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Integration of Distinct Educating Spaces and Their Potential for a More Comprehensive Environmental Education Work

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Abstract

To investigate if the units of the São Carlos Ecological Pole (São Carlos, São Paulo, Brazil) are educating spaces that may contribute to the understanding of the complexity of environmental issues and stimulate a sense of belonging and social responsibility, we interviewed primary school teachers who had accompanied visits to these places and members involved with environmental education in these spaces, and followed guided tours in all units of the Ecological Pole. We have identified that the activities can address issues that espouse the three dimensions of educational practice: cognitive (knowledge), subjective (feelings, principles, ethics) and political. No site alone is able to espouse all parameters considered essential in a valid environmental education work, but considering their sum, we identified that all of them are taken into account. Therefore, we reinforce the idea that the integration of these units would yield a more thorough EE work.

***Keywords*:** educating spaces, urban natural areas, educational practice dimensions, outdoor activities, critical environmental education.

Introduction

Background Information

The São Carlos Ecological Pole aims to integrate environmentally relevant administrative units in order to jointly conduct an effective and contextualized work of diffusion of environmental education (EE), constituting an ecological corridor between their natural areas. These units are located in urban areas in the city and provide an opportunity for residents and visitors to connect with the natural environment. The units comprise the local Zoo, the Municipal Botanical Gardens, which include a plant nursery and ecological trail, the

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Municipal Organic Vegetable Garden, the municipal utility of Espraiado (water extraction station), an experimental farm and a nature trail inside a public university. These units are run by the municipal and federal government and a municipal utility. All EE activities are currently performed in an independent fashion, without benefiting form of a common program of environmental education that could exploit the complementary character of the work. Therefore, the São Carlos Ecological Pole was signed into agreement in June 2010, with the main aim of integrating the various existing educational initiatives, in order to develop a coordinated environmental education work. The present research aims to evaluate if the units of the São Carlos Ecological Pole are educating spaces, and if the environment education work developed has contributed to the understanding of the complexity of environmental issues and stimulated a sense of belonging and social responsibility.

Critical environmental education

We consider it important to clarify what EE we are talking about and working with. According to Acserald (2008), since the beginning of the environmental movement, a utilitarian and a cultural view dispute the scenario.

> The two approaches outlined here correspond to two models of strategic action. The utilitarian approach has led to the so-called ecological modernization strategy, with its emphasis on market, technical progress and political consensus. (…) In contrast, the cultural approach has given rise to protest action seeking to overturn the unfair distribution of environmental benefits and harm. Since social injustice and environmental degradation have the same origin, there is therefore a need to change the way in which power over environmental resources is distributed – unfairly- and to take away from those in the power the ability to transfer the environmental costs of development to the most dispossessed (Acserald, 2008, p. 88).

Mohai and Bryant (1998) use the Theory of Environmental Deprivation to explain the unequal distribution of resources and environmental damage. According to this theory, first hand experience of adverse environmental impacts lead us to a greater concern with the issue. Thus, urban residents are more concerned about environmental problems than rural residents, just by being in contact with environmental conditions of degradation. According to the authors, this theory can be applied to ethnic differences. African Americans are more concerned about environmental impacts than white Americans, because of the uneven pattern of localization of their homes.

The movement that the authors Acserald (2008) and Mohai and Bryant (1998) refer to is called environmental justice. Currently, many environmentalists are concerned with public policies and actions aimed at profound changes in society, since environmental issues require rethinking our current development model. That means, the search for sustainability goes beyond technical issues and technology improvement. Working whithin this more complex view of the environmental problem, means to work in a critical perspective of EE.

Urban green areas

The earliest records of natural areas preservation come from Eastern peoples motivated by religious factors. In Europe, the preservation of natural areas was based on the idea of protecting wildlife for the exercise of hunting by a rich and powerful social class (Diegues, 1996; Milano, 2000; Phillips, 2004). In the nineteenth century, the advance of Natural History, Romanticism and the Industrial Revolution helped to change this scenario. City life had become unhealthy and degrading, and rural life was idealized by the proletariat (Diegues, 1996; Milano, 2000). According to these authors, it is in this context of American

capitalism* and accelerated urbanization that movements intended to protect nature for recreational use from the urban population emergence. The protected areas were "regarded as 'islands' of great beauty and aesthetic value that led the man to the contemplation of the wonders of unspoiled nature" (Diegues, 1996, p. 24).

Today, international agreements and laws in many countries worldwide are related to the protection of natural areas. Particularly in Brazil, we have the Forest Code (Law No. 4771 of September 15, 1965) and the National System of Conservation Units (Law No. 9985 of July 18, 2000). However, not all of these areas are accessible to the population due to both legal aspects (some are not open to visitors) and their distance from the urban centers, since more than 80% of the brazilian population are urban (Muninet, 2008† as cited in Nicodemo & Primavesi, 2009) and can not always travel to these areas.

