Learning by collaborative projects in context: Contributions for the practice of teaching

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ABSTRACT

The present study was aimed to analyze contributions of teaching practices concerning a project-oriented learning proposal by means of collaborative research. It is composed of interview, reports of educational practices, questionnaire, field diary and observation of participants. Teachers developed new educational actions based in the context reflection and showed transitions from teaching traditional practices to progressivist practices, overcoming disciplinary and transmissive education. Additionally, this study demonstrated that the major contributions to the teaching practice were related to critical reflection over educational practices and the contextualization of curricula, surmounting the fragmented and abstract character of curricula.

Keywords: Project Based Learning. Collaborative Teaching. Educational Practices. Elementary Schools.

Aprendizagem por projetos em contexto colaborativo: Contribuições na prática docente

RESUMO

O estudo investigou contribuições relativas às práticas docentes concernentes a uma proposta de aprendizagem por projetos, a partir da pesquisa colaborativa. Foram utilizados entrevista, relatos de práticas pedagógicas, questionário, diário de campo e observação

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Received for publication on 24 Ago. 2017. Accepted, after revision, on 19 Nov. 2017.

participante. Os professores desenvolveram novas ações pedagógicas pautadas na reflexão do contexto e, demonstraram transições de práticas tradicionais de ensino para práticas progressivistas, superando o ensino disciplinar e transmissivo. O estudo ainda revelou que as principais contribuições para a prática docente foram relacionadas com: a reflexão crítica sobre as práticas pedagógicas e a contextualização dos conteúdos curriculares, superando o caráter fragmentado e abstrato do currículo.

Palavras-chave: Aprendizagem por Projetos. Pesquisa Colaborativa. Práticas Educativas. Ensino Fundamental.

INTRODUCTION

Characterized by the speed of information, new society requires an education oriented by the development of cognitive and cultural skills that are necessary for humans. Aimed at meeting such needs, the Brazilian Ministry of Education and Culture has launched the National Curriculum Guidelines for Basic Education (BRASIL, 2014), a document elaborated from a new curriculum profile, supported by basic skills for the integration of young people into adulthood.

From a context in which teaching is de-contextualized, compartmentalized and based on the accumulation of information, the purpose is to reach curricular organization built according to the peculiarities of the environment and the specific characteristics of local students, without limiting them to a group of subjects.

Designing an educational practice that addresses a broad, critical and reflective perception means building a structure that meets the assumptions of an emerging model, which has knowledge production as fundamental axis, and whose central focus is learning (MORAN; MASETTO; BEHRENS, 2013). Therefore, the expanding of views, in search of articulations and interconnections in learning, has required re-thinking teaching activities that encourage new ways of building in good quality education that favors effective learning for students.

The choice of a project-based teaching offers the possibility of a pluralist learning and allows for the different articulations of each student involved in the process. When creating projects, teachers may opt for teaching through research, using a collective and reflexive critical discussion approach that enables students to experience a diversity of opinions, interchanging methodological activities into enriching and meaningful learning situations (MORAN et al., 2013). This methodological procedure provides access to different ways of learning, and especially learning to learn.

Thus, project-based learning, grounded on the principles of contextualization, interdisciplinary relations, and with skills on learning to learn and learning to create, can be seen as an educational option. Project-based learning practice enables the formation of an active, critical subject capable of developing collaborative projects (MELLO; DALLAN; GRELLET, 2012). The construction and development of a learning project occur collaboratively and cooperatively among the subjects involved in this process (BEHRENS, 2006).

However, overcoming a teaching based on the uncritically transmission of contents requires re-thinking the curriculum weaknesses of the school, which strengthens the view that it is essential to teacher training, both initial and continued, based on a research and survey process has focused on dialogicity, reflexivity and collaboration (IBIAPINA, 2008). Nevertheless, as stressed by Pimenta (2005), only the reflection of the problems is not enough, because the teacher should be able to take concrete positions to solve them. The teaching knowledge is not built just for practice, but it is also nurtured by the theories of education. Therefore, educational theories are fundamental in the formation of teachers as they offer opportunities to individuals of varying points of view of a contextual action, offering analysis of prospects for teachers to understand the historical, social, cultural and organizational contexts.

