Weaving Teaching Situations in Environmental Education Seeking Sustainability in the Cerrado

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ABSTRACT

The didactic situations elaborated with teaching and learning strategies that are significant can contemplate the construction of skills and competencies present in the National Curricular Common Base (BNCC). This article aims to present a part of the Didactic Situations focused on Environmental Education for Sustainability in the Cerrado, developed in a public school in Goiás. The methodological procedures used are part of qualitative and descriptive research. Data collection involved 160 students and 10 elementary school teachers. The data collection instruments used were periodic meetings for study, application of semi structured questionnaires and analysis of five didactic situations elaborated and developed by the group of teachers. In the evaluation of the project, the participating students cited as educational activities: planting of seedlings 39%, collecting garbage 25%, lecture 13%, recycling 10%, project environment 7% and 6% respect the next. In this sense, the objectives of this study were achieved. It was possible to perceive that the Didactic Situations worked playfully, using different teaching strategies, contributed positively to the construction of students' knowledge as well as their ways of exposing and socialising the contents of Environmental Education explored in the Cerrado.

Keywords: Teaching Learning Process. Educational Situations in the Cerrado. Environmental study. Environmental Education for Sustainability.

Tecendo Situações Didáticas em Educação Ambiental: Buscando a Sustentabilidade no Cerrado

RESUMO

As Situações Didáticas elaboradas com estratégias de ensino e aprendizagem que sejam significativas podem contemplar a construção de habilidades e competências presentes na Base Nacional Comum Curricular (BNCC). Este artigo tem como objetivo apresentar uma parte das

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Situações Didáticas voltadas à Educação Ambiental para Sustentabilidade no Cerrado, desenvolvidas em uma escola pública em Goiás. Os procedimentos metodológicos utilizados se inserem em uma pesquisa qualitativa e descritiva com enfoque de estudo de caso. A coleta de dados envolveu 160 alunos e 10 professores do Ensino Fundamental. Os instrumentos de coleta de dados utilizados foram observações nas reuniões docentes periódicas para estudo, aplicação de questionários semiestruturados e análise de cinco Situações Didáticas elaboradas e desenvolvidas pelo grupo de professores. Na avaliação do projeto os alunos participantes citaram como atividades educativas: plantio de mudas (39%), recolher o lixo (25%), palestra (13%), reciclagem (10%), projeto meio ambiente (7%) e respeitar o próximo (6%). Nesse sentido, os objetivos deste estudo foram alcançados pois foi possível perceber que as Situações Didáticas trabalhadas de forma lúdica, utilizando diferentes estratégias de ensino, contribuíram positivamente para a construção de conhecimentos dos alunos, como também, em suas formas de expor e socializar os conteúdos de Educação Ambiental explorados no Cerrado.

Palavras-chave: Processo de Ensino Aprendizagem. Situações Didáticas no Cerrado. Estudo do Ambiente. Educação Ambiental para a Sustentabilidade.

INTRODUCTION

Since the 1990s, Brazil has sought to implement guidelines and public policies to promote Environmental Education in both Elementary and High Schools (UNESCO, 2005). However, these data do not express the actual insertion condition, modalities and practices of Environmental Education in the schools of these levels of education.

When observing the modalities of Environmental Education in loco, it is verified that there is a structural difficulty of the school regarding the flexibility of the curricular disciplinary organisation, searching for integration paths that may include Environmental Education in different disciplines (UNESCO, 2005).

There is a contradiction in the management of Environmental Education regarding the general and participatory principles proclaimed in the legal documents. Both in the promotion of activities and in the involvement of actors involved in the process of knowledge and understanding of the environment, where the schools demonstrate a contradictory process and distance from the community.

Among the reasons that contribute to an ineffective application of the Federal Environmental Law, Law No. 9.795/99 (Brazil, 1999) in schools is the fact that community participation is insufficient in Environmental Education projects. In this sense, Bourscheid (2015) states that more investment is still necessary to reach the desired level, within the parameters required by law. The researcher also presents a reflection on the need to seek more significant support in teacher education, since she believes that environmental education contributes to the formation of active subjects that can interact, engage in culture and capable of making a difference as citizens.