Urban green areas are characterized as natural or man-made, and are found in parks, forests, public spaces, alongside waterways, or private residential areas. These green spaces are the only opportunity the urban population has to be in contact with an environment closer to nature. It is precisely for these reasons that these green spaces in urban areas tend to be one of the best indicators of quality of life in cities (Benayas, Gutiérrez & Gutiérrez, 1999). Within this scenario, we advocate the creation of urban green areas and the educational use of these spaces . We agree with Tuan (1980), who believes these areas should provide an excellent opportunity for consistent educational practices, since nowadays the contact with the natural environment is restricted to certain times and only takes on a recreational aspect (Tuan, 1980).

> Despite the scientific advances, how much do we know about the natural environment? How many of us (and how often) stop to think that the pleasant conditions (although apparently inhospitable in some extreme regions) that exist on this planet are the foundations for the magnificent diversity of plant and animal species, many of which still unknown? Although emphasis is usually placed on biodiversity, it is known that there are also significant associations among large bodies of water, winds and weather. It should be emphasized that all these systems are interrelated and interdependent. (Lestinge, 2004, p.38).

The São Carlos Ecological Pole can be considered one of the relevant areas to the local population. The units are located in an urban area and contain natural and reforested environments. As previously mentioned, educational activities that have been going on in these spaces (although they are isolated) contribute significantly to the regional EE.

In Brazil, from the mid-1970s, a number of proposals have incorporated educational activities related to environmental issues as extra-class activities (Mendonça, 2003). According to Peralta (2002), the set of values inherent in modern urban-industrial society has led humanity to lose contact with the primary sources of creation, such as headwaters of rivers, color of the land, rocks, aroma of foliage, the sky, the sun and fresh air. This loss of physical contact with the natural environment, due to the urban lifestyle, leads to the loss of immediate contact with the means of production in its original source (Guimarães, 1995;

* The concept of American capitalism is contextualized within the perspective of justice and environmental racism (Mohai, Bryant, 1998) discussed in the previous section. From this perspective, cultural, socioeconomic and political issues are inextricably linked to environmental problems. In this context, overcoming these challenges requires a complex and deep vision within the environmental debate.

† MUNINET. *Rede Brasileira para o Progresso Municipal.* Available at: <http://muninet.org.br/banco/index.php?g_cod_hierarquia=1&newVisualizacaoID=5>.

Peralta, 2002). As such, "the outsourcing of food can produce the illusion that life springs inside a supermarket" (Peralta, 2002, p. 116).

However, a tendency towards returning to nature can be perceived in several ways, such as practices that use interpretive paths or trails in natural areas as an educational strategy to integrate the human being with nature (Tabanez, Padua, Souza, Cardoso, Garrido, 1997; Robim & Tabanez, 1993). Seniciato and Cavassan (2003) believe there is consensus among researchers who study the relationship between humans and nature on the environmental interpretation representing a relevant strategy to integrate people´s knowledge and subjective aspects. The exploration and discovery through interpretation of new interactions and interrelationships during the ecological and psychological journey in a trail, in both natural and built environments, involve feelings, information, narratives, evocations, uses, meanings and associations (Lima, 1998). The author asserts that the affective (represented by the feeling or emotional experience and learning) and cognitive (represented by the activity of the mind to understand an object, intellectual functioning) aspects are so integrated that the experience transcends the moment in which the path is being driven.

Dorado, Arias, Alonso, Maldonado (2002) reported that many experiences dealing with large-scale environmental problems (ozone layer, greenhouse effect, etc.) may incur in passive attitudes because they seem so distant. EE activities in urban green areas have the advantage of approximating the population and the local reality. According to the authors, this approach seeks to establish an emotional bond and the perception that we can participate in local decisions (Dorado *et al*., 2002). They also see the nature contact activities as a possibility for effective teaching because they raise interest and attention, allowing entering any area of knowledge: physics, geometry, health, among others.

However, Pacheco - Muñoz (2002) pointed out that in many of these places the environmental education is centered on nature, and does not deal with the complexity of the issue. For this author, these spaces have not become a symbol of collective identity and community action, and it is essential that they generate new means of struggle in defense of nature and a fairer society:

> (...) it is necessary to include topics, such as extinction or aspects of biology, ecology and natural history, causes and social consequences of the loss of biodiversity, biotechnology, environmental services, indigenous knowledge, and relationships with causes and consequences of other environmental problems, within different levels and plans (political, economic, social and cultural). Our themes can be extended and we can articulate other knowledge and learnings, explore veins on aspects of law, order, impact, environmental health and safety, traditional knowledge, etc., which have been forgotten by the programs or activities of the centers and environmental culture. (Pacheco-Muñoz, 2002, p. 66).

González-Gaudiano (2002) also showed concern for the different EE pedagogical discourses. The author believes that the management of biodiversity is a complex issue and requires the mobilization of people in individual and collective levels. This perspective goes side by side with the discourse of a critical environmental education. This concern is present in the research conducted by Fracalanza (1992) and Manzochi (1994), who find that the concepts in Ecology are treated in a disconnected manner in both textbooks and classrooms. Manzochi (1994) extended her studies to extra-class activities, in which this trend was the same. Moreover, these studies found that despite the issues and activities having the potential to generate discussion, the cases raise no debate addressing the ethical dimension and citizenship.