Among the research methods based on the critical theory of knowledge, there is a collaborative research, the possibility of building new forms of action and knowledge. According to IBIAPINA (2008), the aim is to create in schools an analysis of the culture of practices that are carried out with a view in order to allow their teachers, supported by the researchers, to transform their actions and institutional practices. As fundamental principles, collaborative research in education has cooperation, reflection and formation as the axis of its structure. Taking action requires the involvement of teachers and researchers, posing as challenge, however, research jointly determined educational practice to improve or transform, given the reality studied, and, otherwise, considering the conditions in which the teaching is carried out, implying coproduction activity of knowledge about theory and school practice (IBIAPINA, 2008; MAGALHÃES, 2007).

From these considerations and focusing on the importance of research in schools, engineering analysis and discussion of the (trans) formation of educational practices, as well as the search for new methodologies for a better applicability in the teaching learning process, this research aimed to investigate the contributions in teaching practices of a project proposal by learning from collaborative research in teaching practice.

METHODOLOGY

The methodological option of this research lies in the areas of qualitative approach, characterized as the goals as exploratory, in the case of a collaborative research (GIL, 2010; IBIAPINA, 2008). According to Ibiapina (2008), collaborative research is characterized as a form of action research, and this research approach in the field of education seeks to break with the empirical-analytic models prevailing research. As collaborative research, it involves the creation of a research group, researchers and subjects with a view to transforming existing practices by means of the participation and contribution of each participant (MAGALHÃES, 2010).

This study has been conducted over two academic years, at a school located in southern Brazil, with 13 teachers from the final years of elementary school, who committed to spontaneous participation.

In order to achieve the goal proposed by the study, i.e., investigate the contributions in the teaching practice of a project proposal by learning from collaborative research, different procedures were applied at different times. Therefore, the research was developed in three phases:

First moment

The first moment of the study aimed to characterize the subjects and find out how they presented the approaches of the teaching learning process of teachers. For this purpose, a semi-structured interview was used as data collection.

For the analysis, categories shown on Table 1 were analyzed. The categories were defined from the conceptions of Saviani (2008) and Libâneo (2005). The analysis focuses have been built by the authors of this article, based on the categories of the aforementioned authors:

TABLE 1 – Analysis focuses of the teaching and learning process.

Categories	Focus analysis
Disciplinary content	The emphasis and the way the subject content are developed
Teacher's role	The form of teacher participation
Student's role	The form of student participation
Interdisciplinary and cross-cutting issues	Development of interdisciplinary activities and / or cross-cutting themes

Source: Adapted from Saviani (2008) and Libâneo (2005).

Data analysis was based on categorical analysis in order to break up the transcripts of the interviews into categories, consisting of themes that emerged from the text. The interviews were categorized and quantified according to the frequency of presence or absence of meaningful items (BARDIN, 2011).

Second moment

In order to enhance the self-training and collaborative attitudes to trigger critical reflection processes that could reframe the current practices of teachers, the authors decided to use the project-based learning as an educational strategy found on this collaborative research.

The constituent stages of projects for learning were designed collaboratively among researchers and teachers during the course of the research, taking into account the considerations made in collaborative interventions, and having as major theoretical

contribution, the conceptions of Hernandez and Ventura (1998), Araújo (2003), Moura and Barbosa (2013). It is constituted as follows:

a) Analysis and reflection of the school context. Survey and reflection of aspects of school or social reality that could serve as a subject of study. Step exercises by the teacher (or group of teachers), to have greater possibility and maturity to see the contextual variables;

b) Theme definition. The teacher (or group of teachers), through reflections on the context, would indicate parameters for the definition of the subject by students;

c) Previous conceptions and questioning. Finding the preconceptions of students and questioning of the subject to be studied / researched;

d) Project Development. Planning and development of activities to be performed by students. These should be: taking into account the preconceptions; stimulating students and researchers to develop new skills or concepts, and providing articulated disciplinary content;

e) Project culmination. Process of disclosure of students' productions.

To analyze the process of educational projects, the transcripts of teachers' accounts on the field diary and participant observation were used. In the diary, times observed were recorded, with a description of reports, events and conversations, as well as the reflections and ideas of the research participants. The recordings were made in the form of actual description, i.e., spelled the way they have been heard and seen and just as the participants exposed it. Participant observation was assessed from the record of observations and interpretations of the researcher in a field diary, with regard to those seen in this perspective, focusing on their ideas, reflections and conversations. The collection of data and collaborative interventions occurred fortnightly.

