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REPORT



Environmental education research in Brazil: some highlights from theses and dissertations

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ABSTRACT

This article discusses an analysis of abstracts of Brazilian theses and dissertations on environmental education from a database organised and maintained by a group of researchers in the EArt Project (www.earte.net). In presenting extracts of key trends in this dataset, our aim is to provide a snapshot of the many possible approaches to, and histories of, Brazilian environmental education research. The data also allow us to raise some questions that explore possible 'blank spots', 'blind spots' and 'bald spots' in Brazilian research on environmental education. Given the temporal development of the research field since the 1980s, we illustrate these 'spots' by exploring data related to epistemological and methodological diversity, from the viewpoint of knowledge areas as well as the graduate programmes that have been developing research on environmental education. Finally, we draw a picture of the methodological trends that have been privileged by Brazilian researchers, and pose questions as to what is needed in shaping an agenda for research on environmental education in Brazil into the future.

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Brazilian environmental education; environmental education research; theses and dissertations; postgraduate environmental education; methodological trends

Introduction

The complexification of contemporary Brazilian society's environmentalisation and ecologisation processes (Leff 2002), coupled with the current diversity of theoretical–methodological trends in environmental education practices (pedagogical and research) can also be readily observed in the Brazilian environmental education field. Such diversity is a challenge to understanding environmental education as a monolithic field of knowledge, particularly when the field, be that nationally or internationally, is susceptible to both the emergence and proliferation of nature and culture hybrids (Latour 2004) and calls for new paradigms that 'redefine science-politics relations', that lead to a radical questioning of the separation between nature and culture, including within education and research (Freire 2006, 53).

Payne (2009) has previously drawn attention to some of the changes that the field has experienced internationally from the 1970s onwards, but mainly from a position of documenting those approaches and trends in Anglo-speaking, globally north/west countries. From Payne's perspective, positivist approaches predominated up to the 1990s, until a political and more socially critical education began to emerge, informed by the theoretical and practical fundamentals for a transformative education, for example, pointed to in critical circles by Jurgen Habermas and Paulo Freire (amongst others). From the mid-1990s, however, multiple conceptualisations and approaches to environmental education began to surface more clearly. These included aspects that reflected globalised discourses and a global logic of education for sustainable development, responses that marked interactions with the so-called linguistic turn or even a 'corporeal turn', emphases on emotional experiences and on interdisciplinarity ... just some of the tendencies that Payne (2009, 56–57) saw as influencing various pedagogical and research currents in environmental education.

Elsewhere, Stevenson et al (2013b) and Gough (2013) have addressed the profound changes in the international field from both a theoretical point of view and in relation to methodological approaches. For these authors, the fields of research and practice must accommodate disciplinary, interdisciplinary and transdisciplinary perspectives and, for this reason, are bound to resist attempts to delimit and impose strict limits on what they can and might be. Yet, according to Payne (2009), although such diversity is celebrated by many as a healthy sign of a democratic, pluralistic field, because different theoretical and methodological perspectives have to be developed and accommodated, concerns can be raised about any singular historical meaning or commitments, as well as the strategic value of the field, including in relation to a perceptions of a lack of coherence, identity and collective purpose.

While not everyone or approach is recognised in such overviews of the field—including those from Brazil—it is in such complex and contested international scenarios that attempts to produce knowledge about a particular subfield of environmental education must occur, including through attempts to develop studies of research on environmental education itself. Equally, it is in a context of ontological, epistemological and methodological plurality that the relations between environmental education and research in a field must receive attention by its academic community. Whether they were well-founded or not, nearly a decade on, Payne's (2009) concerns also beg the question of what are the possible implications of maintaining a diversity of perspectives in environmental education for research in the field, locally, nationally and internationally? For Payne (2009), this is important because it must include critical questions of the research community itself, such as to what extent the knowledge produced by certain quarters of a research community is contributing to the construction of its identity, social credibility and political role, from the local to global, and vice versa, if colonisation is also a factor?

