



Ideas on Environmental Education: a dialogue with postgraduate students in a Brazilian University

Ideias sobre Educação Ambiental: um diálogo com estudantes de pós-graduação em uma Universidade Brasileira

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Abstract:

The construction of meanings in Environmental Education throughout a scientific course for Master's and Doctoral candidates in Education for a Science and Mathematics in a Brazilian University is diagnosed and evaluated. The qualitative research comprised illustrations, interviews, half-structured questionnaires and the preparation of proposals for projects based on postgraduate candidates' knowledge and concepts formed during the course. At first, the students forwarded a reductional and traditional view on the environment. Lectures and discussions were held during the semester. They dealt with the theoretical and practical principles that foregrounded Environmental Education, coupled to discussions within the social, political and cultural context. Results were positive since the postgraduate students' concepts on environmental themes improved. However, in-depth and long term studies are required to build concepts within a more complex dimension on social and environmental reality. The insertion of environmentalism in the academic curriculum is highly relevant. It will attribute to Higher Institutions of Education an essential role in the preparation of responsible citizens and constructors of a democratic, just, equal and sustainable society with a view on future generations.

Keywords: environment, concepts, curriculum, Higher Education, teachers' formation

Resumo:

O presente estudo teve como objetivo diagnosticar e avaliar a construção de significados em Educação Ambiental no decorrer de um curso com pós-graduandos de mestrado e doutorado em Educação para a Ciências e a Matemática de uma universidade brasileira. A pesquisa foi de caráter qualitativo, na qual utilizamos como instrumento de constituição de dados, ilustrações, entrevistas, questionários semiestruturado e elaboração de propostas de projetos com base nos



conhecimentos e concepções dos pós-graduandos construídas durante o curso. Inicialmente, os alunos apresentaram uma visão reducionista e tradicional de meio ambiente. No entanto, foram ministradas aulas expositivas e dialogadas durante um semestre letivo, as quais contemplaram os princípios teórico-práticos que norteiam a Educação Ambiental, e com discussões dentro do contexto sócio-político-cultural. Os resultados mostraram-se positivos em melhorar a concepção dos pós-graduandos acerca da temática ambiental. No entanto, concluímos que são necessários estudos mais densos, e em longo prazo, para construir uma concepção em uma dimensão mais complexa e aprofundada da realidade socioambiental. Nesta perspectiva, é relevante a inserção da ambientalização no currículo acadêmico, atribuindo às instituições de Ensino Superior papel essencial na preparação de cidadãos responsáveis e formadores de uma sociedade democrática, justa, igualitária e sustentável que contemple as gerações futuras.

Palavras chave: meio ambiente, concepções, currículo, ensino superior, formação de professores

Resumen:

Este estudio tuvo como objetivo diagnosticar y evaluar la construcción de significados en Educación Ambiental durante un curso con el maestro de estudiantes graduados de doctorado y en Educación para la Ciencia y las Matemáticas en una universidad brasileña. La investigación fue de tipo cualitativo, en el que utilizamos como herramienta de creación de datos, ilustraciones, entrevistas, cuestionarios semi-estructurados y preparación de propuestas de proyectos sobre la base de los conocimientos y las concepciones de los estudiantes graduados construidos durante el curso. Inicialmente, los estudiantes presentaron una visión reduccionista y tradicional del medio ambiente. Sin embargo, las clases expositivas dialogadas y se les enseñó durante un semestre, que contempla los principios teóricos y prácticos que guían la educación ambiental, y discusiones en el contexto socio-político y cultural. Los resultados fueron positivos en la mejora del diseño de los estudiantes graduados sobre cuestiones ambientales. Sin embargo, llegamos a la conclusión de que más estudios densos y largo plazo para construir un diseño en una dimensión ambiental más complejo y profundo de la realidad. En esta perspectiva, es importante insertar ambientalización en el plan de estudios académicos, asignando el papel esencial de las instituciones de educación superior en la preparación de los ciudadanos y los líderes de una sociedad democrática justa, equitativa y sostenible que contemplen las generaciones futuras, responsables.