Third moment

In the third phase of the study, we sought to find the perceptions of teachers in relation to project-based learning and contributions to their practice. Because it is a collaborative research, in which researchers and subjects engage in a cooperative and participatory way, a questionnaire was chosen as a data collection instrument to ensure greater freedom and security in the answers, avoiding the influence of researchers. The questionnaire consisted of three questions about the evaluation of the proposal, perceptions about contributions to the educational practice and difficulties encountered. The interpretation of the responses was based on the content analysis proposed by Bardin (2011).

The study was approved by the Ethics Committee under n. 23081.004120 / 2011-90 and all participants signed terms of informed consent, according to Resolution 466/12 of the National Health Council (BRASIL, 2012).

RESULTS AND DISCUSSION

The results will be presented and discussed according to the methodological sequence covered in this study.

Study of subjects and approaches from current teaching and learning process

Through data analysis and subjects in this study, it was found that the teachers group averaged 40.4 years old, with minimum and maximum values respectively of 33 and 51 years, and the age group of 31-40 years old was the most represented, with 54%. All teachers were female and the following educational areas: languages and codes (31%), Human Sciences (23%), Mathematics (23%), Natural sciences (15%) and Supervision (8%). Regarding academic qualifications, 64% had expertise in the area of training or in education and the remaining 36%, were only undergraduates, with an average time of experience in the teaching of 12.8 years, ranging from 7 years to 31 years of teaching. In the weekly working hours, there was a prevalence of 40 hours / week, with 69%, followed by 23% with 60 hours / week and 8% with 20 hours / week.

Prevalence of gender, rates weekly hours and concentration in the age group of 33-40 years are higher when compared to the findings of the Anísio Teixeira National Institute of Educational Studies, which shows that: 71% of teachers from the final years of elementary school in Brazil are female; 70% play a workload of 20 hours / week, followed by 29% with a workload of 40 hours / week; and concentrations in the age groups 33-41 years, with 28% of teachers in the final years of primary education (BRASIL, 2014).

By analyzing the continuing education experiences of teachers prior to the application of this study and their contribution to the educational practice, we found that all teachers held precast courses by the Department of Education and / or educational workdays, in specific times in the school environment. According to reports, in these qualifications teachers were only considered listeners, and could barely discuss in depth the real reasons that interfere in the quality of the teaching and learning process, as evidenced by an extract taken from the interview:

> I did the training offered by the 8th Regional Coordination of Education. But the theory is far from practice, we go there and watch a lot of theory and sometimes a few examples, but in practice it changes little [...]. (TEACHER B)

It has been noticed that the continuing education hitherto held by teachers, were characterized by the gap between theoretical knowledge and teaching practice. There is therefore need for better action strategies for continuing education programs that

may be more effective for teaching practice. As evidenced by Cristino (2007, p.40), "one of the most frequent criticisms of the continuing education programs focuses often on the development of continuing education proposals designed from top to bottom, with the complete exclusion of teachers." The construction of an emerging paradigm in education demands reflective teacher education, to be developed individually and collectively, focusing directly on improving the quality of education. To this end, professional practice should lead the teacher to reflect on the conditions and on their practice in order for such training to elapse throughout the course of the act of educating.

Regarding the approaches to teaching and teacher learning process analyzed under the framework of theoretical categories of the study (Table 1), it was found that there are three different approaches.

The first, with 70% of teachers, found that the focus of the teaching and learning process was the exposure of the subject content by the teacher, in which they played the central role in the process. The students had a more passive role and should assimilate the transmitted content, even with the absence of interdisciplinary activities and cross-cutting issues. As can be seen in the extracts of the speech of teachers:

> [...] The first thing I make it clear in my class, from the beginning, is order and discipline. Because otherwise no one would learn, I need to have the attention of the class. I cannot teach people when they're talking or yelling. I think I'm quite traditional, because that is how students learn [...]. (TEACHER A)
>
> Look, to be honest, I am traditional. [...] If you do not bring a well-planned class, if you do not say what students should do, it is no good to come to class. (TEACHER E)

The second approach found, by 15% of teachers, the focus was also exposure of the contents, but some contents were developed from the knowledge of the students or their reality. The teacher still had the central role of the process, but the students played a more active role when they were asked to participate in the development of activities. As demonstrated by teacher G:

> There is a time of lecture to present the content, but I try to know what they already know. I also work with debate, talk according to the reality of our city. (TEACHER G)

In the third approach, 15% of teachers reported that there was alteration between the description of contents and development of educational projects. In this approach, at times, the central role of the learning process was shared between teacher/student.

