

Science teachers in Higher Education: Continuing education in an interdisciplinary collaborative group

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ABSTRACT

This article presents part of the dissertation that aimed to analyze strategies to converge Sciences Professors in the formation of an interdisciplinary collaborative group. The collaborative group comprised professors from the area of Biological Sciences of a higher institution of northern Brazil, focusing interdisciplinary continuing education. All participants were volunteers. For this purpose, it was used as the methodology the action-research in a simultaneous approach in the collaborative group action and the group research itself. The group realized the importance of seeking continuing education as a response to the demand that the region presents. In this sense, collaborative groups are important tools for ongoing professor training. The organization of an interdisciplinary collaborative group was an important strategy for the continuing education of those in higher education as possible to deal with the reflection of teaching practice problems that were apparently individual, but peers often shared them.

Keywords: Interdisciplinary Collaborative Group. Continuing Education. Science Professors.

Professores de ciências no ensino superior: educação continuada num grupo colaborativo interdisciplinar

RESUMO

Este artigo apresenta um recorte da dissertação de mestrado que teve por objetivo analisar estratégias para convergir os docentes da área de Ciências da IES na formação de um grupo colaborativo interdisciplinar. O grupo colaborativo foi constituído por docentes da área de Ciências Biológicas do Ensino Superior de uma instituição superior do norte do Brasil, com vistas à formação continuada interdisciplinar. Todos os participantes eram voluntários. Para tanto, utilizou-se como metodologia a pesquisa-ação numa abordagem simultânea na ação do grupo colaborativo e na pesquisa do próprio grupo. A partir dos trabalhos desenvolvidos, o grupo percebeu a importância de buscar a formação continuada como uma resposta à demanda que a região apresenta. Neste sentido, o grupo colaborativo é uma ferramenta importante para a constante formação do professor.

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A organização de um grupo colaborativo interdisciplinar constituiu uma importante estratégia para a formação continuada destes docentes do ensino superior, pois possibilitou lidar com a reflexão de problemas da prática docente que aparentemente eram individuais, mas que muitas vezes eram compartilhados pelos pares.

Palavras-chave: Grupo Colaborativo Interdisciplinar. Formação Continuada. Professores de Ciências.

INTRODUCTION

This article presents fragments from the master's thesis entitled "Teaching in Higher Education: continuing education in an interdisciplinary collaborative group" which was originated from the first author's unrests during her pathway as a professor in Northern Brazil (ROSA, 2014). The reality experienced in the region highlights factors as the absence of graduated teachers to work in the higher education; the obstacles that teachers find to reach a graduated degree due the low supply of courses in the Western Amazon; the little involvement and commitment of professionals who are teaching only in order to supplement income. Therefore, the problems generate an urgent necessity for the professionalization of teaching in higher education in Northern Brazil.

A common situation in higher education institutions is the existence of professionals from vocational schools who work as professors. Unfortunately, many of these do not have pedagogical training, often bringing trouble to the activities. Therefore, it is necessary to seek ways to assist these professionals in order to unify their skills and knowledge into a good teaching practice in higher education.

Higher education institutions have shown concern about that reality and are looking at ways in overcoming them. This is corroborated by Martins (2003, p.2) when he states, "The pedagogical training of higher education teachers has been established as a constant concern in the universities among their professionals (managers and teachers)."

However, the existing concern by the higher education institution and by the professors focus on specific training in the adherence area, prioritizing the desired inseparability teaching-research-extension concept and the achievement of Master and Doctor titles, much more than in the pedagogical preparation.

A brief review of the university history – in general, and, more specifically, the Brazilian – exposes that the required training of professors has been restricted to an in-depth knowledge of the subject to be taught: practical knowledge (resulted from the professional exercise) or theoretical/epistemological (from the academic exercise). Little or nothing has been required from pedagogical skills. (PACHANE; PEREIRA, 2003, p.1)

One of the strategies to meet the deficiency presented by professionals could be the formation of an interdisciplinary collaborative group, where they can interact with their peers seeking to overcome gaps in their training as teachers. As Nôvoa states (1992), this

is not an easy path because the professional training of teachers demands an awareness raising which is a process full of conflicts, hesitations and setbacks. Where “[...] the strengthening of innovative teaching practices, built by a teacher from reflections on experience, may be the only possible way out” (NÓVOA, 1999, p.18).