Palabras clave: medio ambiente, conceptos, planes de estudio, de educación superior, la formación del profesorado

Introduction

The social transformations provided by scientific knowledge and technology during human history have also caused the degradation of relationships between Mankind and Nature. It is thus highly relevant to recover the meaning of Environmental Education as an educational practice that would make people aware of environmental issues.



However, when we try to explain the term 'Environmental Education', we note that the term brings forth several controversies which have to be faced. The issue is rather thought-provoking, especially for people who think that there is only a clear and pre-established definition of Environmental Education (Oliveira; Obara, 2006).

According to Reigota (2010), Environmental Education has been undertaken through the concept of Environment which, in its turn, is not a scientific concept but a social representation, or rather, "[...] a type of socially and shared knowledge with a practical aim, and which contributes towards the building of a common base for a social construct" (Jodelet, 2001, p. 22).

Several research works, particularly by Bezerra & Gonçalves (2007), Fonseca & Oliveira (2011); Silva & Campina (2011) and Junta & Santana (2011) have identified the concepts of Environmental Education and Environment produced by different agents and in several situations: teachers, environmental educators in informal spaces, media and pedagogical practices, and in scientific papers, respectively. Research has shown that no agreement exists among the declarations given. However, the concepts of Environmental Education may be classified according to traits in different environmental representations.

Sauvé (2005, p. 317) states that "the aim of Environmental Education goes beyond a type of education on, for, in, by or in favor of the Environment. It is rather our relationship with the environment". Six representations of the Environment are thus identified: nature; resource; issue; system; biosphere; a community project. These representations trigger different pedagogical approaches and strategies for activities by environmental educators.

Such varieties in representations on the term Environment have also contributed towards a lack of understanding on the true meaning of Environmental Education. In the case of many teachers, educating for the Environment is limited to the preservation of Nature, discarding cultural, social, economic, political and historical issues inherent to the theme, which are bypassed in debates. When discussing representations of Environmental Education, Sato (2001, p.8) warns the readers:

[...] each person or social group may have its own representation, or its own trajectory. It is, however, not admissible that people shun the capacity to criticize and endeavor to reproduce discourses and practices for the demobilization of Environmental Education, as just another educational practice.

This boils down to the fact that Environmental Education should not be studied as a methodological tool of environmental management or merely within educational institutes. Economic, political, cultural and social relationships between Human beings and Nature should be taken into account when Environmental Education is practiced. It is a commitment with the formation of citizens that may and should seek environmental solutions of their conditions. Reflexive and participating movements are highly important towards a change of behavior of the population in search of a common good (Reigota, 2010).

In this context, we defend Critical Environmental Education based on the theoretical referential of critical thought applied to education. It is an educational practice that aims at interpreting a more complex world which is capable of re-addressing life styles individually and collectively for an



intervention within the transformation process of social and environmental reality (Carvalho, 2004; Guimarães, 2004).

Within the practice of critical environmental education, agents participate in the process as individual and social beings, conditioned historically in their real environment. Consequently, research is undertaken to make aware people and social groups to identify, problematize and act in the wake of social and environmental issues.

With the perspective of a critical environmental education, formation occurs within the individual-society relationship and thus the individual and the collectivity are meaningful if they are related. People relate themselves with the world in which they live with others and for which they are accountable together with the others. Such a stance in environmental education supposes responsibility for oneself, with others, with the environment, without dichotomizing and/or hierarchizing such dimensions characteristics of human activity (Carvalho, 2004, p.20).

We may say that Critical Environmental Education does not consist in the transmission of truths, information, demonstrations and models; it lies in the action-reflection processes that make the agent apprehend the truths and thus develop new strategies to understand and act on reality.

Environmental preservation is thus not restricted to scientific discourse which frequently is seen by society as the absolute truth. Consequently, the opinion given or omitted by researching teachers contributes towards the construction of representations of a small part of society. This is the reason why we are engaged in this study within the context of the discipline Environmental Education in the Master's and Doctoral Postgraduate Program in Education for Science and Mathematics of a government-run university in the state of Paraná, Brazil.