The student was more involved in the preparation of activities in times of experience, research and produce. As shown by this interview extract:

> Last year I worked the traditional way of content, but also developed, with the Portuguese teacher, an educational project working content of physical activity and health promotion [...] where students collected data, researched and then presented to the school. I always tried to integrate the discipline of content with the project. (TEACHER H)

The implications of the learning process of teaching approaches revealed that in the researched context, traditional education is still adopted. The traditional approach is characterized by teaching concepts as a transmission / transfer of knowledge by a passive learning[1] and an absolutist and rational knowledge (LIBÂNEO, 2005).

Development of learning programs for projects

By means of collaborative interventions, we tried to bring teachers to deal with the practical problems and the school environment, so feel open to test new hypotheses of educational actions giving answers and solutions to the difficulties, breaking new ground, building and developing supported features the theory and the ideas shared in collaborative work.

Through the testimonies of teachers, practice reports and participant observation, we noted that the development of projects in the second year of application had some peculiarities in the first year. Thus, to better relate the data obtained, we firstly present the course of the projects and, as a result, the differences in the second year.

The process of project-based learning

For the development of the projects, four groups were organized, divided by class. These were defined by the educational coordinator and teachers: Group A, with two classes in 6th year and 3 responsible teachers; Group B, with 2 classes of 7th grade and two responsible teachers; Group C, with 2 groups of 8 years and 4 responsible teachers; Group D, with two classes in 9th grade and 3 responsible teachers; 1 teacher was responsible for coordinating education and joint projects.

To perform the analysis and reflection of the school context, researchers conducted a survey of promotion of indicators of the health of schoolchildren, theme that worked with teachers in the year preceding the survey. This data would support actions that could

[1] Learning in which the student behaves as a mere spectator, waiting for the teacher's coordinates. They only perform the tasks requested by the teacher, being limited to the information provided, and they cannot test new dataset (NETTO, 2013).

be carried out in projects by learning proposals. At this stage, it was observed that the teachers did not know the concepts of the students or had inaccurate understandings, as evidenced by the following extracts: [...] Teachers were very surprised by the fact that most of the students did not answer correctly, i.e., have concepts based on common sense about diet and the food pyramid (the researchers' field diary Extract).

In subsequent steps, guiding theme of the definition of each group and previous / questioning conceptions, it was found that the issue of definition of three projects was list by the teachers and the realization of theme ideas and questioning took place for discussions or conversations about the matter presented by the teacher. Only in one (01) project (Group A) the subject of the definition was given jointly between teacher and students and the ideas and questioning started from questions prepared by the students themselves.

From the development of collaborative projects and interventions developed by researchers and teachers, it was found that many of the problems, doubts and tensions experienced by teachers were common, and therefore the lecturer group realized that the exchange of experiences could be extremely productive to think or build solutions for their own doubts.

At that time, it was noted that some projects have developed more contextualized to the needs of students, extrapolating the conceptual and transmissive dimension that dominated most traditional practices.

However, four teachers failed to implement the projects as planned since they were still rooted in the characteristics of traditional teaching and have difficulty in overcoming the *status quo* established. Developing this way, the subjects of any form or within a teaching unit and restricted the content of the discipline. In this regard, Imbernón (2002) points out that the change in teaching practice is a complex phenomenon and takes time to be (re)constituted, as the author describes "the change in education is very slow and never linear. No one changes from one day to another. One needs to internalize, adapt and try new things that they lived in their training" (p.16). Corroborating, Sacristán (2010) says that the change in teaching practice, understood as changes at the level of ideas and practices are neither linear nor sudden.