It is observed that Environmental Education is a necessary tool for the formation of citizens (Medeiros et al., 2011). According to UNESCO (2005, p.46), "it is a well-established discipline that emphasises the relationship of men to the natural environment, ways of conserving it, preserving it and managing its resources properly".

Medeiros et al. (2011) state that the school environment is essential in this context, and should provide practical situations contextualised to the local reality. Thus, educators should encourage the learner to acquire knowledge about environmental issues using strategies that encourage students to have a new vision about the Environment and consequently can act as transforming agents in their community.

Reflecting on the need for transformation in the School Environmental Education, the question was asked for the group of teachers: how the Didactic Situations (SD) developed in the school can contribute to raise consciousness and make students aware of the need of an Environmental Education aiming Sustainability in Cerrado?

DIDACTIC SITUATIONS AND TEACHING STRATEGIES LEARNING

The Theory of Didactic Situations was initially proposed by the French Guy Brousseau (200/8) and in this study it is understood that a didactic situation is a set of relations established explicitly and implicitly between a student or a group of students, in a specific medium, possibly comprising instruments and objects, and an educational system (the teacher) with the purpose of enabling these students a knowledge constituted or in the process of being constituted [...].The student's work should, at least in part, reproduce characteristics of the scientific work itself, as a guarantee of an effective construction of knowledge (Brousseau, 2008, p.8).

In this theory, Passos and Teixeira (2011, p.157) argue, "teachers and students are indispensable actors in the relationship of teaching and learning, as well as the environment in which the Didactic Situation is present".

It is stated that creating a Didactic Situation is to plan situations and circumstances in which the student actually builds his knowledge. The purpose, therefore, is to enable the student to construct their knowledge through the articulation of several educational theories, such as the notion of objective-obstacle to be unveiled.

For Zabala (1998), the didactic situations can be characterised as, "a set of ordered, structured and articulated activities for the achievement of certain educational objectives that have a beginning and an end known to both the teacher and the students" (Zabala, 1998, 18).

It is intended to work on a project involving Didactic Situations, which for Hernandéz (1998), in the practice of working with projects, students acquire the ability to solve problems, articulate acquired knowledge, act with autonomy in the face of different situations that are proposed, develop creativity and learn the value of collaboration.

The Educational Situations with differentiated teaching strategies and above all from Environmental Education represent what Oliveira (2004) considers a different way of reinventing the pedagogic practice, through the daily creation of an emancipatory curricular alternative, the result of which meets the idea (and in) citizenship where

we can better understand that each of us forms as a network of subjects, and thus the fragmentation of both the knowledge and the dimensions of life, both do not make sense and impairs the formation .

In a well-planned Didactic Situation, there is a possibility of working several activities, among which, the concepts, principles, history and importance of Environmental Education for the future Sustainability of the Planet.

Throughout the life of citizens and, according to researchers, education, while form of teaching-learning can be divided into three different forms: formal school education developed in schools; informal education, transmitted by family, friends, social spaces and others, that is, that comes from natural and spontaneous processes; and non-formal education, which occurs when there is the intention of individual subjects to establish and achieve goals outside the school institution. Thus, non-formal education is the one that provides the learning of the contents of the standard curriculum (formal education) in spaces where the activities are developed in a well-directed way, with defined objectives (Vieira et al., 2005).

By dividing education into different forms, the goal is not to give credit to one or the other, not even to put them in opposition, but to know the potentialities of each and to correlate them so that they can interfere, together, in the intellectual, conscious formation and criticism of the human being (Coelho, 2014).

Aiming at changing behaviour about social and environmental problems, Queiroz (2011) emphasises that the relationship between non-formal spaces and the school must be alliance since non-formal space does not in itself lead a student to scientific education. This alliance ensures greater agility in the educational process and makes the student fix the learning, stimulating critical thinking about their reality, and influencing it (Coelho, 2014).