Further, the National Curricular Guidelines for Environmental Education (Brasil, 2012) propose the establishment of public policies for curriculum environmentalization in Institutes of Higher Education. The term has been used since 2002 by the Curriculum Environmentalization of Higher Education Network (ACES) with European and Latin American universities, to divulge the activities, projects, methodologies and programs of Environmental Education. A new outlook for educational practices is proposed in their respective contexts, promoting Environmental Education within each and every reality. In the case of teachers' formation, ACES network aims at better society-nature relationships committed to justice, solidarity, equity and the ethics of diversities (ACES, 2002).

Higher Institutes of Education have an important role in the environmental crisis and may bring about deep changes within the predominant social paradigm through their contribution for a critical, reflexive and transforming Environmental Education, the formation of responsible citizens who participate in a more democratic society, with new values. It is a challenge for universities and may be one of the pathways in search of a sustainable society (Sorrentino, 2014).

The above considerations are required to condition our research which aims not merely to recover and analyze the ideas of post-graduate students on Environmental Education but, above all, to push them towards a reflection on their own concepts and the influence of their studies in pedagogical practice in the wake of Critical Environmental Education.



Methodology

Current analysis was undertaken in the last half of 2014 during the Environmental Education course within the Master's and Doctoral postgraduate program, during the discipline Teaching Sciences and Mathematics. At the start of the discipline, eighteen students from the Chemistry, Physics, Biology and Mathematic Courses were invited to represent through drawings what they understood by Environment, so that their ideas prior to the presentation of the theme could be identified. The discipline included theoretical and practical principles that foregrounded Environmental Education to contribute towards the construction of concepts on the environmental theme based on discussions within the social, political and cultural context. Lectures were given and discussions were held on the following topics about Formation Program (Figure 1):