Addressing these and many other related issues requires a range of efforts to document and problematise instances and trends in research on environmental education in different countries, and by different research groups. The release of the International Handbook of Research on Environmental Education (Stevenson et al. 2013a) is a strong marker of this, as are various articles and special issues of journals in this field dedicated to the analysis and reflection on environmental education research in particular regions. According to the editors of the aforementioned handbook, analysis of 'the state-of-the-art' of environmental education research nationally and internationally opens up new avenues of inquiry. It also helps the wider research community understand the meaning of what has been produced by particular individuals or groups, in regions and subregions, schools and movements, as well as thematically or in relation to global trends. In other words, reflecting on the 'state of the art' allow us to:

consolidate what we already know and what we do not know as a field and demarcate the boundaries of our certainties and uncertainties; critically examine the changes that we have experienced, in recent decades, in the different dimensions of research practice; highlight the current debate and controversy as

well as our silences; identify our weaknesses and highlight our achievements as a consolidated epistemic community. (Stevenson et al 2013b; 1)

Studies of this kind can also move the field beyond initial needs to assess 'the substance and robustness' of the knowledge produced by the environmental education field, towards offering a 'foundation for advancing the thinking of scholars and students about future directions for environmental education research' (Stevenson et al 2013b, 2). Mindful of the colonising processes associated with internationalised knowledge production and exchange, for Gough (2013) this requires questioning the beliefs, slogans and assumptions that may be(come) uncritically rooted, uprooted or re-rooted in particular research communities or settings, as these tend to lead to the production of unhealthy or unwarranted consensus about research paradigms and priorities.

Gough continues his challenges to the status quo by recognising that in the aforementioned handbook on environmental education research, 'several of the chapters argue that we need to be aware of different notions of our history and how it influences us'. Or, as Ferreira (2013, 64) puts it later on in the handbook, our 'histories of the present' can offer 'an understanding of how we have to come to be what we are where we are, and therefore an understanding of how we might become something other than we are, and do something other than we do, now and into the future'.

What seems relevant to us here is to acknowledge that although environmental education is steeped in contextual factors that lead us to a complex view of the research field, it is possible to identify different groups of researchers in different regions of Brazil who work within networks, regionally, nationally and internationally. We can note too that today, and internationally, there is already a variety of bibliographic resources available, both in terms of the number of publications and with regard to a recognition of thematic, epistemological, methodological and geographic diversity (see, for example, the main and peripheral journals of the field, and examples such as Robottom and Hart 1993; Hart and Nolan 1999; Gough and Reid 2000; Ardoin, Clark, and Kelsey 2013). Returning to Payne (2009), attention can be drawn to some possible links between research and the actual construction of a particular environmental education field. This requires the realisation that the knowledge produced by research practices in environmental education is typically a constituent part of the basic socio-cultural construction of the discourse of this area of knowledge locally and regionally. Payne also observes a singular role for researchers on research on environmental education here: they must reach beyond the description and analysis of teaching practices, because the discourses constructed by researchers are themselves constituents and participants in the construction of the identity of this field. (This is brought home when their studies, if not their very bodies/minds, are those used in the education of the next generation of environmental educators, such as during initial teacher education.). In other words, research reports are not simply objective portraits of educational practices related to environmental issues, but discursive products that contribute to the very construction and assignment of meanings concerning environmental education practice, such as during their use within pre-service and in-service professional development activities, or during debates, seminars, workshops and symposia on the state of the art and future directions of the field.

Turning to a Latin American context specifically, although González Gaudio and Lorenzetti (2013) admit that research on environmental education in this region is still embryonic, they recognise some institutional efforts in Mexico and Brazil to promote research about the field and how knowledge is produced within faculties of education and in the academic and public sectors more broadly. Other references to the field of environmental education research in the Latin American region can be found in Arboleda and Páramo (2014), who present a review of articles published in the field of education by journals indexed by SciELO and Redalyc from 2000 to 2013. Their results identify articles written from seven different countries (Argentine, Brazil, Chile, Colombia, Costa Rica, Mexico and Venezuela). According to Arboleda and Páramo, analysis of these selected studies can reveal very different characteristics to practice in environmental

education when plural epistemologies and methodologies are explored. Yet, they also acknowledge that a substantial part of these studies are descriptive, focusing as they typically do on identifying the types and extent of environmental knowledge, attitudes or representations of students, or by offering investigations that evaluate various teaching strategies used in environmental education activities.