In this context, a collaborative group of professors can become one of the alternatives to further exchange and interaction with their peers, as well as to diminish the shortage of pedagogical practices since there is a lack of events and activities of continuing education in Northern Brazil. One can understand that the professor:

[...] constitutes the main pillar in whose heart and mind lay most of the changes that must be operated. They are the most important human resource in which one cannot carry out the foreseen reform of thought of higher education. On their professional skills, modes of action, motivation and commitment largely depends the maintenance and improvement of quality standards that the university historically reached [...]. (AQUINO, PUENTES, 2011, p.17-1810)

Drawing from these considerations, this article proposes to assess the creation of a collaborative group in the Sciences area, aspiring its continuing education as professors of an IES (higher education institute) in the state of Rondônia, Northern Brazil.

INTERDISCIPLINARY COLLABORATIVE GROUP: A PROPOSAL FOR A CONTINUING EDUCATION

According to Nóvoa (1992, p.26), “[...] The exchange of practices and the sharing of knowledge consolidate spaces of mutual formation, in which each teacher is required to play the role of trainer and trainee simultaneously. When teachers shift the attention away from themselves, from the knowledge they teach, and starts to consider the people to whom this knowledge will be taught to, they also move the attention axis and have the ability to reflect on their profession. Moreover, when this reflection, beyond the individual dimension (self-reflection), takes a collective dimension (shared reflection), it becomes possible to have, within the University, debate routines, peer training, reflection, decision making and the possibility to have interdisciplinary attitudes.

In this sense, the individual option by the Licentiate Degree Course in Biological Sciences of the IES located in the town of Ji-Paraná, Rondônia state, to be or not part of the collaborative working group was predominant. Because it was necessary to have the predisposition to contribute to and learn from their peers, of common interest, which contributes to the identity of the group. According to Fiorentini (2004, p.54):

Such identification does not mean the presence of the same subject to it (with the same knowledge or the same cultural environment), but people willing to

spontaneously share something of common interest and that may have different views and understandings of the concepts [...] and the didactic and pedagogical knowledge and practice related to teaching and learning [...].

For the development of the research, the action research method was used as an approach, with a simultaneous and participatory focus in the action of the collaborative working group and in the research of the Biological Sciences teacher's group volunteers. Due to the systematization and analysis of meetings, these data were videotaped, later transcribed, interpreted, along with theoretical reflections. The four subjects were identified by the letter P (professor) and a number: P1, P2, P3 and P4.

To initiate the activities of the interdisciplinary collaborative group it was needed to create a space for the teachers and the researcher to interact with their peers, seeking to exchange experiences, creating empathy and sense of belonging. For this, five meetings were provided. Four are described and analyzed below.

ANALYSIS OF THE COLLABORATIVE MOMENTS

The **first meeting** was divided into two periods: the first for dialogue and group composition, the second to get the continuing education started with a video¹ presentation and subsequent dialogue on it. To initiate the dialogue, there was an informal presentation of the present ones, and then the researcher explained the theme and objectives of the research. Then, teachers were invited to join the continuing education group. They accepted and filled the free and informed consent, as well as a questionnaire. After forming the group, it was together decided to initiate the dialogue with a video that portrays the college student's view of higher education. While the video was being played, the teachers remained attentive and, at times, some reacted with the body and others with the speech, according to the experienced reality.

When they were asked what most was marking in this video, teachers placed:

P4. "The time that the student uses, 26.5 hours per day to stay connected to the internet and phone."

P4. "It makes us reflect on the use of time on the internet. Because today I also use social networks and read news on the internet. I do not know what I used to do before with my time. If I used to sleep more, or read more, or if I used to study more. Do not know."

P1. "I think we used to study more."

P2 and P1. "I used to read more."

¹ Available in <https://www.youtube.com/watch?v=25mzhB1JKxQ>

P1. “Today people only read things from others on the Internet. Things that others are posting on Facebook, about things that really matter. Today if they enter the computer to work, the first thing they do is to open the Facebook. They can spend 15 to 20 minutes and then start.”