Regarding the implementation process of the projects in groups, Group A developed projects for interdisciplinary learning[2] through activities collaboratively built between teachers and students, with active student participation in the planning and development of activities. On the other hand, in Groups B, C and D, the projects were applied multidisciplinary[3], getting the process focusing on teacher performance, i.e., the teacher was the mentor of activities, and the student, although participate in

[2] Mutual integration of two or more disciplines because of a design common to them in order to promote the construction of knowledge (FAZENDA, 2010; MORIN, 2006).
[3] Association of disciplines because of a design common to them but without the concern of interconnecting them with each other (ARAÚJO, 2003; MORIN, 2006).

activities, searching, reflecting and discussing with their peers, had a more passive role in the preparation of activities.

Nevertheless, it is emphasized that in all groups disciplinary knowledge was not discussed in the light of their own, but rather as a necessary context or research problems to be solved. Teachers encouraged students to learn by doing and recognizing the own making in what they produced, through research, thereby propelling the context of scientific and disciplinary concepts.

Thus, one can infer that teachers of Groups B, C and D were in transition between more conservative actions of education (traditional trend[4]) to the project-based learning (progressivist trend[5]). According to Libâneo (2005), although certain antagonism of traditional and progressivist tendencies, they can be mixed in the educational practice, especially in the reconstruction process of educational practice. The temporary hybrid educational trends can envision new perspectives, ideas and understandings of the teaching-learning process, especially when the educational perspectives of epistemology and teachers are grounded in traditional education.

Another factor that marked the development process of the projects was the (re) construction of concepts and behaviors of teachers. On collaborative interventions to the researchers, teachers often listed change issues in their lifestyles, as can be seen in the extract below.

> [...] My husband, my son and I started going to the gym, and my diet is now very different than it was when we started the project. We teachers are learning to change our habits, and we are also changing our concepts [...]. (TEACHER A)

In addition to Teacher A, most teachers also reported requiring a dietician and changing their lifestyle. These findings demonstrated that, in addition to being in the process of transformation in the teaching practice, there were personal behavioral changes of teachers. Thiollent (2011) points out that in action-research, the investigation moves towards the transformation of a reality, leading directly to the participation of the subjects involved in the process for making conscious actions toward perception and behavioral changes. Therefore, when considering contributions in teaching activities for learning grounded in collaborative research projects, actions of behavioral changes heading into training processes would be assumed.

[4] The contents and didactic procedures have nothing to do with the daily life of the student and social realities, characterized by the transmission of knowledge by the teacher, while the student is a passive being who must assimilate the transmitted content (LIBÂNEO, 2005).

[5] The content and teaching procedures are related to the school environment or social reality. The teacher acts as a mediator of the teaching-learning process, while the student is an active subject of the knowledge construction process (LIBÂNEO, 2005).

Regarding the culmination of the projects at the end of the first school year, two forms of sharing of student productions were verified. The first, held jointly by Groups A and B, was constituted by a walk in the community, as reported by the teacher:

> Students planned and held a walk in the community. They made paper signs with mottos about the importance of having a healthy diet and physical activities, and also distributed brochures along the way, door to door, with information relating to physical activities and food. (Teacher H)

The second form of sharing production was carried out by all groups in the First Educational School Show, where they exposed to the school community productions of the students and other works developed during the school year. It was noticed that project-based learning was one of the developers of Educational Exhibition, and the major productions of the students consisted of making food pyramids, posters related to health promotion conditions, information distribution and search result performed in the school community by students.

Both forms of sharing student production show one of the basic assumptions of projects for learning, the authorship of the student. From this, the student learns how to learn, to research and think critically, and to work collaboratively. Students, in turn, become an active builder of his knowledge (ARAÚJO, 2003; HERNANDEZ and VENTURA, 1998).

But when compared to forms of culmination of the projects, it is clear that, in Group A and B, the socialization of the results of the projects went beyond the school environment, involving several co-authors in the knowledge production process, while in Groups C and D, socialization of the results was limited to the school environment. In this respect, Prado (2005, p.4) states that "[...] hence the importance of developing articulated projects involving co-authoring the various players in the educational process." The fact that a learning project is articulated with the community becomes critical to the rebuilding process of a new educational approach because, as the author points out, "[...] The partnership established between the protagonists (students and teachers) with the school community can facilitate the search for solutions that make it feasible to carry out new teaching practices, with a view to learning for life" (PRADO, 2005, p.4).