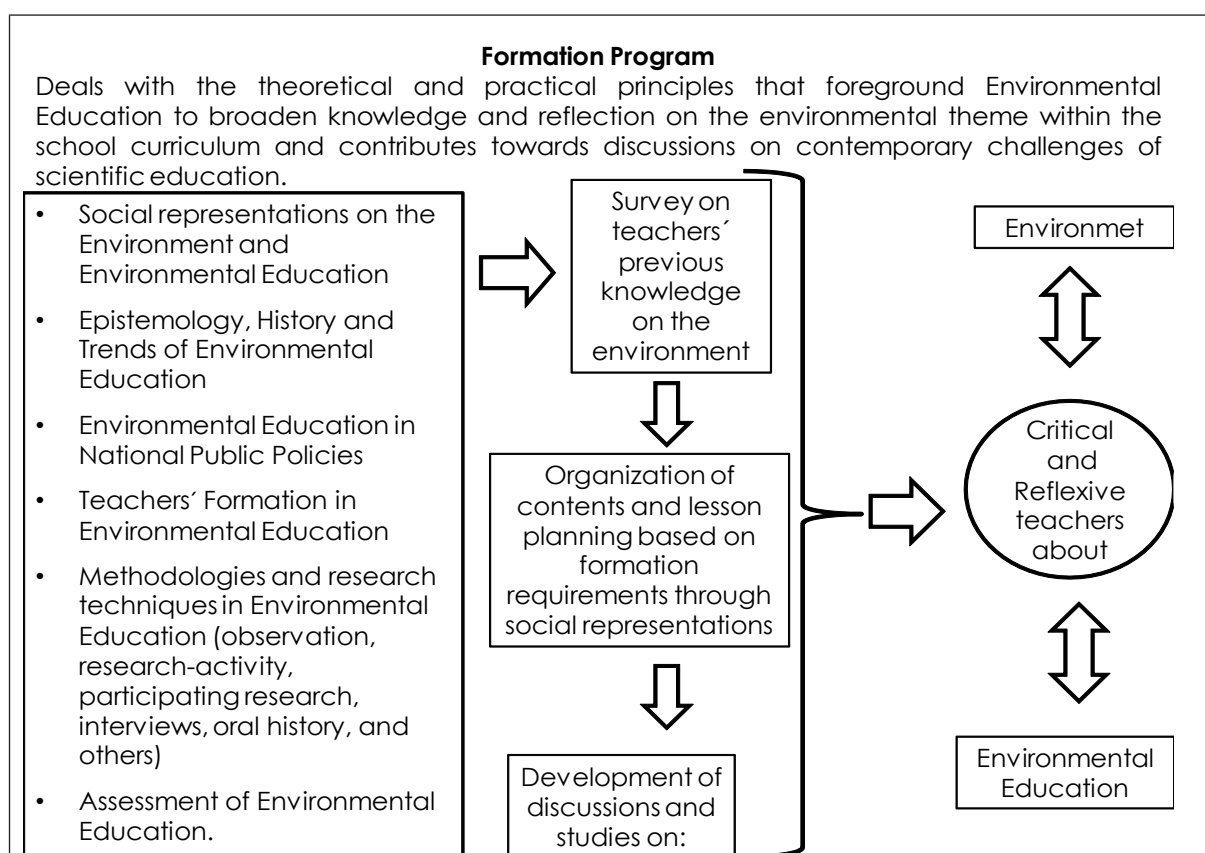


Figure 1. The Formation Program in Environmental Education: theoretical, political, curricular and pedagogical aspects.



By the end of the discipline, a questionnaire with three open questions was prepared to assess the concepts of the postgraduate students. The students had to discuss their concepts and experiences on the theme and participate in the recorded interview (Lüdke & André, 1986), transcribed and evaluated by Discourse Analysis (Bardin, 1977). The quantitative research interpreted data within the postgraduate students' context.

The questionnaire comprised the following questions:

1. What is your idea on Environmental Education?
Aim: to identify the different concepts on environmental education.
2. Which were the projects developed during your trajectory as a teacher, undergraduate or training student?
Aim: to perceive commitment with environmental education practices and approaches to such research.
3. According to the new concepts learned during the course, prepare a project on Environmental Education.
Aim: verify understanding of Environmental Education after discussions undertaken in the course.

Results and Discussion

When students' representations were analyzed, we could note that most gave a rather romantic idea of the environment in which Nature is underscored as good and perfect; it should be the object of contemplation, while human interference is either beneficent or non-existing. The above characteristic also belies an anthropocentric vision in which nature is the place to live in, a place occupied by humans and filled with resources that should be used (REIGOTA, 1991) (figure 2).





Figure 2. Representations previously elaborated by the interviewees

Most students had a rather Romantic opinion on the environment, including on an untouched Nature and Nature without people. Results revealed that 82% of the interviewed had a reductionist environmental opinion, whereas only 18% showed a broader and more realistic opinion (Figure 3).

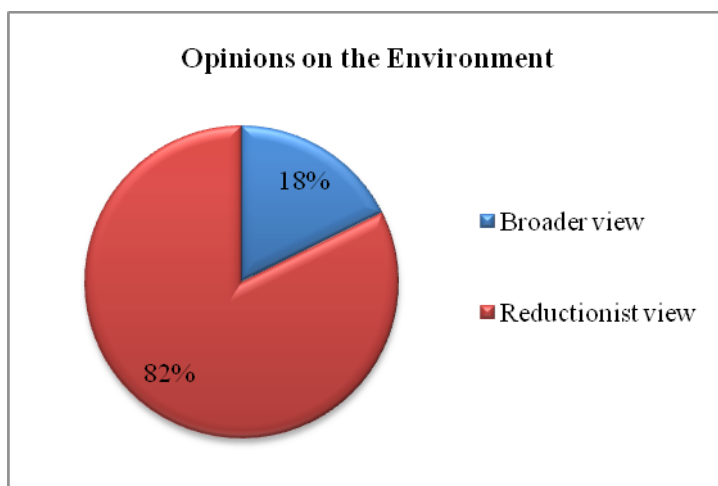


Figure 3. The postgraduate students' opinions on the Environment.

The reductionist opinion on the Environment conceives Nature constituted by physical and biological dimensions and proposes preservation actions (Reigota, 1998) but fails to take into account people and their interventions on the Environment, as Figure 4 shows.