Both the video and the teachers stressed that digital technologies and social networks are occupying an increasing social living space, producing on it a not yet measured impact. According to Recuero (229, p.12), “The nature, reasons, probable and possible consequences of these changes, in turn, are extremely complex, and the process speed has been stunning.” In addition, the professor has the tendency to consider the knowledge as something steady and inherent to the university. According to Zabalza, these:

[...] are the two obstacle that modify the incorporation of higher education to a broader context in which neither the knowledge are seen as permanent (because its characteristics and its basic condition are the flexibility and the change), or are seen as a patrimony of the University (reason why some talk about the knowledge society, because knowledge is present in multiple sources and is developed through multiple social processes). (ZABALZA, 2004, p.59)

Because of that, a new vision from teachers on the student and the learning process is required, besides a constant updating and promotion of applied content and methodologies. For Pozo (2002), the new culture of learning and knowledge raised from the information society consolidates the need for change in formal education. Because, in nowadays informal education, it is possible to make choices that allow a permanent training according to the multiple intelligences and personalities of every human being. This need is part of the dialogue between teachers, as transcribed below.

When P2 said, “There is no getting away from it” and P3 reiterated, “What I realize, if you cannot beat them, join them”; it exposed the implied need for change in order to keep up with new learning contexts. Contexts that, in the knowledge and/or information society, necessarily involve social interaction, where facts, behaviors, explicit and implicit theories, social skills, attitudes, social representations, verbal and conceptual learning correlates, going beyond the comprehension of concepts by the apprentice and the use of strategies and techniques from the master. For that, the organization and distribution of quantitative and qualitative practice, collaborative and social organization of mediated learning between the teacher and the learner demand the play of different roles by the teacher. In fact, the author cites the multiple master roles: provider, model, coach, mentor and advisor of learnings in order to clarify the role of master and apprentice within this new culture of learning.

In addition to these professional facets, one might think the masters must professionalize themselves, taking a reflexive posture of their practice, as Perrenoud (2002)

places. Therefore, it is essential to recognize, as stated by Hall (2205), that modern societies are the result of constant, fast and permanent changes, and that formal education cannot be left out of this process. For there is no teaching without learning, according to Freire (1997), but both complement each other as subjects of the learning process, reflecting on the learning object, since no one can think to or for the other. For Demo (2004), the act of thinking is full of instability because it assumes the criticism, self-criticism, self-deconstruction; yet the modesty to learn how to learn despite the dissonant, divergent, conflicting or parallel ideas.

Also in this meeting, professors dialogued upon the profile of the university students' current classroom teaching, at which teachers voiced their concerns and fears.

P3. "I think it is difficult because they have everything that conspires against them to focus in the classroom. They have cellphones [...]."

P1. "They have computers; they have the pub."

P3. "[...] they have the Internet, the friends. It is hard. Previously, what did they have? The college gate, the classroom and the vivarium. They knew they would only walk around these environments. Not today. Today they have the phone that will be beside them all the time. They have the pub in front of the college that has always existed, but now is somehow more present."

These are traces of a new culture that is installed in the school, not only local but also global as all are connected. By reporting conflicts, difficulties and or problems to each other, teachers and researchers end up in one way or another, according to the experiences and individual interpretations, becoming aware of their actions and make a self-analysis of their work, changing the point of view to difficulties.

You have to learn and unlearn, according to Zabalza (2004, p.102) "To learn, that is, to incorporate improvements and to reach higher stages of development, it is necessary to unlearn, eliminate remnants, deconstruct practices, meanings and priorities that are part of the traditions [...]." It is not easy for any professional because demands change and continuous learning to learn.

P2. "The video shows a part which says that technology has come to save us. I do not know if it came to save or if it is saving us. I just know that it is there, it has its advantages. It has many advantages, also some disadvantages. However, some disadvantages and IES need to walk together if they do not [...] because the technology, the bad side, dispersed the student. However, the institution cannot remain stagnant; it must walk side by side, and it must stop the dispersing consequence for the student in order to include students in the education process."

In his speech, P2 put his perception before the available technologies, technologies that change every historical moment and the existing social relations. “Technologies are the product of human action, historically constructed, expressing social relations on which they depend, but are also influenced by them” (OLIVEIRA, 2001, p.101). The technologies interfere in the social organization of each time, and these have markedly influenced the modes of communication between subjects. In a way, the technologies do not facilitate. On the contrary, complicate the pedagogical practices, providing new challenges for teaching and learning processes, which brings the contemporary generational differences out:

P1. “Us, who were not born in this time, we need to flip through and blue-pencil. I picked the book up, and I analyze, I italicize. [...] Technology attempts to reproduce the most real feeling of leafing through a book, to italicize.”

P3. “To write, too, because it has an annotation field, colorful highlighter.”

P4. “I am averse to technology. How could it replace the feeling of flipping through a book? I believe it is not a substitute.”