Peculiarities found in the second year of project-based learning

Whereas action research is a spiraling process that involves planning, decision making, action and reflection on the results of action (THIOLLENT, 2011) and as a way to exceed the difficulties encountered in the previous year, the work groups were reconstituted during the development of learning projects as: Group A, with three classes (two of the 6th and 7th grade) and four teachers; Group B, with two classes (the 8th

grade) and two teachers; Group C with two classes (9th grade) and five teachers; and two teachers responsible for teaching coordination and joint projects.

Unlike the first year, the analysis and reflection of the school context set out the perceptions and reflections of teachers and served as the basis to list the themes of projects, as shown in the following extract:

> I realized that the students of 9th grade did not drink coffee and often brought junk food or bought it in the school bar. They also did not know that inadequate nutrition in the morning could harm their health, they have misconceptions about it. So we collectively decided that this would be the design theme [...]. (TEACHER L)

This reveals, by means of the teachers, knowledge and/or concerns about the context and concepts of students. Ilha and Soares (2015) point out that the issue of definition of learning projects should arise from reflections made about the context of the students and the school itself; they must indicate broad parameters to define the theme of the projects. "Generating thus a problematic situation in which coping with knowledge and information requires the organization of learning activities" (ILHA; SOARES, 2015, p.65).

Another point that stands out in the second year of implementation of the projects was the reduction of teachers who failed to develop the projects previously planned. Out of the four teachers who did not implement the projects in the first year, only two (belonging to Group A and B) did not perform all the steps proposed and only developed the theme partially and *ad hoc* in their classrooms. In this regard, Pena (1999) points out that the change in teaching practices should not be seen as a transformation of teachers, in what it concerns assuming the abandonment of all their past practices and the radical change in their way of working. Therefore, it is important to point out that a proposed project-based learning, based on collaborative research, can lead to different practices resulting from various factors, including the interest of the teachers, their work style and the way they behave to this proposal. In this sense, "beyond the theoretical dimension necessary for change, personal dimension greatly influences in the change process" (LUSSICH, 2010, p.175).

As a result, Group B developed activities in a single discipline in collaboration between teacher and students, with jointly defined objectives arising from a collective questioning and giving rise to the research process and construction knowledge on the subject. This process meets the educational projects proposed by Moura and Barbosa (2013), who, when reporting the learning projects, state that these can be applied in a single discipline: "[...] these are projects developed by students in one or more school subject or curriculum content in the school context, under the teacher's guidance, and aimed at the learning of concepts and development of skills and abilities" (p.26).

In turn, Group C went from a multidisciplinary approach to interdisciplinary activities, consisting of the reciprocal integration of disciplines by means of collective

planning shared with students; integration and contextualization of the subject content; research activities on the project theme and the production of knowledge of the student (author). Thus, as noted by Fazenda (2010), it is verified that it is possible to overcome the obstacles of an interdisciplinary practice through project-based learning, when you discover new ways to act collaboratively, enabling the collective construction of practical and theoretical ways.

There was also other expanding actions of projects such environmental education-themed shirts, walks in the school community, development of recreation moments directed by the students to the school of the early grades, construction of models of food pyramids, design of menus, and preparation of healthy breakfast, besides presentations made at the Second Educational School Show.

Generally, two factors mark the development process of project-based learning in the second year of implementation. The first is related to changes in teaching practices of most teachers participating in the research who, in many instances, are no longer transmitters of knowledge, based on the description of contents, to become mediators of the learning process, thereby stimulating the active student learning, helping them to seek a critical perspective of the contents, thus relating with their social contexts. The second factor was the change of disciplinary practices[6] for interdisciplinary practices, overcoming an individualistic teaching/specialist to, as proposed by Fazenda (2010), an education that considers the process of investigation of various school subjects in a process of interaction, thus eliminating the barriers between disciplines and people so that teachers seek alternatives to know each other better, exchange knowledge and experiences with each other, involve and commit themselves on common projects.