Other authors have argued about the relationship among cognitive (knowledge), subjective (feelings, principles, ethics) and political education for a real EE work (Carvalho *et al*., 1996, 2006; Guimarães, 2004; Tristão, 2005, among others).

Based on a review of the literature performed to date and our experience in working with nature trails, we have found that most activities in these areas do not benefit from their entire educational potential, both regarding the contribution that ecology can offer and working towards the formation of values and social mobilization. In this sense the present work is justified by the need to overcome the challenge of focusing only on informative / ecological aspects in the environmental education work developed in the São Carlos Ecological pole Units.

In this research, we sought to understand how the knowledge, ethical and aesthetic values, and political participation related to environmental issues can be addressed in a coordinated way, in places where there is a tendency to discuss mostly the ecological aspects.

Method

Ecological Pole[‡]

São Carlos is a municipality in the state of São Paulo that stands out regionally for having, among other things, two public universities, an experimental farm of the Brazilian Enterprise for Agricultural Research and a track record in environmental education, the result of partnerships among various local institutions. It is within this history characterized by strong advocacy and articulated work that, in 2002, the São Carlos City Hall idealized the "São Carlos Ecological Pole" project . The idea was to integrate the various environmental education activities under development in the different units.

The Municipal Botanical Garden "Navarro de Andrade", which includes a plant nursery and an ecological trail, was founded in 1953 to produce seedlings for trees and gardens in public areas. The ecological trail, opened in 2004, is a small 350-meter path meandering through an area where patches of seedlings have been planted for over 30 years. This unit receives two types of visits: monitored field trips, which are considered environmental education activities with the presence of approximately 400 students a month, and people who come in search of urban trees and seedlings for reforestation, recording a monthly average of 190.

The Municipal Organic Vegetable Garden produces vegetables without using pesticides or fertilizers. There is a composting pile on the site, and the educational work is based on the importance of this practice and the consumption of healthier foods. In this area there are water tanks that supply their own water necessities, which helps demonstrating the importance of water resources conservation. The organic garden is also being structured to produce and supply medicinal plants. The Garden receives school field trips. The educational work is based on the practice and knowledge of organic gardening, medicinal plants and techniques for composting waste, essential activities for environmental education.

The Municipal Zoo, called São Carlos Ecological Park (PESC) “Dr. Antonio Teixeira Viana”, occupies an area of 64 hectares, composed in part of cerrado, also known as brazilian savanna and in part of gallery forest. Half of this area is a preserved watershed.. The main objective of the Zoo is the ex situ conservation of South America fauna; it contains a

[‡] Excerpt adapted from " São Carlos Ecological Pole - Broadcast Centre in Environmental Education" sent the notice of Fuzzy Fund Law in April 2009.

collection of nearly 630 specimens of animals of more than 93 different species, many of which are endangered. It also has an environmental education center that receives schools and other visitors from São Carlos and neighboring cities.

The Water Station, called "Espraiado", belongs to a municipal utility: the Autonomous Water and Sewage Service (SAAE), responsible for water extraction, treatment and distribution and sewage collection and treatment in São Carlos. This station is one of the city´s two surface water extraction places. It is considered an important place to develop work in environmental education. As it is easily accessible and located close to the urban area, it allows exploring issues related to water resources protection and quality and quantity of drinking water for human consumption maintenance.

Founded in 1968, the Federal University of São Carlos (UFSCar) is the only federal institution of higher education located within the State of São Paulo. One of its particularities is the existence of a rural area which is a privileged place for the development of educational activities focused mainly on environmental issues. This space includes 223 ha of natural area (185 ha of cerrado, 3 ha of riparian forest and 35 ha of reforested area) which houses a spring, a lagoon, a stream and neighborhoods with a strong human influence. In this context, professors of the UFSCar Botany department have created the extension project "Guided visits to the Nature Trail" The objectives are to raise awareness on the importance of conserving the environment through guided visits to the cerrado area and contribute to the formation of university students, sharing the knowledge generated in the university with the local community. In this research we consider only the education space of the Nature Trail, but it is noteworthy that there are other locations within the university which can be exploited.

The experimental farm, called Embrapa Livestock Southeast, is a research unit of the Brazilian Agricultural Research (Embrapa), a federal agency, and was established in 1975. The research programEmbrapa Cattle-Southeast includes the areas of beef cattle, dairy cattle, equine and forage crops. The physical area of Embrapa comprises 2,668 ha of which 970 ha are natural reserves (cerrado and rainforest) and nature trails are guided in these locations. Another feature of the Embrapa is the presence of more than 90% of watershed in its lands.