Prensky (2001) refers to the generation gap, which P1 pointed. The author created the expressions “digital natives” and “digital immigrants.” Digital natives are those people who have grown or are growing up surrounded by technological artifacts. This is the reason why the digital language and worldview are natural and are part of their daily life. They have marked subjective characteristics, such as: “[...] availability for online contacts and via mobile phones, sensitivity and talent; the fluidity of virtual and physical movement; the expectation of free access to information of all kinds; lack of planning; the immediacy and little tolerance for waiting or delaying gratification [...]” (NICOLACI-DA-COSTA, 2009, p.239). The “digital immigrants”, otherwise, are those people similar to traditional immigrants, those who fail to master the native language and cannot fully release themselves from customs and beliefs of their cultures of origin. “They may have welcomed digital innovations, they can master and use several every day, but they will never cease to be influenced by its analog past” (NICOLACI-DA-COSTA, 2009, p.239). Thus, some “digital immigrants” get along with the changes and digital innovations, although they are still under the influence of its analog past; while others have difficulty to appropriate or even have an aversion to certain technological artifacts. Therefore, they are attached to modernity, which values largely absorbed from the “digital natives,” who are postmodernists.

As we are immersed (I include myself with teachers as a researcher and educator) in the knowledge era, we are all co-authors of this historical moment, we suffer pressures and changes suitable for the transition phase of contours of this new society. This is extremely complex and challenging for educators. We are, as a collaborative group, digital immigrants, coming from classical structures, whose paradigms are reviewed and reevaluated all the time.

At this time, the intention was not the idea to update them or force so everyone would have accepted it as only the possibility of using technological artifacts in the practice of the classroom. Otherwise, the intention was to enhance a training that could be able to establish spaces for reflection and participation, so they can “learn” with reflection and analysis of problematic situations. From these needs perceived by the subject as an individual and/or collective, it can exist a change in pedagogical practice that, due to the different tasks of the teacher of higher education in the day-to-day, do not allow dialogue or reflection, the so important exchange to the growth of the pedagogical practice.

Continuing, the researcher asked the group about: “What is to be a student these days in higher education classroom mode?” The collaboration of professors follow below:

P3. “I think it’s difficult because everything conspires against the focus in the classroom. They have the cellphone [...].”

P1. “They have the computer; they have the pub.”

P4. “Inattention increased, they increasingly heedless.”

P1. “There’s something else, those who were born on this technology, they can be here and there.”

All: “It also happens!”

P1. “I’m here doing something, and the other is by my side and is still pays attention to what another is doing.”

The digital native higher education student makes new demands on teachers, not only just the explanation of scientific content. It is required to enable advisory activities and to give support to students. It is also required for teachers to develop learning activities in different training environments. Zabalza (2004) contributes placing the importance of the preparation of teaching materials, the need for greater efforts in planning, design and development of teaching proposals. According to him, “[...] more students, greater heterogeneity, higher vocational orientation studies, new teaching methods with the incorporation of new technologies, etc., university teaching complicated a lot” (ZABALZA, 2004, p.31).

The need for change is the result of social, economic, political and educational context, of a living, dynamic and globalized society. According to Perrenoud (2000), a competent teacher of the higher education is now required. The author understands competence as the ability to mobilize a set of cognitive resources (knowledge, skills, information, etc.) to solve, with relevance and effectiveness, a number of situations related to cultural, professional and social conditions.

According to Gardner (1994), we all possess multiple intelligences to emerge and bloom at different stages of life. These intelligences are languages that all people talk

and are partly influenced by the culture in which each person was born. They are tools of learning, problem solving and creativity that all human beings can use.

According to Tapscoff (2010), young people learn in a different, not sequential, asynchronous, interactive, multitasking and collaborative way. The nowadays youth is a generation that was born and raised in the digital world, and is encouraged to be curious. They are accustomed to multitasking, in other words, watch TV, listen to music, chat and use the cellphone and notebook, all at the same time.

It is necessary to think and rethink the pedagogical dimension of teaching in order to enable the diversity found in classrooms a continuous process of training, with methodologies that corroborate according to the different levels of knowledge of the student in view of the expansion and deepening of discipline according to their own motivation and personal guidance.

Continuing the dialogue among the group, P3 pointed his concern against this multitasking student presented in the video and that is in the classroom:

P3. “It brings me concern because I see the multitasking student as one who does not want to help others, an individualistic. They can even study the new content during the, but they do not help others. [...] I think that the teacher-student relationship is very important. [...] Professors must know their own place in the classroom, logical knowledge, and the teacher of students. [...] The multitasking is great, but what you do with what is not multitasking?”