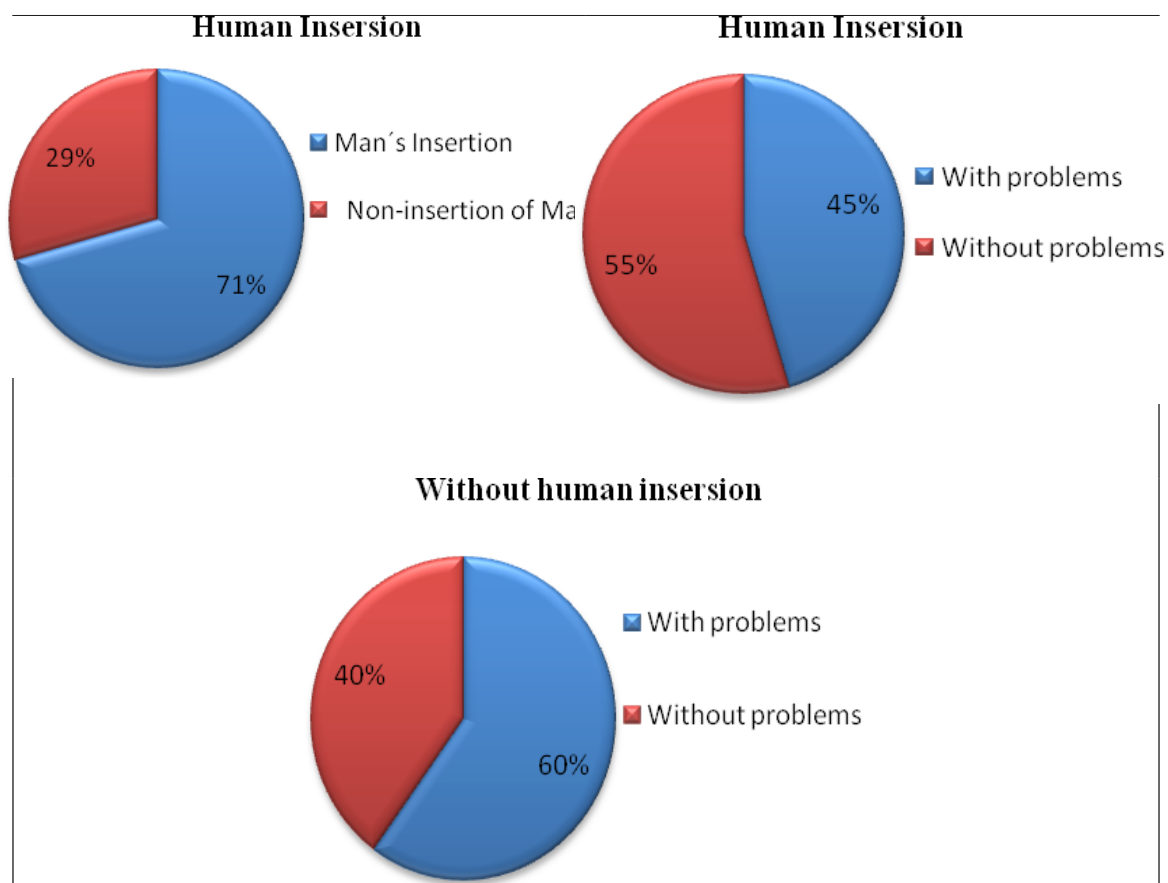


Figure 4. Man's insertion and non-insertion in the Environment represented by environmental problems; without environmental problems in other cases.

Result demonstrated that, although 71% of the interviewees do not think that Man is an integral part of the Environment, only 29% took into account his insertion in the Environment. However, among those who consider Man as part of the Environment, 45% pinpointed man and his intervention, whilst 55% considered man's insertion in the environment without his participation in the environmental issue.

Further, 40% of students who think of the Environment without Man's insertion forwarded several environmental problems, whereas 60% revealed an environment without problems.