It is noteworthy that in spite of learning proposal of applying for projects point to a more reflective teacher with a educational approach that reflects a conception of knowledge as a collective production, learning projects have been developed in conjunction with a conventional curriculum in this case the projects were superimposed on the conventional curriculum. As evidenced by Domingues (2006)

> At no time teaching and project-based learning breaks radically with this paradigm [...] that focuses on knowledge built without reflection, however, it causes teachers to reflect on their practices, leaving those that are mechanized and proposes an organization the everyday work which involves the student as this learning. (p.30)

Corroborating, Araújo (2014) points out that the challenges of an implementation project-based learning in the school context, it is required to be aware of "tradition and conservation, because such features are an essential part of the social mission of education

[6] Practices based on the fragmentation of school knowledge, separated into several relatively closed contents, which are unrelated and disjoint to the real context. (GERHARD; ROCHA FILHO, 2012).

preserving, transmitting and enriching the heritage culture and science of humanity" (p.87). Thus, the development of learning projects cannot be conceived in a dichotomous way, counterpoint, tradition and innovation. "The new does not lie on the empty, but on the millennial experience of humanity" (ARAÚJO, 2014, p.87).

Contributions in teaching practice

At the end of the application of project-based learning, it sought to verify the perceptions and contributions in the teaching practice of the participating teachers.

It was found that all the teachers positively evaluated the development of the projects and, through the categorization and classification by similarity of the responses of teachers, five major points were characterized, as listed in Table 2.

TABLE 2 – Major points listed in the assessment of learning proposal.

Categories	Percentage of teachers *
Critical reflection on teaching practices	61%
Collaboration between researchers and teachers	46%
Interdisciplinarity	31%
Intrinsic motivation	15%
Extrinsic motivation	15%

* Some answers were classified into more than one category.

Source: Research data.

It is observed that most teachers (61%) pointed out the critical reflection on their teaching practices as a major positive factors worked during the development of project proposals for learning, as seen in the extract taken from the questionnaire:

> The project development was extremely positive, because we do not have this practice of thinking in the classroom. Why do I teach this way? Why do I work this content? So, in a way, I had to think about my practice. [...] I was thinking about my practice, reflecting on what I could do differently on what went right and what went wrong [...]. (TEACHER E)

The collaboration between researchers and teachers was also highlighted by 46% of teachers, "[...] researchers have shown concern, good preparation and organization, always interacting, supporting and contributing with information that enriched our practices" (TEACHER N). To a lesser extent, it was mentioned the intrinsic and extrinsic motivation, with 15% of teachers. The intrinsic motivations were related to the teacher's own factors (interests), "[...] the proposals were of great value. I enjoyed participating and I was motivated to do projects with students [...]" (TEACHER I). Extrinsic motivations

were correlated to student learning, teachers found themselves motivated by the progress made by students, "[...] emerged effect on the students' own experience, I noticed that a lot was going on during that period. The students were improving their quality of life and learning the content, and it motivates a lot […]" (TEACHER F).

These results reveal one of the characteristics of collaborative research, "collaborative research happens in the movement that understands teachers as subjects who can build knowledge about teaching in critical reflection on their activity" (PIMENTA, 2005, p.523). It also demonstrates that teachers were constituted as reflective teachers, which, according to Schön (2000), is based on the epistemology of practice to propose an increase of a reflective practice in their training, thus being able to respond to new and unexpected situations.

Regarding perceptions of contributions to the educational practice, it was found that, out of the 11 teachers who had class regency, 9 (82%) reported that teachers assisted the development of the proposal and also motivated to change their teaching practices; and 2 (18%) reported having not modified their classes due to the implementation of projects.

Teachers who did not make contributions to their practice used the following arguments: "I modified my classes because student indiscipline makes me unmotivated, it is tiring, but there are some stakeholders who even could perform a different job" (TEACHER D); "I was already using learning projects in my classes and working with colleagues, but I confess that I used interdisciplinary elements [...]" (TEACHER L).

In order to understand the actions of these teachers, analysis of data was made from three stages of the research, in which Teacher D had a more traditional view of education and this was unchanged throughout the learning process of the proposed application by projects, as well as Teacher L, who used a mix of teaching approaches.

In relation to teachers who have made contributions to their teaching practices, three major categories were verified, as shown in Table 3.

TABLE 3 – Key contributions to the educational practice.

Categories	Percentage of teachers *
Contextualization of curricula	89%
Change in the teaching and learning process	33%
Integrating theory and practice	11%

* Some answers were classified into more than one category.