P2. “So you have to force them to come to you. If you let them always with the multitasking, they will never come to you. Information is on you and not on their colleague.”

P3. “They will only go to you if they feel they can get to you. [...] I try to change my methodology for the students to realize that they can reach me.”

Diversity is an aspect to be considered in the analysis of the contemporary world as it permeates the classroom of teachers at all school levels. A diversity that goes far beyond, students who are multitasking or not, native or digital immigrant. One can also mention the different ethnic groups, gender, creed, sexual orientation, age, socioeconomic status, among many others. According to Gil (2007, p.49), “[...] many teachers probably are not prepared for this diversity, which means they need to review their tables of values and change their attitudes towards social groups.” To recognize that students, as well as teachers, are different and that these differences represent a very important point in favor of the teacher is the first step towards a reflection and possible change of pedagogical practice in the classroom. The relevance that P3 deposited on the teacher-student relationship is extremely important as it provides an interactive relationship between the student and the teacher.

According to Zabala (1998), to establish a suitable environment, consisted of a framework of relations with predominantly acceptance, trust, mutual respect and sincerity, facilitate self-esteem and self-knowledge. “For it will be essential to promote the participation and the relationship between teachers and students and among students themselves to discuss views and ideas about the work to be done [...]” (ZABALA, 1998, p.101).

As Zabalza (2004) states, each student comes with their baggage of knowledge built along the school trajectory and the higher education environment becomes a privileged space for learning. Learning designed as a complex and shared process among different mediation structures, where the students themselves are the most important, since it filters out stimuli, organizes them, processes them, build with them the contents of learning and ultimately acts from the content and assimilated skills. Every relationship built in the classroom runs through interpersonal relationships that will be part of the life of the graduated in the labor market, in personal life or society.

This is the expectation of the labor market itself, waiting for the higher education egress. According to Gil (2007), the market believes that diversity can represent an improvement in quality of work, improvement of brand image, increasing of competitiveness, more personalized service, increasing of resilience to market changes and greater ability to recognize and value talents and employ the ideas of its employees. Increasingly, the teacher is to transit in a heterogeneous environment of students, who have different interests, different motivations, abilities and expectations.

To lead the meeting to an end, the researcher asked participants teachers to express themselves using one word what they had realized after watching the video. In analyzing the results, the researcher found out that three teachers indicated the words *fear* and *loneliness*, which shows the impact of the video on the teaching practice, the teacher-student relationship, and the importance of reflection. Two teachers put the words *technology*, *sadness* and *time*, proposing a reflection on teacher practice and resourcefulness of students in the classroom, as well as the priorities of these. None of the teachers was able to express themselves in only one word, and all contributed by putting the words: *concern*, *alternative*, *anxiety* and *fear of the future*. At the end, one of the teachers left a question for individual reflection: “Is to be allied to technology the best option for teachers?”

In February 2013, the IES started a training involving three periods. The first and second were mediated by a teacher in person in order to show the virtual environment NetAula in the student profile and the other with the interaction in the computer lab, mediating the teacher profile. After the initial interaction, the training continued with the third phase that was developed in NetAula own virtual environment. Environment that has been created and is used for distance and presential learning of the IES. It is important to clarify that the presential learning of this higher education institution uses 20% of the meetings as blended, as required by Ordinance No. 4059 of 10 December 2004, from the Ministry of Education, which authorized the higher education institutions (IES) to

include in the pedagogical and curricular organization of recognized higher education courses, up to 20% of the workload in blended mode.

As the group of teachers had not yet interacted in the third stage of training and the deadline for completion of this step was expiring, the **second meeting of the collaborative group** was proposed to exchange aid and support in order to facilitate the management of teachers with the virtual training environment NetAula and perform this phase. Three of the four teachers participated in this moment. Among the participants of the meeting, one had accessed, but had not accomplished any activity. The other had access, but had not made any access, as one may understand from his speech: P3 “I confess that I just did not do anything for lack of time.” The last participant does not actually had access to the virtual environment.

Since only two of the three participants had access, the researcher asked the teacher without access to sit beside a colleague in order to follow and exchange ideas and later apply for access from those doing the training. As all meetings between the researcher and teachers were videotaped and transcribed, it was possible to watch them and see that the first manifestation among teachers came from P2 while interacting in the training, as said: “It is a lot of material.” P3 and P4 sat together, interacted a lot, exchanging ideas about the access and the available material, and did not comment on the amount available.