Data Collection

In August 2008 we sent a questionnaire to all teachers who had students in the 06-10 years-old range in the São Carlos municipal schools, and at one private school. Our goal was to have a first approach to present our research and invite them for an interview. Therefore, the teachers who accepted the invitation had the option to provide a contact so that we could look for them. From November 2008 to June 2009, 25 such teachers granted us interviews (Appendix A).

We also contacted all units of the Ecological Pole to invite those responsible for EE in each educating space for an interview. So, during the first half of 2009, we also interviewed two people of the Municipal Zoo, three participants in the university´s Nature Trail, three workers of the Municipal Organic Vegetable Garden, three of the Municipal Botanical Garden, three of the Embrapa farm and one of the Water utility SAAE (Appendix B).

From March to October 2009 we followed monitored visits to São Carlos Ecological Pole units. Whenever possible, we followed a visit with a group of youngsters and an adult group in each unit. We observed two visits per unit which were recorded in a field notebook. In this field notebook, we took note of the issues discussed at each stopping point of the trail.

During the observations we sought data on the spheres of knowledge, ethical and aesthetic values and participation in accordance with the work of Carvalho *et al*. (1996) and Carvalho (2006). The author considers three basic dimensions for formation in environmental issues: 1) the dimension related to the nature of knowledge, 2) the dimension related to ethical and aesthetic values, 3) the treatment given to the possibilities of political participation of the individual. We used semi-structured interviews and recorded field observations covering these three areas of educational practice.

Data Analysis

The use of multiple sources of evidence allows the researcher to study a wide margin of angles of the same phenomenon. But more important is the development of converging lines of inquiry for analyzing these data. It is recommended that a process of triangulation be used (Patton, 1990). Therefore, the validity of the research is resolved because a variety of sources shows the multiple angles of the same phenomenon.

To organize and analyze the data we followed Moraes' proposal (2003, 2005)- a discursive textual analysis. According to the author, this type of analysis has been used in EE qualitative research. Thus, interviews and field records were subdivided into units of analysis and we performed the triangulation of these units of analysis. We grouped all the elements identified as similar, which we call data points. These data points comprehended in all suggestions and potential activities identified in all interviews and research observations.

The issues raised were classified based on the criteria proposed by Marpica (2008), which are organized according to the dimensions of knowledge, ethical and aesthetic values, and participation proposed by Carvalho *et al*. (1996) and Carvalho (2006), as shown in Table 1:

Table 1.

Parameters of EE practice according to a critical view (Marpica, 2008).

Dimensions	Parameters	Symbol
Knowledge	1.1. Concepts are presented, discussed and experienced in ways that contribute to the systemic view.	C1
	1.2. Interdisciplinary / transversality is valued in the production and systematization of knowledge.	C2
	1.3. Local knowledge is considered valid / Scientific knowledge is not absolute.	C3
	1.4. Investigative attitude during the process of knowledge construction.	C4
	1.5. Historical, social, economic and environmental themes are contextualized. The environmental situation is a historical, social and cultural result.	C5
	1.6. Science and technology are discussed in relation to positive and negative impacts, they are not placed as a solution or a problem.	C6
	1.7. Consideration of country's cultural and natural diversity.	C7
Ethical and aesthetic values	2.1. Human-nature interaction: complex relationship, human being belongs to the web of social, natural and cultural relationships and lives in interaction.	V1
	2.2. Conflict: controversial issues are presented from various perspectives.	V2

Table 1. *(Cont.)*

	2.3. Discussion on differences in the access to elements of nature and distribution of environmental risks.	V3
	2.4. Solidarity as a basis for collective work in search of environmental solutions.	V4
	2.5. Point of view presented in an argumentative way.	V5
	2.6. Use of elements that enable interaction, participation and satisfaction.	V6
	2.7. Use of aesthetic elements that arise the awareness of the environmental issue.	V7
Participation	3.1. Discussion on the legislation related to the environmental content. Discussion includes the relevance of the legislation.	P1
	3.2. Responsibility of various social segments (civil society, governments, non-governmental organizations - NGOs, private companies, etc.).	P2
	3.3 The solutions of environmental problems are sought on a collective basis. The state is responsible for creating spaces for participation. Science and technology are valid insofar as they are democratised.	P3
	3.4. Exploitation of local potential and regional environmental strategy to motivate participation.	P4
	3.5. Education encouraging dialogue and participation.	P5
	3.6. The core issues of environmental problems have to be addressed, whether they are social or of other kind.	P6
	3.7. Participatory citizenship.	P7

Results and Discussions

We could assign more than one parameter for each identified aspect. We counted the number of notes for each dimension considered (independent or associated, ie, when the dimension of knowledge appears alone, or associated with values, participation, values and participation, and so on). Then we calculated the percentage of points raised for the following subdivisions: knowledge, values, participation, knowledge + values, knowledge + participation, values + participation knowledge + values + participation. We also decided to check the frequency of each parameter and build a table showing the percentage of notes of the 21 parameters proposed. After the systematization of data, *metatexts*, in table format, were interpreted and we started the final stage of theorizing study according to Moraes (2003, 2005).