Source: Research data.

It appears that the majority of teachers (89%) perceived contributions in their teaching practice through the contextualization of curriculum content. They realized that

the connection of school subjects with the student's everyday situations brought new meaning to the curriculum content, as stated by Teacher C: "in these very busy days, I did not realize I could work contents which were closer to the reality of our students. [...] The major contribution was being able to contextualize my subject content with the student's reality."

The change in approach in the teaching-learning process was reported by 33% of teachers, as reported by Teacher H: "[...] I had to change my classes, plan with other colleagues, deploy and make it happen. Perhaps if I had not done the projects, I would not have realized that I could work differently, using other methodologies. In turn, 11% of teachers indicated the integration of theory and practice as a major contribution of the implementation of projects by learning proposal, "[...] by applying the projects I could reconcile theory and practice, that is, make the connection between theory and my teaching practices "(TEACHER B).

The main contributions noted by the teachers and the very changes in their teaching practices meet the guidelines of the National Guidelines for Basic Education (BRASIL, 2013), which stressed the need to consider the relevance of the selected content to the lives of students as well as the relevance of which is addressed in the face of the diversity of students, thereby seeking contextualization of the content and its flexible treatment.

> [...] There is a need to overcome the fragmentary nature of the areas, seeking integration in the curriculum that allows to make the most significant covered knowledge to learners and to encourage the active participation of students with skills, life experiences and different interests. (BRASIL, 2013, p.118)

Concerning the difficulties encountered in the project implementation process, four categories that emerged from the responses of teachers are consolidated in Table 4.

TABLE 4 – Major problems in implementing projects.

Categories	Percentage of teachers
Lack of time for planning	46%
Student behavior	23%
Interdisciplinary work	15%
Lack of teaching resources	8%
No difficulty presented	31%

* Some answers were classified into more than one category.

Source: Research data.

It was noticed that 46% of teachers related to lack of time for planning as the major obstacle to the development and implementation of projects. It was also observed that this

difficulty was related to the weekly workload of teachers and the lack of space and time at school to reflect, evaluate and plan projects. Another observation, mentioned by 23% of teachers was the behavior of the students, ranked second, usually accompanied by the indication of lack of time, as described by Teacher D "[...] and the lack of time available, the lack of interest by some students also hindered the development of projects."

On these obstacles, Gimenez, Maria and Caldeira (2007) point out that the lack of time and other impediments was one of the most often cited difficulties for the implementation of changes in teaching practices, since the reflective approach takes time. Added to this, the structure of the education system still maintains a functional and operational organization, such as 50-minute class times and sequential curriculum, which, according to Prado (2005, p.4), "hinders the development of projects involving interdisciplinary actions." That is probably why the transformation in teaching practices or the implementation of new teaching methodologies is seen with difficulty by teachers.

FINAL REMARKS

From the analysis and discussion of the results of this study, we can infer that, in the context studied, the traditional teaching approach was prevalent, and continuing education was characterized by specific courses and fairly related to teaching practices.

When developing projects by learning from collaborative research, teachers have dealt with problems of practice and school context, thus experiencing new educational actions based on context and reflection on their teaching practices.

In implementing projects in the first year, teachers showed a transition from traditional teaching to teaching geared to project-based learning, exceeding the linearity of the syllabus, the disciplinary teaching and transmission of knowledge for multidisciplinary education, content-oriented themes emerging context and related to problem solving, in addition to rebuilding concepts on the learning process and modify personal behaviors grounded in developed themes.

In the second year of implementation of projects, teachers solidified mediation actions of the teaching-learning process, therefore encouraging active student learning, seeking a critical perspective of the contents by means of research questions and contextualization of the contents, demonstrating a transition from disciplinary and multidisciplinary teaching for interdisciplinary teaching.

Regarding contributions to the teaching practice, the development of project-based learning with a view to collaborative research brought subsidies for: a critical reflection on teaching practices through reflection on the action, and contextualization of curriculum content, overcoming the fragmented and abstract character of the curriculum.

The major challenge to the development of a practical project-based learning and consequently the implementation of changes in teaching practices was lack of time for planning due to the high workload of weekly work of teachers and, added to this,

the functional structure of education system, which still retains a more bureaucratic organization of teaching.

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