Aware of this pattern, in Brazil, the academic community has endeavoured to redirect and strengthen the field and outputs of environmental education research primarily through graduate studies, providing it with visibility and disseminating the knowledge generated by such research. The numerical growth of studies on environmental education in Brazil is no longer news to the scientific scene in the country. Recent studies presented in scientific events and journals, especially in the areas of education and science education, point to this growth, and are discussed in the article by Carvalho et al. in this issue.

More specifically, the plethora of graduate studies on environmental education in Brazil, offer a rich data set that can reveal insights into how knowledge is produced, disseminated and socialised in this field. Of particular note is the study of theses and dissertations at the level of meta-research. Marcinkowski et al (2013) argue these can offer some pertinent insights, in that: 'studies of studies' may reveal the theoretical and methodological frameworks and focuses of investigations that have been either privileged or received little attention from emerging researchers, as well as by their advisors or supervisors. Moreover, these meta-level studies may help identify and delineate the contours and roles of communities of researchers, lines of research, and graduate programmes in the area, as much as how they produce and reproduce certain knowledge in relation to particular research questions over time.

For Marcinkowski et al (2013), the merit of studying theses and dissertations is also justified by the scarcity of these studies: there is simply a limited amount of these types of analysis available, at national and/or international scales. A number of factors appear to have contributed to this, particularly in relation to theses and dissertations. Chief among these, Marcinkowski et al. observe, is that while there is a growing amount of graduate-level work carried out in a range of countries, there is also a diversity of languages of record, an absence of indexes or electronic databases that systematise and make available the entire scope of activity internationally, a lack of financial and material resources to ensure these studies stay available, e.g. in digital archives that offer translation too. Given these limitations, and a distinct need for periodic and synoptic review, meta-studies with a national, regional, or international scope play an important role in addressing these research gaps.

Acknowledging but also seeking to address this situation, an inter-institutional group of Brazilian researchers developed the project, 'Environmental Education in Brazil – analysis of academic production – theses and dissertations' (EArte – Environmental Education – state of the art). Given the wider purposes of this collection to which this article contributes, and from a brief history of this research project as a point of departure, this article will present part of the analyses performed on abstracts of Brazilian theses and dissertations entered in the EArt Project database (www.earte.net).

Since 2006, when the current version of the Project started, various authors of theses, dissertations, articles and scientific conferences communications, have researched the state of art, referring to this database as the main source for their investigations (see the references to this research in the research report available at the website mentioned above, and in Carvalho et al. 2016).

The data on theses and dissertations that have already been entered, systematised and analysed allow us to raise questions that explore the possible 'blank spots', 'blind spots' and 'bald spots' in Brazilian environmental education research (as proposed by Gough (2004) and expanded by Reid and Scott, 2013). For this article, we have chosen to focus on data that reveal the temporal development of the research field in environmental education in Brazil since the 1980s. We have also sought to explore data related to diversity, from the viewpoint of

knowledge areas as well as of graduate programmes that have been developing research on environmental education. Finally, we draw a picture of the methodological trends that have been privileged by Brazilian researchers, and ask where, and what next.

Put differently, we have not attempted to delineate an all-encompassing overview of graduate studies, nor do we present ‘the picture’ of environmental education and its research in Brazil. Rather, we present a series of snapshots on environmental education in Brazil that these can provide which, as proposed by Stevenson et al (2013b), afford insights into the many possible ‘histories that could be created and reflect the perspectives of those whose voices are included’ (2). With this in place, we can then compare these with the trends and issues noted elsewhere, in further research on trends in the production of knowledge on environmental education, locally to globally.

‘State of the art in environmental education research in Brazil’ (EArte): an overview

At its heart, the EArte Project entails the construction and maintenance of a database of theses and dissertations on environmental education in Brazil.

The project has the following goals:

- a. To locate studies that relate educational processes to environmental issues across Brazil and in different graduate programmes, including identifying the research groups in the country involved in such activities¹;
- b. To analyse the contexts and contents of knowledge production, such as identifying educational settings (school and non-school) and the themes of the study, that have been privileged by Brazilian researchers;
- c. To develop analytical and reflective studies based on the main interests of the different researchers involved in the project, including an analysis of gaps and research agendas for the future.

