitive monitoring can impact and be impacted by the metacognitive experiences experienced during training meetings in a dialectical movement that contributes to the modification of beliefs that limit the sense of self-efficacy, which is important for control and regulation aimed at achieving goals and objectives in pedagogical practice (GÓES; BORUCHOVITCH, 2020; MAYOR SÁNCHEZ; SUENGAS; GONZÁLEZ MARQUÉS, 1995).

Considerations

The research showed that in a continuing education program, by taking a metacognitive perspective, participants can reflect on their performance and consequently on their

learning during meetings and exchanges of lived experiences, focusing on the awareness of the use of cognitive and metacognitive strategies. This stems from the evidence that metacognitive monitoring can impact and be impacted by the metacognitive experiences experienced during training meetings in a dialectical movement that contributes to the modification of beliefs that limit the sense of self-efficacy that is important in the control and regulation aimed at achieving the goals and objectives in pedagogical practice.

We note the importance of developing training programs for pedagogues that privilege strategies of "thinking about thinking," suggesting that it is necessary to develop an "adaptive expertise," a feeling of being in control, as an indispensable metacognitive skill in a scenario of constant uncertainty experienced by school pedagogues in their daily work.

There is a need for further research on the perspective of developing metacognitive strategies in the initial and continuing training of pedagogues in order to contribute to new practices that qualify pedagogical processes and positively impact student learning.

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