A reductionist and anthropocentric view of the Environment may be identified through people's representations of the Environment (Reigota, 1998). The trend has been reported by several authors (Hoefel et al. 2004; Costa et al. 2006; Molin et al. 2007; Malafaia & Rodrigues, 2009) who analyzed different populations from different places, featuring a predominance of the reductionist point of view. Hoefel et al. (2004) investigated people living in four towns in the state of São Paulo, Brazil; Costa et al. (2006) studied students from Technical Courses in Rio Grande do Norte, Brazil;



Molin et al. (2007) researched students from different schooling levels; Malafaia & Rodrigues (2009) investigated government-run and private school children and students from technical schools in Minas Gerais; current study researched postgraduate students at a University in the state of Paraná, Brazil. The basic question is: *Which motives form a reductionist and anthropocentric ecological concept in people?* Several authors think that one of the motives is that few disciplines deal with the environmental theme and that concepts on the issue are analyzed rather superficially (Costa et al. 2006). Another motive is due to the sensationalism transmitted by the social media on the environmental problem. In fact, the social media report a rather untrue idea on the environment to televiewers. Moreover, in their textbooks, several authors also underscore ecological themes in a traditional and decontextualized, underscoring a fragmented and reductionist view of the environment (Rodrigues & Malafaia, 2009; Molin et al. 2007; Fonseca, 2007; Dias, 2001; Sato, 1994).

Participants in current analysis insisted that they had little or no contact with environmental education in the disciplines studied. In their opinion, the lack of any environmental theme within an interdisciplinary stance in the curriculum, either in secondary education or in Higher Institutions, is one of the factors that contribute towards a reductionist and anthropocentric view which they revealed. The above result is corroborated by other authors. In a similar research at the University of Londrina, Verona & Lorencini Jr (2009) underscored that students also argued on their lack of experience on the theme due to the same motif, or rather, the theme was not studied during undergraduate courses.

However, throughout the course, the group under analysis improved its discussions and concepts on Environmental Education and Man's participation and responsibility with regard to the environmental theme. These concepts may be detected in the first question of the questionnaire: *What is your opinion on Environmental Education?* Postgraduate students insisted that, through knowledge and discussions during lectures on the discipline, their opinions were:

E2: "Understand people's activities and interference on the environment. It is important to reflect, problematize and criticize socially, politically and ethically".

E14: "Understanding Man-Environment relationships in their ecological, social, economic and cultural stance".

Due to such questions and foregrounded on critique and reflections on the environmental theme, postgraduate students could respond in a more holistic way. Consequently, the idea that the environmental dimension involves several systems of knowledge, professional capacity and the university community within an interdisciplinary perspective that includes social-environmental sustainability is reinforced (Jacobi, 2003).

A survey on students' activities on the environmental theme was undertaken during the discussions. *Which type of activities in Environmental Education have you developed in the course of your profession, as a teacher, university student or intern?*

The interviewees narrated on common projects at school, frequently undertaken at certain periods, such as the Environment Week and Arbor Day, and in workshops. They insisted that, in the wake of new knowledge on Environmental Education, they perceived that activities were undertaken



without discussions or reflections, without taking into consideration the school's true needs. The following passage will illustrate the above.

E6: "Yes, I have worked, well I think I have worked with Environmental Education in workshops; we had to prepare workshops with themes; we preferred to work with the Environment theme. Well, we worked on sources of renewable and non-renewable energy. However, after discussing now the subject of sustainability in the discipline Environmental Education, I perceived that we have dealt only with ecological concepts and left behind the social, economic and cultural issues which we have seen here. I have perceived now that there was a gap in the issue".

The above discourse shows that the interviewee self-criticizes himself on the practice of environmental education activities. His speech shows that traditional, technician and a-critical actions which do not allow people to reflect on their own practice and relate them to the issue in a holistic way, fail to be solutions for the issues (Lima, 2004). Figure 5 shows the projects developed by the interviewees.