The meeting developed activities attending the individual interaction rhythm of participants according to the training. One of the comments made by P3 refers to the use of virtual environments:

P3. “I understand, but I see that we teachers have to awaken the research on the student as well as it is our job to make the use of technology in favor of the teacher and the student. One way to reach it is to use the virtual learning environment with activities that encourage research and interaction among colleagues in favor of the discipline and knowledge.”

The speech of teacher expresses one of the current challenges of university professor appointed by Gil (2007), which is precisely to accompany the changes in the higher education, because it requires a professional with very different characteristics from those that have been recognized as important in the past. According to Perrenoud (2000), today it is required a competent university professor. For “competence” the author understands the power to mobilize a set of cognitive resources such as knowledge, skills, information, among others; to solve with relevance and effectiveness a number of situations related to cultural, professional and social conditions.

Although there were possibilities to interact in the training of AVA, it was necessary for teachers to be the interlocutors to come from them the desire to learn how to use the AVA. Nevertheless, this was not perceived by the researcher, as none of them finished the training later. Not that these did not have the authority appointed by Perrenoud (2000), or the features constituted today for teaching as Gil (2007) puts. Only because these

realized the significance and relevance of using NetAula virtual environment to improve or change their pedagogical practice.

In order to conduct the **third meeting** it was proposed the reading and dialogue of Ana Cristina Ferreira's text on collaborative work. Three teachers represented the group of teachers and all of them agreed to perform the reading, then the dialogue on the relevant aspects and or doubts were emerging out from the participants.

When asked about their opinion on reading the text, the manifestations are the most diverse. P2 expressed its difficulty and lack of affinity with the language to understand the text. Fact that can be attributed to his bachelor training, coupled with the fact that little teaching experience in high school and no experience with the elementary school. During the reading, it was observed that the same researched one stopped reading twice to answer the phone. While other teachers (1 and 3) remained constant in reading, stopping only when finalized. Another important aspect of the ability indicated by these to understand the text is in the formation of these two teachers. P1 has a bachelor's degree, but began graduating a certificate in Teaching in Higher Education, and has teaching experience with primary and secondary education. P3 has degree in Biological Sciences and teaching experience with primary and secondary education.

Continuing, teachers exchanged ideas about what they had understood from the text; although collaboration and cooperation relate to the idea of a group of people mobilized by a goal, the way of working differs. The group of teachers ended up firming in the idea of a group work and failed to notice differences, only seeing the similarities between the two forms of work. Except the leadership factor, they attribute the difference between cooperative and collaborative work in the leader's figure. P2 believes that the focus on dialogue is the teacher's role in the classroom, in cooperative or collaborative work as practice. The other teachers gave their opinion focused on group formation and point to the need for institutional hours for continuing education, understanding that if a one puts a collaborative work into practice there would be no need for specific hours. This, according to preparing and involvement, in addition to sharing the leadership, risks, resources, control and the results of the collaborative work which belongs to the group's responsibility.

The reluctance of teachers to consider collaborative work as a possibility is the result in part from the responsibility and commitment that they develop teaching and other activities with. Moreover, among the four teachers, only two have full-time at IES, other teachers vary the workload according to the course credits students take. It does not guarantee the opening of all subjects every semester, a fact that often leads teachers to seek other parallel works to expand their financial income.

As the purpose of the meeting was to reflect and, if possible, to include collaborative work in the group, the researcher proposed a challenge to the group. "It is possible to include a collaborative group work in the continuing education of teachers?" The result was instantaneous: "P1. Among us?" "Researcher: Yes." "P1. Yes." P2 agrees nodding. "P3. I think it's hard." "P1. There's a way, but I cannot see how it could work with students."

The researcher made a question: What can we do for this group to be collaborative? The biggest concern of the group is the responsibility (P1) and time (P3) in which teachers have to organize and thus perform well and continue their collaborative work. At the same time, concerns and examples given by group members express the thoughts of each teacher. Despite the fact they initially used examples of students later in the dialogue, they put their own limitations before the group work and the fear of having confidence to execute group activities (P1 and P2). This moment becomes important for individuals who are part of the group to put their limitations and fears before the group, enabling everyone to know each other more, beyond the halls of IES or the meetings of the course's collegiality themselves. This would allow teachers to gain confidence in each other and then in the group itself.