From the number of parameters assigned to each point raised, we built two tables: Table 2, which presents the frequency of the dimensions addressed, and table 3, which shows the frequency of each parameter identified in the issues raised in the Ecological Pole's units. The percentage in the *Total* column shows the total number of events considering all units of the Ecological Pole. In other words, the sum of all the notes for the dimension or parameter addressed.

Table 2.

Frequency of the dimensions addressed in all aspects raised in the São Carlos Pole Ecological's units.

	Percentage of occurrences identified						
Dimensions addressed	Nature Trail	Organic Garden	Water Capture Station	Zoo	Experimental Farm	Botanical Gardens	Total
Knowledge	23,5%	15%	9%	12%	17%	29%	19,5%
Values	12%	5%	0%	15%	0%	10%	9%
Participation	0%	5%	0%	2%	0%	2,5%	2%
Knowledge +Values	41%	30%	18%	51%	28%	29%	36, 5%
Knowledge + Participation	3%	5%	27%	5%	22%	2,5%	7%
Values + Participation	3%	0%	9%	5%	11%	5%	5%
Knowledge +Values + Participation	17,5%	40%	37%	10%	22%	22%	21%

Legend:Dimension that received the largest number of notes. Dimension that received the smallest number of notes.

Table 3.

Frequency of each parameter identified in the issues raised in the São Carlos Ecological Pole's units.

	Percentage of the parameters identified in the issues raised.						
Parameters of the dimensions.	Trail of Nature	Organic Garden	Water Capture Station	Zoo	Experimental Farm	Botanical Gardens	Total
C1- Concepts are presented, discussed and experienced in ways that contribute to the systemic view.	19%	19,2%	17,5%	21,7%	15,8%	18,2%	19%
C2 - Interdisciplinary / transversality is valued in the production and systematization of knowledge.	4,5%	6,9%	0%	1,9%	8,9%	6,6%	5%

Table 3. *(Cont.)*

C3- Local knowledge is considered valid / Scientific knowledge is not absolute.	3,5%	5,5%	0%	4,7%	3,5%	4,1%	3,5%
C4 - Investigative attitude during the process of knowledge construction.	8%	2,7%	10%	2,9%	1,7%	1,7%	4,2%
C5 - Historical, social, economic and environmental themes are contextualized. The environmental situation is a historical, social and cultural result.	6%	5,5%	7,5%	7,5%	5,3%	8,3%	7%
C6 - Science and technology are discussed in relation to positive and negative impacts, they are not placed as a solution or a problem.	3,5	6,8%	5%	4,7%	7%	3,3%	4,8%
C7 - Consideration of country's cultural and natural diversity.	0%	1,4%	2,5%	6,6%	0%	4,1%	2,8%
V1 - Human-nature interaction: complex relationship, human being belongs to the web of social, natural and cultural relationships and lives in interaction.	3%	8,2%	7,5%	11,3%	7%	6,6%	6,6%
V2 - Conflict: controversial issues are presented from various perspectives.	3,5%	4,1%	5%	0,9%	7%	3,3%	3,6%
V3 - Discussion on differences in the access to elements of nature and distribution of environmental risks.	1%	1,4%	2,5%	0%	1,7%	0,8%	1%
V4 - Solidarity as a basis for collective work in search of environmental solutions.	1%	2,7%	7,5%	1,9%	3,5%	0,8%	2,2
V5 - Point of view presented in an argumentative way.	3%	0%	0%	1,9%	0%	2,5%	1,6
V6 - Use of elements that enable interaction, participation and satisfaction.	13%	8,2%	5%	11,3%	1,7%	7,4%	8,8%
V7 - Use of aesthetic elements that arise the awareness of the environmental issue.	14,5%	4,1%	0%	6,6%	3,5%	7,4%	7,4%

Table 3. *(Cont.)*

P1 - Discussion on the legislation related to the environmental content. Discussion includes the relevance of the legislation.	1%	4,1%	2,5%	1,9%	10,5%	5%	3,8%
P2 - Responsibility of various social segments (civil society, governments, non-governmental organizations - NGOs, private companies, etc.).	3,5%	8,2%	12,5%	2,9%	3,5%	1,7%	4,4%
P3 - The solutions of environmental problems are sought on a collective basis.	3,5%	5,5%	7,5%	2,9%	8,9%	5,8%	5,2%
P4 - Exploitation of local potential and regional environmental strategy to motivate participation.	4 / 3,5%	2 / 2,7%	1 / 2,5%	7 / 6,6%	4 / 7%	10 / 8,3	28 / 5,6%
P5 - Education encouraging dialogue and participation.	2%	1,4%	2,5%	0%	0%	0%	0,8
P6 - The core issues of environmental problems have to be addressed, whether they are social or of other kind.	0%	0%	2,5%	0,9%	0%	0,8%	0,5%
P7 - Participatory citizenship.	3%	1,4%	0%	0,9%	3,5%	3,3%	2,2%