Not always, the teacher is able to carry out a significant activity in these spaces; this can be one of the reasons for unsatisfactory results in practice (Queiroz, 2011). Jacobucci (2008) emphasizes the importance of investments in the training of teachers attending these educational spaces, so that they can articulate and interweave scientific culture, popular knowledge and knowledge itself, with a view to creating new knowledge and disseminating it in a conscious way and citizens, and in the same way as the people who manage, cooperate and make these non-formal spaces, because it passes through them the decision about what and how to focus on a scientific subject and what formative actions may be triggered from the subject in Schedule.

Thus, the student will be able to visualise the concepts studied in the classroom, through interactive and concrete educational activities, leading him to a participative posture within real situations in his community (Queiroz, 2011).

Law no. 9795, dated April 27, 1999, provides for the National Environmental Education Policy – PNEA, and legitimizes non-formal education in the environmental field, since it defines in its article 13 non-formal environmental education as: "actions and practices educational initiatives aimed at raising the awareness of the community about

environmental issues and their organization and participation in defence of the quality of the environment" (Coelho, 2014, p.10).

It is important to emphasise that interdisciplinary teaching in the environmental field should focus on the study of the relationships between natural and social processes, depending on the ability of the sciences to articulate, offering an integrative vision of reality (Leff, 2001).

From this perspective, Interdisciplinarity translates as a collective work that involves content, disciplines and the school organisation itself (Loureiro, 2004).

The central theme of the research is the teaching practice aimed at Environmental Education for Sustainability, which develops specifically the Didactic Situations, and in this article, are presented 05 (five) educational situations, with different teaching strategies used by teachers , who teach different disciplines present in the pedagogical project of the school and how the students perceived such strategies.

METHODOLOGICAL PROCEDURES

Given the different aspects present in the study, it was decided to develop research of a predominantly qualitative nature, using the Case Study form, based on an analytical-descriptive approach that included the theoretical conceptions that enabled the articulation of theory with empirical reality (Minayo, 1994).

According to Demo (2000), qualitative research wishes to live up to the complexity of reality. This approach requires that researchers develop empathy for the people in the study and make concentrated efforts to understand their various points of view (Bogdan, & Biklen, 1994).

The study was submitted to and approved by the Ethics Committee of the University under Opinion No. 2,084,957. Moreover, for this article were selected and presented five didactic situations, which are part of a larger school project, developed during the school year (2017), by teachers of different disciplines and their students.

A total of 160 (one hundred and sixty students) of elementary school, from the 6th to the 9th years, participated in the morning and afternoon shift, with 10 (ten) teachers who teach classes in the classes involved in didactic situations. The confidentiality and anonymity of the answers were guaranteed to the students and teachers participating in the study.

The following are the different procedures used in this study.

Firstly, the research was presented to the school manager, at which time the researcher discriminated the objectives of the school so that the participation of the school community was authorised.

A group (manager, teachers and researcher) was created, which, in regular meetings, carried out the study of the documents governing the School Unit, Political Educational

Project (PPP, in Portuguese), School Development Plan (PDE) and School Rules for the years 2016 and 2017.

During the research development process, the group's meetings had as objectives to promote the study, to stimulate discussions and to provide moments of collective reflection, involving the theoretical referential to base the educational activities. The planned didactic situations were socialised in the group and later implemented in different educational spaces (Classroom, Cerrado Museum, Stream Spring, Water Treatment Station), with the participation of teachers and their classes.

CONTEXT OF THE STUDY

The municipality of Inaciolândia is located in the Southwest of Goiás, in the Center-West region, a micro-region of Meio Ponte, with an area of 680 km², being the seat of the municipality at 442m high, with a privileged location, of Bois, according to the population census the population of the municipality is 6,128 inhabitants, distributed in urban and rural areas (IBGE, 2016).

The research was carried out in a State College created on 07/28/1989. The State College occupies an area of 7,760.00m2, being 6,260.00m2 of free area and 1,489.32m2 of constructed area. It is located in the neighbourhood Perilo Rodrigues de Moura in Inaciolândia-GO.