As the activities that would be triggered, in the view of the researcher, should have a meaning for all teachers belonging to the group, in order to all of them could feel committed, responsible and to deliberate time for implementation, the researcher made a question. In what do you, teachers of the degree course in Biological Sciences, have an interest to work in this continuing education group? The answers varied, none was part of the suppositions of the researcher. It was extremely important for the reflection of the researcher. Because it showed that a research could not previously assume actions to the group, but it is necessary to talk to the group and get together the real interests and needs of these, although for the researcher it seemed obvious.

P1 presented the collaborative work among teachers from different areas as a challenge, even if they were all from Biological Sciences course. Each researcher has an expertise and develop different content as teachers. Then the researcher put a question: What do you all have in common? Are you all teachers? P1 replied. "We are all." The researcher proposed another question: Do you all find difficulties in teaching and learning in the classroom? At this time, the three present participants agreed: "Yes." Another issue was released to teachers: Do you find difficulties in retaining the attention and participation of students in the classroom? The response was immediate: "P1. Oh yes!" "P2. Exactly." "P1. Participation, research, the challenge for students to get involved with research. Although we are working on it, it seems we demand more than they have. P3. These two points are important: research and participation."

Next, the researcher posed: "What about the planning?" The feedback was immediate: P1. "Planning!?" P3. "Our planning?" The researcher put: "Yes. As teachers, would it be interesting to discuss and exchange ideas?"

Teachers gradually launched possibilities and issued the opinion before the suggestions, rejecting the proposal of reflecting on the planning and, at the same time, suggested a dialogue on the didactical/teaching practice. However, during the planning of the next meeting, the group has listed as a priority the research matter. How to develop the survey of higher education students? Then the researcher made the question: "How could we collaboratively work on this topic at the next meeting?" Everyone contributes pointing ideas. The group agreed that the next meeting would happen in the next six

months and that they would address the subject *research*. Everyone would be looking for and bringing elements to exchange information at the next meeting.

With the presence of all, the **fourth meeting** took place in September, as it was not possible to reconcile the time between the group members during the months of July and August. In the previous meeting, all members were charged to raise elements on how it is possible to work the *research* thematic along scholars in order to socialize among the group members. To start the activities, the video: What if? Question it. Find it out. Change it. Knowledge is irresistible². After watching it, the researcher asked the group to express themselves on the topic. Two reflections of teachers follow:

P3. "It leads me to think: if you bring all done, the question with the answer, it is easier for the students. In fact, that is what they want, for when you ask, they do not know, and you do not know, even because the goal is to instigate the students at that time. They have two points of view: either the teacher does not know or is trying to provoke me. [...] On graduation, you have to show the answer if it seems that you do not know. [...] When you ask in the classroom it and ask them to look for the answer, they do not want to, they want the answer following the question and even the score."

P4. "I try to ask during the class. By the way, I do several questions, questions I already have the answer. In the first days of class, I ask the questions, I like when they participate, when they ask, and I like when they ask one thing I cannot answer, because it is time for me to go beyond, it is time for me to leave my comfort zone. Showing him that he can ask me something I do not know. I do not have to know everything. And if I do not know, great, I'll find out now, I have not had this curiosity [...]."

For Demo (2004, p.72) "[...] what defines the teacher is not a class, but the ability to learn to learn in their professional field, followed by the ability to make the student to learn." In this sense, the crucial point for the teacher is the challenge of ensuring the learning. The teachers are not the center of the process; their figure means guidance and evaluation. So it is not easy being a teacher, it is like walking on uncertainty, because "[...] theories are perishable and disposable buildings, necessary to deal with reality, but unable to translate definitive certainties" (DEMO, 2004, p.98). When P3 and P4 placed on the difficulties and limitations in working with the questions in the classroom, they are facing crystallized paradigms, concepts on the teachers as if they were the one who know, and the students were an empty vessel.

Not that teachers believe in these concepts. The opposite occurs many times, as it was presented by reading the transcriptions above. However, until recently, the teachers' role was to repass information. They were the keeper of the knowledge

² Available in <https://www.youtube.com/watch?v=JTm8Q6xh5Qs> <https://www.youtube.com/watch?v=JTm8Q6xh5Qs>.

to be transmitted. Today, virtually most students have access to information and the teachers' role is precisely to assist to search and update this information for it to become knowledge. To have a collaborative group composed by new teachers allowed and facilitated to explore the ability of innovation and argument they had. It is necessary to know how to deconstruct and reconstruct knowledge by the way of learning to learn, because, as Demo (2004, p.133) tells us, “[...] to be updated becomes a restless horizon of life.”