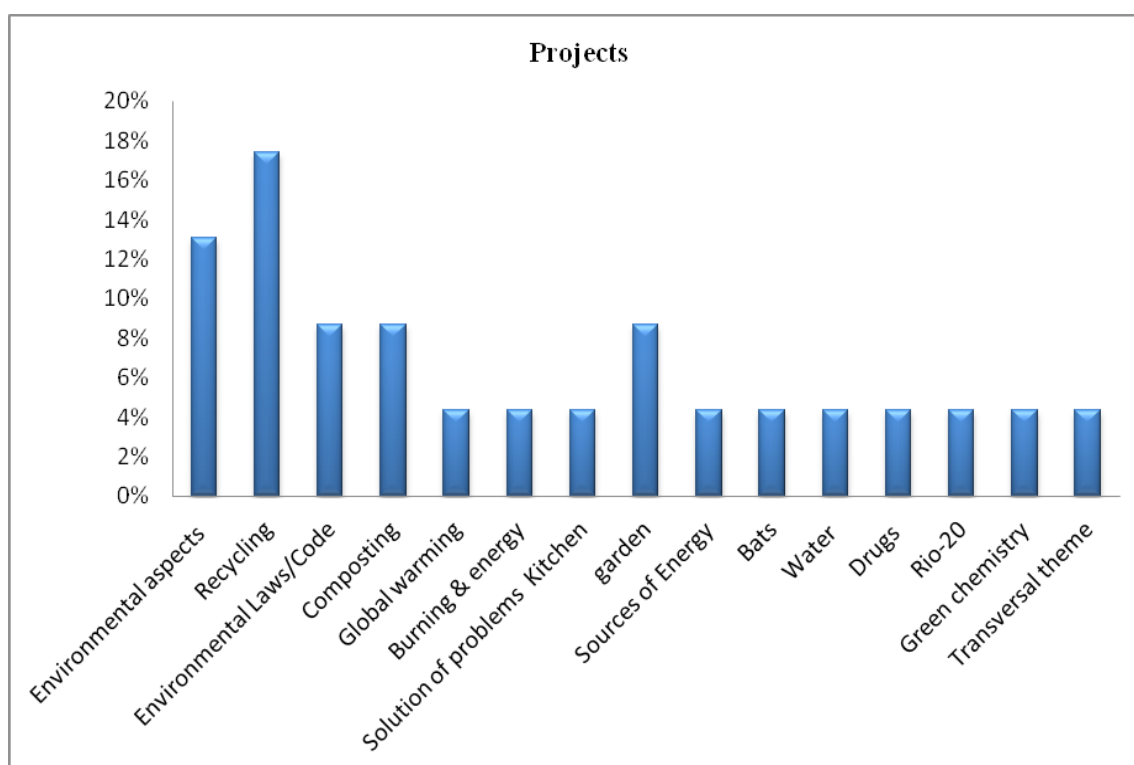


Figure 5. Main projects developed by postgraduate students prior to the discipline on EE.

The most common projects practiced by the interviewees were recycling and environmental aspects, respectively with 18% and 13%, whereas Environmental Laws, composting and kitchen garden comprised only 8% of the projects.



Result reveals that the project's themes, albeit relevant, are deal with superficially and without any problematization. According to the interviewed, teachers frequently have "ready-made models" to deal with the theme discussed.

At the end of the discipline, the participants were asked to prepare a project within the perspectives proposed during the course of the discipline. In other words, they were asked to do so according to the new concept on Environmental Education constructed by the postgraduate students during the course: *Prepare a project according to the new concepts on environmental education*. Table 1 presents the result.

Table 1. Projects prepared after lectures on EE.

	Group 1	Group 2	Group 3	Group 4
Area	Biology Chemistry Physics	Biology Chemistry Physics Mathematics	Biology Chemistry	Biology Sciences
Title	Photos and films as strategies for the perception of environmental issues in teaching in high schools.	Perceptions of university students on social and environmental issues on the campus: a study on pamphlets.	Green chemistry as a tool for environmental reflections in Chemistry teachers' formation.	The river Ivaí-Paraná as an interdisciplinary pedagogical proposal of EE in the teaching of Natural Sciences: a case study.
Approach	Local environmental perception; local social representations; theoretical and methodological presuppositions	Social and environmental critique; enhancement of interdisciplinary EE; broaden environmental perceptions and their acknowledgement.	Social and environmental insertion in the formation of Chemistry teachers.	The importance of the school in the formation/ sustainability of significant/reflexive/ interdisciplinary EE; Identify local/ regional problems