According to the 2017 Educational Policy Project (PPP, in Portuguese), the teaching objective in this School Unit is to improve the quality of the teaching-learning process in a harmonic way; modernize participatory and democratic management, provide the educator with training for the development of their potential, as an element of self-realization, prepare or qualify for work, as well as prepare him for the exercise of citizenship.

The main agricultural products in the region are cotton, rice, corn, soybeans, sorghum, beans and sugarcane. It is also worth noting the cattle raising with the dairy cattle and of cut, swine, goats and horses.

In the municipality of Inaciolândia-GO, the predominant vegetation is the Cerrado, with shrubs, vegetation of grasses and trees with twisted trunks, broad and thick leaves. The characteristic climate is tropical; the main types of plants are piquizeiro, jatobá, mangava, bacuri, buriti and aroeira. The fauna is much diversified with prominence of Tamanduás-bandeira, Capivaras, Armadillos, Deers, and Alligators among others.

It should be noted that the vegetation of the Cerrado in the region has been suffering considerable damage, since the interference of man is affecting the geographical landscape, especially in the areas of agriculture and livestock, which is the strong point of income in the municipality.

ANALYSIS AND DISCUSSION OF SELECTED DIDACTIC SITUATIONS

There were selected 05 (five) Didactic Situations developed in the different disciplines during the study, which are presented below, where the subject is mentioned, the proposed objectives, the analysis and the discussion of them.

Didactic Situation I

Theme: Expressing the environment in English

Learning Strategies: Research, Concept Review and Poster Making

This didactic situation was worked on in the English course with students from the 9th (ninth grade) of the morning and afternoon shifts, and integrated into the study, with the following objectives and strategies: identify expressions in English, related to the environment; research the environmental problems of the region and present them in English; search words in the Portuguese / English dictionary; revise the concept of cartoons and encourage artistic and visual production in the production of posters.

The professor introduced the theme by introducing the students to several words in English, related to the Environment, having examples such as: tree, animals, rivers, forests, Environment, ecology, sustainability, preservation, global warming, greenhouse effect, water, vegetation, nature, land, reforestation, natural, life plants, recycling, deforestation, garbage and education, among others. From the instruction, the students used the dictionaries to search the words and form the sentences with the teacher's help. It was observed that encouraging students to learn in practice provides moments to develop some skills expected for the 21st century: collective work, new relationships with one another, with the other and with the environment, shifting looks to a new way of thinking (Setúbal, 2015).

Environmental issues presented in the form of local problems such as garbage, waste discards, deforestation, pooled water and burnings were also explored. Carvalho (2001, p.184) states that "speaking, listening and seeking an explanation about phenomena, then writing and drawing, that is, expressing itself in several languages, solidifies and systematises the concepts learned". For this Didactic Situation, two classes were used in the accomplishment of educational activities.

Didactic Situation II

Theme: Themes that Affect the Environment

Learning Strategy: Production of Comic Books

The Didactic Situation was developed in the subjects of English and Portuguese Language with students of the 9th (ninth grade), of the morning and afternoon shifts.

Students were encouraged to recognise the importance of the Comic-Con (HQ) genre to society; produce comic books with themes that affect the environment in society, and share these comic books with colleagues.

Figure 1. Comic book in English about the environment.

The activity began with a class where the teachers talked with the students about Comics. The inquiries were made with the intention of retrieving the students' previous knowledge, such as: What do you understand by Comics? Which characters do you most like in Comics? Do you remember any stories you read? How was the story? Moreover, yet Ribeiro and Frucchi (2007) say that the different languages proposed by scientific dissemination (such as comic books, chronicles and theatrical productions) stimulate

curiosity since they deal with themes that are sometimes little known by the communities. In the students' curiosity, the search for the construction of knowledge and the socialisation of their researches was stimulated to the great group in the two classes in each discipline used for the accomplishment of the educational work.

Didactic Situation III

Theme: Most Consumed Food in the Region

Learning Strategies: Eating Habits Survey and Poster Making

This activity was developed with students from the 8th (eighth year) of the morning and afternoon shifts in the subjects of Science and Portuguese Language.