The teaching learning was evident in the collaborative group. The speech from the P4 teacher exemplifies this:

P4. “I used to listen to the other, even thinking that he had nothing to learn from me, but I had to learn, and learned. I improved a little bit. The group helped me, we got closer together, we know a little more. We can feel more confident, a lot has happened among us, so it got better. I think the collaborative group would go further, now I believe that. I think it would have to add us much more. It was very good for me, I like it.”

As the speech of P4 in the interview evidenced , the constitution of the group, the strategies used for meetings, the lectures, exchanges of experience and information, the joint planning of the next meeting, the experienced difficulties in teaching practice consolidated and strengthened the collaborative group.

FINAL CONSIDERATIONS

Higher education is believed to be a space *in* a changing, because it is driven by social, economic, political context; by globalization and the knowledge society. Indeed, it is a space *of* changing, because this context of transformation of higher education directly affects the life and work of teachers. This is not a transformation or change in which the teachers of higher education would be a passive agent. On the contrary, it is necessary to come from them the desire to change. This process is full of struggles and conflicts, particularly as an individual, and that would be shared with a group of teachers who also teach classes in the undergraduate course. For its turn, the process of change would need to reach the universe of higher education teachers of IES, constituting a faculty committed to the identity and the profession of professors.

The group of teachers from the Biological Sciences course who took part in this research voluntarily proposed to participate because they had the desire to learn and share knowledge with their peers, which created an empathy and commitment among members of the group. The involvement of members of this group helped the researcher to understand how the work of a collaborative, composed of a group of teachers from the area of Sciences of Higher Education of an IES located in Ji-Paraná, Rondônia, developed, in a perspective to the interdisciplinary teacher training.

The methodology of research-action was essential for the reflection *in* and *on* the meetings *for* planning, *in* dialogues between teachers and the researcher. Thus, the course of activities and reflections in the meetings were giving form and meaning to the group of teachers, without, however, compromising the teaching individuality and the rhythm of learning and understanding of each member of the collaborative group. The meetings with the group were intense. This intensity is due to the construction of meanings and externalized subjectivity by each participating teacher.

The collaborative group became a space for which each participant brought their expectations, experiences and epistemological points of view, and which sought to extract answers to their concerns. The teachers must have a space to talk about their practice. It soon became clear that time is an essential element and that perseverance and commitment are essential qualities to achieve individual and collective goals.

At the end of the meetings and after the interviews, one could notice an expansion of knowledge and of the process of reflection on the practice of those involved in the group, including the researcher. Both teachers and the researcher ended up engaging with group's formation and with the processes of knowledge produced in the group. This since continuing education would not only be happening in the meetings, but it was also happening in the lectures that preceded them, in the search for material to be shared, in the exchange of experience started in the group and that was extended to the classroom.

As we different, the diversity of characteristics that makes us up, the process of learning and change did not occur in the same way for everyone. It was observed that the group met different purposes for each of its members and that the differences were associated with the experience, the stage of life, personal and professional history, that is, the individuality of each teacher. All teachers and the researcher broadened their knowledge about the contents studied in the group, and knowledges were assimilated and related in different ways. In other words, each teacher gave an own sense to the experience of participating in the group. However, the feeling of belonging to a group of teachers dismissed the idea of a solitary work that many teachers had experienced.

On the other hand, the continuity of the meetings of the interdisciplinary teachers' collaborative group of Biological Sciences is not guaranteed because it was found that the group was not autonomous in conducting the meetings, requiring constant encouragement and support from the researcher for the organization of them.

Yet the member teachers have shown and reported in an interview the desire to continue with the meetings, as well as expressed how the participation in the group helped in the planning of the classes of subjects in the course of activities, the didactic and pedagogical relationship, the interpersonal relationship of teachers and the teacher-student relationship. As mainly in the reception of teachers who are starting their activities in IES as professors. The exchange of experiences, knowledge, exposure of difficulties and conflicts by the group members favored creating emotional bonds of empathy and confidence in themselves, as uniqueness and as a group.

The formation of interdisciplinary collaborative group fomented questions that were not object of the research but enabled further research: How could it be institutionalized the continuing education through a collaborative group of teachers in higher education? Would it be necessary the presence of an institutionalized leadership for the endurance of the continuing education activities of the interdisciplinary collaborative group? No one has answers yet for these questions.

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