Legend: Parameter that received the largest number of notes

Parameter that received the second largest number of notes

Parameter that received the smallest number of notes

Most of the points raised pervade the knowledge's dimension as seen in Table 2, which shows that this dimension always receives notes associated or not to other dimensions. This result can be explained by the local environment: because it is a natural area, plenty of interest is drawn in relation to the names of plants, animals that live there, procedures and techniques and the local history. This information is not often linked directly to another dimension. In our view, this is one of the challenges of environmental education. Many times we believe that the access to information means making people aware of the environmental aspect and as Mayer (1998) and Sauvé (1999) discuss, historically, knowledge about the subject has not been proven an effective strategy to environmental education work. Such a conception must be overcome as it is not conducive to deep reflection on this issue.

Table 3 shows that the parameter most worked on in the dimension of knowledge is C1 (Concepts are presented, discussed and experienced in ways that contribute to the systemic view). The perception that everything is interconnected in nature and is influenced and influences this dynamic equilibrium may arouse sensitivity to parameter V1 (Human-nature interaction: complex relationship, human being belongs to the web of social, natural and cultural relationships and lives in interaction..) So much so that it is the second most frequently cited in two locations (Municipal Zoo and Organic Vegetable Garden). This element identified in our analysis is consistent with that of Carvalho (1999):

> In an environmental education program, without doubt, the identification and description of natural components and understanding of the phenomena of nature are of fundamental importance. However, this **functional nature dimension** should be regarded as a **means** or **step** required to understand the reasons and causes of the processes of interaction present in the wild. (CARVALHO, 1999, p. 11, emphasis added).

Also in this context, parameter C3 (Local knowledge is considered valid / Scientific knowledge is not absolute.) received 3.6% of the notes. This aspect should be emphasized, because it raises the discussion on the process of scientific knowledge production. According to Carvalho (1999), it means thinking about the social influences and cultural and economic policies that guide the relationship between science and technology (equivalent to parameter C6, which received 4.6% of notes). The author concludes by saying that, as a human activity, science is subject to errors and mistakes. This element was remembered in the Nature Trail, (C3 received 3.5% of notes) in which different theories are explained and the fact that scientific knowledge is not absolute and is transformed throughout history is shown.

In a study about educational programs dealing with wildlife, Pegoraro and Sorrentino (1998) remembered the importance of knowing our species diversity in all its contexts: cultural, historical, aesthetic and scientific. These issues should involve cognitive and affective situations and must allow a reflection on the lifestyle of modern societies. The authors stated that the lack of contact with our biodiversity reduces our understanding about what their extinction means affecting the way we position ourselves to face facts.

As shown in Tables 2 and 3, many of the issues raised can include more than one dimension at a time, so that in two places (Organic Vegetable Garden and Water Station), the largest number of themes permeates the three dimensions. In the final summation, the percentage of subjects that address the three dimensions (21%) is also significant, bringing up the idea that the subjects involve more than one issue, which is consistent with our view that it is up to EE to unveil the complexity of environmental issues.

In this sense, Pegoraro and Sorrentino (1998) worry about some works that have a linear conception by combining monitoring, legislation and education. The authors criticize such a perspective and argue that we should have a more complex approach in educational practice, permeating the different dimensions, fact observed at the São Carlos Ecological Pole.

According to Table 2, the dimensions of values and knowledge are associated in 36.5% of subjects. This result may be due to the fact that information should usually be linked to aesthetic or curious aspects, which arises the sensitivity and satisfaction about nature. Therefore, there are many notes to V6 (Use of elements that enable interaction, participation and satisfaction) and V7 (Use of aesthetic elements that arise the awareness of the environmental issue.) in Table 2. Krasilchik (2004) suggests a link between cognitive and aesthetic sightseeing. It is important to highlight that parameter V7 is the second most reported in the Nature Trail. Indeed, during observations and interviews, we realized how relevant this aspect is to the monitors, since cerrado has been devastated in Brazil due to the low aesthetic value assigned to it.

The sphere of participation can be significantly approached, since several parameters have received many notes: P1 (Discussion includes the relevance of the legislation.), P2 (Responsibility of various social segments.), P3 (The solutions of environmental problems are sought on a collective basis.), P4 (Exploitation of local potential and regional environmental strategy to motivate participation). In other words, the extent of

participation can be worked on at various times, but it is not necessary to dwell on it on all issues raised.

The most reported parameter within the dimension of participation is exactly P4 (5.6%), and in this sense, we reinforce the importance of EE work in green areas close to the visitors´ reality. The "feeling of belonging" has high potential to arouse the "feeling-able" (Sorrentino, 2000). Furthermore, we believe that the monitor's position, who is in contact with the group at all times, contributes to the work with the dimension of values and participation. By referring to the sensitivity to nature, respect and solidarity with all forms of life, the dimension of values is being worked on. Likewise, instructional procedures that facilitate participation, collective and cooperative work are elements that contribute to the development of skills related to the process of building citizenship.