The objectives were to recognize the importance of food for the functioning of our body; know the different processes of energy production; discrimination of types of food necessary for life; recognize characteristics of each food group: fats, carbohydrates, proteins, vitamins and minerals and identify the foods most consumed in our region and where they are cultivated.

Figure 2. Posters about food consumed by students.

The learning strategy started with an informal conversation with students about the importance of proper nutrition for health maintenance. Students were instructed to search the internet about their eating habits, their families and acquaintances. They were also

challenged to research the most consumed vegetables in the region, about the dangers caused by poor diet, overweight, high blood pressure, diabetes, depression, bullying and low self-esteem among others. In this didactic situation, it observes its pedagogy that takes advantage of learning; which embraces differences and misunderstandings in communication as potentializes of the contradictions that provoke development (Luzzi, 2012).

Within this vision, in Science and Portuguese Language, students developed and presented posters about healthy eating (Figure 2). They performed theatre about anorexia and bulimia, presenting the piece for the classes.

The students researched recipes from different places in Brazil, their ingredients and way of doing; they also researched the typical dishes of the region and brought the favourite recipes of their family to the School. Reading, analysis and comparison of the revenues brought in were carried out. It was elaborated a list of the recipes that the students brought, identifying its origin, of which Brazilian region they originated.

Some recipes were interpreted as having ingredients unknown to most students, thus increasing their knowledge of typical Brazilian foods.

Still in this Didactic Situation, the interdisciplinarity was worked using problems with mass measures, dozen, text productions; the origin of the families was researched relating them to the recipes. Later a recipe book was organised, where each student registered its revenue. With the development of the strategies, it was verified that culture operates the integration of the different components of life activities favouring the freedom, responsibility and rights of each of the citizens (Setúbal, 2015).

Carbonell (2002) states that "diverse, stimulating physical, symbolic, mental, and affective spaces are necessary [...] classes outside the classroom, in other spaces of the school, the countryside and the city. Because the forest, the museum, the river, the lake [...], well used, become excellent learning scenarios" (Carbonell, 2002, p.88).

The activities evolving the didactic situation were worked during three classes. At the end of the Didactic Situation, the volume was delivered to the school library.

After the research, the students made posters that were socialised in the classroom and later exhibited by the school.

Didactic Situation IV

Theme: Water for Consumption

Learning Strategy: Shared Reading

The activity was developed with students of the 6th (sixth year) in the discipline of Sciences, of the morning and afternoon shifts.

The discipline of Sciences has as objectives: to realize that the water proper for consumption must be obtained inappropriate treatment plants for this purpose; identify the stages of the water treatment and the types of separation of the mixture employed; understand that water treatment involves physical and chemical processes; understand the environmental importance of water treatment and conscious consumption of drinking water; know the water treatment plant of our municipality; carry out field trips for learning purposes and prevent environmental problems related to water resources used at home, school and in the municipality. Although popular participation is commendable, it is essential to emphasise to the student that the success and sustainability of experiences related to waste and water treatments depend on local policies and cooperatives (Setúbal, 2015).

In the developed activities, one can affirm that "it is in this context that the critical theory of teaching, meaningful learning, metacognition and ecological approaches on the functioning of the classroom" (Luzzi, 2012, p.114) is outlined.

Figure 3. Water capture in the Pindaíba stream.

The teachers presented the subject questioning the students about the subject, seeking to observe their previous knowledge. From the initial conversation, they provided text for shared reading highlighting the importance of water treatment in cities so that the population has access to drinking water. They demonstrated and explained a scheme illustrating the steps of running a water treatment plant. They visited the Pindaíba Stream to know the beginning of the water catchment that supplies the municipality of Inaciolândia.

A panel was set up to disseminate the study of this content to the school community. Activities were written in the room addressing the subject studied. The students identified and cited some environmental problems related to water pollution and carelessness with the stream that supplies the municipality.

According to Santos (2002), the contributions of the Field Class of Sciences and Biology in a natural environment can be decisive in the learning of the concepts as they are a stimulus for the teachers, that comes a possibility of innovation for their work and thus focus on student orientation.