Development	Photos, films, data collection of problems; Tracking in several places, identification and comparison; Reflection, dialogues; broaden one's vision on environmental reality; construction of values, attitudes and solutions.	Previous knowledge; difficulties, garbage, visual pollution; analysis of previous knowledge and contrasting them with those acquired after activities; mathematical discussions and technical reflections. Interdisciplinary questionnaires. Photos.	Previous knowledge; concepts and understanding of green chemistry (GC); associated with EE; evaluate, change, adequate experimental plans; Impacts of GC on society/ environment; GC in the basic education teaching; problematization, readings, discussions, critical analyses; report, practical lessons, decision-taking, others.	Previous knowledge; importance of the school in the formation/ sustainability/EE significant/reflexive/ interdisciplinary of local/regional problems; didactic interdisciplinary sequences (Chemistry, Physics, Biology, Geography) debates, identification: limits, advances; critical and reflexive formation.
Methodology	Research-action	Mathematical modeling	Qualitative research; case study.	Qualitative research; case study, analysis of documents.

Table 1 identifies interesting proposals with regard to environmental themes, with a greater knowledge on environmental education and approached within the social and environmental reality of each place. Since they were able to propose a methodology and the development of the project, they showed knowledge and capacity in dealing with the projects' proposals.

Analyses of the projects demonstrated that the groups focused on day-to-day environmental situations that require action and rapid solutions. For instance Group 1 suggested the identification of social and environmental problems through photos and films for registration and analysis. Group 2 also proposed a relevant suggestion with regard to pamphlets on campus. The issue requires discussion on shared responsibility with the academic community with regard to giving priority to the non-generation, reduction, reuse, recycling, treatment of residues in an environment-correct way, by reducing their impacts on human health and environmental quality (Medauar, 2014). Group 3 suggested discussions on the environment through green chemistry in the formation of the Chemistry teacher, with a holistic approach that would deal with society-environment and decision-taking. Further, Group 4 underscored the importance of the river Ivaí for research on Environmental Education in the teaching of Natural Sciences.

The four groups insisted on projects dealing with social and environmental issues, taking into consideration situation-problems that require identification and solutions. It is highly relevant to underscore that interdisciplinarity among the areas that form each group, Chemistry, Physics, Biology and Mathematics, provided a wider approach for problems involved.



Postgraduate students developed their concepts on the environmental theme provided by readings and discussions during the course. They showed capacity, self-confidence and creativity in the preparation and execution of the projects. Teachers' formation is mirrored by their practice and reinforces the importance of higher education institutions in establishing the environment theme in their curricula. Since they aim at the quality of initial formation, they should be able to face social and environmental issues in a reflexive, contextualizing and problematizing manner to obtain solutions for the social and environmental problems.

Final considerations

Current analysis identifies the ideas of postgraduate students in a Brazilian university with regard to the environment theme. The authors initially reported that postgraduate students had a sort of Romantic and anthropocentric view of the environment and a reduced knowledge on the theme. Dialogues during lectures, readings and discussions throughout the course for a questioning stance within the environmental issue were efficacious in the improvement of their concepts. Discussions during the half-year course were highly beneficial for the students to identify day-to-day environmental issues and prepare projects within the social and environmental contexts concerned. However, the authors insist that more in-depth and long term studies are required for the construction of stable and solid ideas on environmental education within a deeper and more complex dimension in social and environmental reality. Although results were positive for the improvement of postgraduate ideas on the environment, the relevance of an environmental approach in Higher Education should be reinforced. Interdisciplinary insertion in the curriculum of university courses will prepare future teachers to face the challenges imposed by environmental sustainability. High Education Institutions should reassess their role in the preparation of responsible citizens who will form a democratic, just, equalitarian and sustainable society within the perspective of future generations.

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