In two units of the Ecological Pole (the Organic Vegetable Garden and Water Station), parameter C4 (Investigative attitude during the process of knowledge construction) was the second most identified. This as a positive point, since there is a tendency toward discussing the complexity of the facts surrounding the environmental issues. We also advocate the collective knowledge construction is a way to pervade the ammount of participation. In a study about policies for the conservation and sustainable use of biological diversity, Andelman (2001) indicates that these factors depend on intersectoral dialogue and consensus among social, economic and political sectors, public and private segments.

In an analysis of the pedagogical potential of non-schooling education, Pivelli and Kawasaki (2005) remember the importance of these opportunities to awaken curiosity, generate questions and investigate situations. As the results of their research, the authors observed that political, economic, cultural, ethical and social aspects can integrate the aims of these activities. Non-schooling spaces can be explored in order to awaken affection, curiosity, raise questions and desire to contribute to local sustainability. Thus, we value parameter C4 (Investigative attitude during the process of knowledge construction), which received appointments in all units. In another investigation, Viveiro and Diniz (2005) also found motivation fundamental in field activities. We believe that such situations nourish affective feelings in relation to local biodiversity.

Lucas (1980-81)[§] as cited in Mayer (1998) discusses three pedagogical perspectives related to environmental education: education *about* the environment, education *in* environment and education *for* the environment. Robottom and Hart (1993) argue that the prospect of EE *in* the environment is for those who have proposed an interpretive vision of nature and support the development of an appreciation of the environment as an individual and personal value. In an overview, we can say that the three dimensions of educational practice have the potential to be discussed at the Ecological Pole's units. Therefore, we advocate that these natural environments or those close to natural spaces are potential educating spaces to work with a critical view of EE, which, according to Robottom and Hart (1993), agrees with the prospect of EE *for* the environment.

There is heterogeneity in relation to which parameters are addressed with more or less frequency and we believe it depends on the subject to be further explored in each location. Therefore, we reinforce the idea that the integration of these units would yield a more thorough job of EE. When we look at each site independently of each other, we realize that many parameters are not taken into account, but by analyzing their sum, we observe that all are identified. This result shows the importance of an EE that is permanent and

[§] LUCAS, A.M. (1980-81), The role of science education in education for the environment. *Journal of Environmental Educatio*n. v. 12, n. 2, p.32-37.

continuous, interdisciplinary and transdisciplinary, requiring partnerships among various agencies to be viable. The connectivity between the Pole units in a coordinated action would increase each unit's educating potencial.

There are certain parameters that still are not considered very often. Thus, we aim at an EE that is permanent and articulated with other educating spaces so that other issues, at other times, or other opportunities can be discussed and reflected upon. The field trips take place in educating spaces where several themes (or parameters of a critical EE) can be dealt with. . The classroom is another educating space, allowing several of these parameters to be potentially addressed. On the other hand, there are also other social organizations that can and should engage with these themes. Thus, we avoid the "pedagogical illusion" (Carvalho, 2006) and understand the limits and possibilities of each educating space and work towards the interaction of these various proposals.

Relevance of an Ecological Pole for EE activities

From the data analysis, we have found EE activities that are integrated and articulated in different educating spaces can address issues that permeate the three dimensions of educational practice (knowledge, ethical and aesthetic values and participation). The subjects raised in these educating spaces involve social, ethical, aesthetic, cultural, historical and biological issues. The clarification of all these issues contributes to the understanding of how environmental issues are complex and, therefore, environmental education in natural spaces should be valued for a critical view of EE.

This is why we argue that all these elements critically approached in the visit must be linked with the work developed in other educating spaces of the city. Thus, a first challenge arises facing proposals for field trips as a tool for environmental education: the punctual character of these activities.

In March 2009, we participated of the International Meeting for Education Applied to Conservation and Sustainability[**] organized by the Zoo of São Paulo. Several experiences of educating spaces (botanical garden, zoo, nurseries, aquarium, etc.), in which there occur educational activities about environmental issues, were presented. Also in 2009, during the VI Iberoamerican Congress on Environmental Education[††], several papers on field activities and environmental education were presented. We noticed that several experiments do not treat the visits to such places as a punctual activity. The institutions in charge are integrating field trips into a permanent program or project. In this sense, the visit becomes an essential and contextualized activity within a continuous and planned action.

Another crucial factor for the effectiveness of EE actions is the formation of responsible personnel to work with environmental education in these spaces. For all educational potential to be exploited it is necessary to allow for a debate on the educational role of these units. In fact, the first step is to enhance the educational processes that occur at these sites and include hiring professionals to take such positions. Pacheco - Muñoz (2002) suggests an institutional educational project that resembles the school curriculum by defining objectives, targets and guidelines for the development of skills, attitudes, beliefs and values. The author considers that the construction of an educational planning helps to overcome the decontextualized and naive practices by defining practical strategies for the

[**] For more details on the event schedule, visit: http://www.zoologico.sp.gov.br/encontro_internacional.htm
[††] For details about these works is necessary to access the Event's Proceedings, available only to participants. Among the works considered in this investigation, we can mention: Faggi and Perelman (2009), Bentt and Pellegrini (2009) and Lameda (2009).

activities. In addition, the plan incorporates the idea of evaluation and supervision of the educational program quality.