The visit to the facilities of the Treatment Station of the Companhia de Saneamento de Goiás (SANEAGO) and the demonstration of the processes of water purification allowed the students a more reflective view on the importance of this natural resource, considering the fact of its preservation and thus being able to make conclusions about the pollution damage, because the treatment plant is what allows that water does not come with bacteria, dirt and pollutants for human consumption, which would lead to contamination and could even cause the death of individuals who drank this water.

In the developed activities, one can affirm that "it is in this context that the critical theory of teaching, meaningful learning, metacognition and ecological approaches on the functioning of the classroom" (Luzzi, 2012, p.114) is outlined.

Two classes were worked out before the visit. The visit to the Treatment Station lasted 2 hours. The students worked for one more class after the visit, for the elaboration of reports that involved the educational activity.

Didactic Situation V

Theme: Typical Recipes from the Region and the Body Mass Index

Learning Strategy: Building Charts and Tables

This Didactic Situation was developed with students of the 9th grade (ninth grade) in Mathematics, in the morning and evening shift.

The objectives for the activities developed were to address cultural aspects related to typical recipes; perform calculations involving mathematical concepts in a recipe; calculate expenses and profits in the organisation of food fairs; determine the Body Mass Index (BMI) of the students and identify the increase in BMI related to food.

Figure 4. Students learning the history of the Cerrado in the Museum.

After the preliminary instructions, the students were organised in pairs; calculated how many dozens of green maize would be needed to serve 150 pamonhas at the food fair. Questions: If it were necessary to increase the amount of pamonhas to 200, how much corn would increase? To finalise the work with profit, what is the price determined for each pamonha? students compared the profits of each food stall in the fair. They made graphs and tables with the income obtained at the Food Fair.

In the Mathematics period, the students answered questions about the Food Fair held at the school. The data on amounts collected were socialised and discussed the results of profits and expenses. They made graphs and tables and arranged the results on the school's murals. Foucault (1996) points out that when something is described to us, narrated, presented via a discourse, functioning language produces "realities" in us and for us, that is, language not only names, describes scientific histories and concepts, but the builds.

In this didactic situation, it was possible to identify planning constructed between the different teachers, articulating their didactic plans in a whole, coherent way, giving

meaning and identity to schoolwork (Luzzi, 2012). The planning of the activities involved the disciplines of Science, History, Geography, Portuguese Language and Mathematics.

RESULTS

Through verbal, written reports and the evident interest of the students during the visit to the Memorial Museum, it was observed that the objectives were achieved. One positive point was the socialisation of the students with the monitors of the Museum, the ability to discuss the preservation of the material observed and the reports involving the valorization of the culture of the State of Goiás.

The objectives of researching the typical foods of the region, know how to calculate expenses for an event, encourage the community to participate in the school events proposed by the interdisciplinary work involving the disciplines of Science, Mathematics, Portuguese Language, History, Geography, English and Arts were achieved in a timely manner. Students were actively involved with research and at the culmination of the study demonstrated the growing integration between school and local communities.

The study also showed that working in a fragmented way on the part of the School makes it more difficult for students to understand their reality. Moreover, for the teachers, the study proved that working Environmental Education in an interdisciplinary way is possible.

At the end of the project, as a recognition of the work done and for the valorization of the School, the money collected from the Food Fair was used as follows: revitalization of School and surroundings, exchange of broken glass, repair of damaged locks, tree pruning which could cause accidents and exterior wall painting.

Analysing the Didactic Situations selected and developed during the study, it was verified that the environmental theme in the Cerrado is little worked in classes and Environmental Education Projects. The activities carried out in educational spaces emphasised that most of the students do not know the correct definition of the environment, but they can identify environmental problems in the environment in which they live, showing that they lack incentive and reinforcement for changes in habits, such as the correct disposal of waste.

The relevance of working with sustainability education with different themes has been proven, alerting and showing the participants the care and importance of the environment, since no individual is capable of change if there is no motivating factor. In this sense, it is up to the teachers to approach and explore subjects that are part of the daily life, as well as the culture of their students, thus encouraging them to develop positive attitudes towards the environment, in search of quality education and a more fair and equitable.

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