The present study has showed that experiences in educating spaces of an Ecological Pole can sensitize people about the complex and dynamic relationship between environment and society as well as motivate the collective participation in promoting local sustainability. However, this potential can be achieved depending upon how these spaces are structured for the educational activities undertaken in them. We believe that an effective integration of EE activities among the units will contribute to a broader and deeper approach to environmental issues. Furthermore, we hold that the Ecological Pole work in coordination with other EE initiatives in the municipality to achievement a permanent EE.

As previously mentioned, we are guided by a critical perspective of EE. Thus, we believe that cultural, social, political, economic and ethnic implications are part of the debate. Acserald (2008) calls "critical neutralization" the procedure by which we emphasize the technological adaptation to solve environmental problems. In fact, environmental degradation is not a problem of ecosystems but of how we are related to nature and each other for the appropriation of nature, so that, even in urban green areas such as the Ecological Pole, there is a potential for addressing issues that are not only the ecological relationships among living things.

We need to rethink our hegemonic model and we argue that one possible way are dialogical processes. Freire (1993, p.88) states that "Human Beings are not built in silence, but in word, in work, in action-reflection". This Brazilian educator has the dialogue as the essence of his theory. He believes it is in the encounter with the other, mediated by the world, that we seek to be more human and (re)construct the world. It is within this collective and participatory approach that we seek to act in EE.

Wals and Leij (2007) believe in the potential of social learning in the pursuit of sustainability. The authors state that this process occurs within a social context where differences of conflicting interests, norms, values and visions of reality provide a learning environment. This learning takes place at the individual and collective levels, involving different social actors to think of new ways to deal with current challenges in our society.

> This new kind of thinking means that we cannot think about the sustainability in terms of problems that are out there to be solved or 'inconvenient truths' that need to be addressed, but to think in terms of challenges to be taken on in the full realization that as soon as we appear to have met the challenge, things will have changed and the horizon will have shifted once again (Wals, Leij, 2007, p. 17).

Within this context of thinking about how to overcome conflicts and the search for new paradigms for our current society, Lotz-Sisitka (2002) challenges us to reflect on our own process of research and knowledge production, which she calls the globalization of knowledge production. The author tells of how she mechanically incorporated a research framework without thinking about their own reality and, later, how she questioned the process. She believes that building a collective construction between colleagues (teachers and students) contributes to this reflection on the paradigm in which we want to support ourselves.

When we assume that environmental issues should incorporate human culture and all its features (political, social, economic, religious, ethnic, etc.), we are considering the existence of environmental conflicts (Acserald, 2008). We believe that one of the tasks of environmental educators is unveiling the conflicts in order to show the depth of socio-environmental problems. Another goal of EE is to foster opportunities for dialogue, participation and collective decision making in seeking to resolve environmental conflicts

and / or reflect in which paradigm we want to support ourselves for rethinking the relationship between society and nature.

♦ ♦ ♦

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Appendices

Appendix A - Teachers interview – partial guiding questions list

1-) Today, there is much talk about environmental education, besides it being in the Constitution, we have a National Environmental Education Policy, which among other things, implements EE at all educational levels. Thus:

a-) What is environmental education?

b-) Do you think teachers can contribute to this work? If yes, how (which content should be addressed?)

2-) One of the issues present in environmental education is values changing. Thus:

a-) Do you consider that the moral and aesthetic values may be related to environmental degradation? Why?

b-) Can the school and the teacher act in this sphere, ie, can they contribute to building a new paradigm where the prevailing values are reviewed? If yes, how (which themes we should approach, which activities should be developed, what methodologies should be adopted)?

c-) During the visits to the units of the São Carlos Ecological Pole, do you consider that the issue of values has been mentioned? How?

d-) Could this dimension have been more widely discussed?

3-) Another aspect that was discussed is society´s participation in decision-making.

a-) Is it the teacher´s and the school´s job to form a citizen concerned with political issues? If yes, how (which themes we should approach, which activities should be developed, what methodologies should be adopted)?

b-) During the visits to the units of the São Carlos Ecological Pole, do you consider that the issue of participation was mentioned? How?

c-) Could this dimension have been more widely discussed?

Appendix B - Interview script used for people involved with EE work in the units of the São Carlos Ecological Pole

1-) What is your training?

2-) How did you come to work here?

3-) Do you know the history of this unit / institution?

4-) Environmental issues are being widely discussed in most (if not all) segments of society. For you, what is environmental education?

5-) This being a unit of the São Carlos Ecological Pole, we believe that this area may potentially contribute to the formation of environmentally educated citizens. Could you say (describe??) which topics can be discussed here so this objective can be achieved?