A more detailed history of the project, its objectives, the criteria for selection and classification of documents entered in the database of dissertations and theses of EArte, the descriptors used in this process, and other project data, can be found in the project website: www.earte.net. A search engine associated with this database, which allows for the location of studies based on the interests of researchers, educators and the community at large, is also available to the research community and environmental educators at the aforementioned website.

Methodological perspectives for analyses of dissertations and theses

State-of-the-art studies, especially those in the early stages of exploration of a research field, usually benefit from a descriptive phase to orientate the analyst and reader. These early steps also make it possible to identify the aforementioned ‘blank spots’, ‘blind spots’ and ‘bald spots’ in studies. In this regard, and in order to systematise and analyse the descriptive features of these theses and dissertations on environmental education in Brazil, we adopted the methodological procedures of content analysis (Bardin 2011). According to Bauer (2002), such an approach provides a ‘bridge between statistical formalism and the qualitative analysis of materials’, reducing the ‘complexity of a collection of texts’ (3) and allowing the identification of certain characteristics of the corpus.

Another methodological approach that has guided our analysis is the possibility of exploring entries from the perspective of ‘discursive genres’ (Bakhtin 2010). This requires treating the research reports as instances of discursive practices. Doing so also allows us to explore questions

such as the following: what meanings can we construct from a dialogue with the texts regarding fundamental concepts or processes in environmental education, such as nature, society, relationship between human beings (society) and other elements of nature, education, environmental education? And, what meanings can we construct when focusing on ontological, epistemological, methodological and axiological positions that have guided research practices during the exercise of representing the knowledge generated in the research?

When we undertake such an approach, we accept the proposition that our research reports are not a 'picture of reality', but are results of discursive interactions; that is, there are a link in the communication chain and a response to concrete statements already produced that will probably encourage other utterances too (Ferreira 2002), such as through citation and critique. Therefore, we cannot refer to data from the analysis of theses and dissertations '[...]' as faithful records of reality, but as aspects that reveal a way to see things and an intention' (Martins 2006).

Theses and dissertations on EE in Brazil: historical development and geographical production distribution

Considering the material available in the EArtee database, the corpus we worked with includes abstracts of theses and dissertations developed in the country from 1981 to 2009 and from 2011 to 2012.² (The first master's thesis on environmental education in Brazil was completed in 1981, and the first doctoral dissertation, in 1989.)

The history of the environmental movement in the country and the Brazilian political context in the 1970s and early 1980s provide key elements to explaining the conditions for the beginning of research in this field. The 1970s, a period of military dictatorship, are considered to be gestational, marking the beginning of the environmental movement in Brazil³ as well as of the environmental debate at that time. Viola and Leis (1989) consider that this is a response to a combination of international and national historical factors, such as the Stockholm Conference in 1972 and a 'slow and gradual' process of political liberation, tightly controlled though it was by the military. In that process, the return of exiled politicians who were amnestied in 1979 had a strong impact, bringing and encouraging issues to be addressed in the public sphere that had already been placed on the agenda of international discussions. Among them was 'green' political movements, which culminated in the creation of the Green Party in Brazil in 1986. The graduate school system in the country gathered momentum in the 1980s too, which also created favourable conditions for research initiatives on environmental education, which begin to be institutionalised shortly thereafter.

In Figure 1 and Table 1, we present figures on the total number of Brazilian master's theses and doctoral dissertations in environmental education research, year by year, and by level of academic degrees four for the 1981–2012 period.

The 1980s then, can be empirically recognised as the beginning of research on environmental education in the country, when the first studies on environmental education at the graduate level were carried out. During that decade, 17 master's theses (from approximately 3000 studies recorded in the EArtee database) were completed. However, the rapid growth in the number of studies subsequently produced is quite evident in Figure 1, mainly in relation to those in academic master's programmes, and between 1992 and 2012. We can consider that the 1990s marked the first phase of consolidation of research on environmental education in graduate schools, leading to that, subsequently, at the doctoral level.

According to Fracalanza (2004, 57), the so-called ecologization of society and the 'environmentalization of educational processes', especially by means of propositions and practices denoted by or named as environmental education, are very recent events. Nevertheless, such a 'dizzying explosion' of research in this field can be observed in relation to the number of theses and dissertations related to that topic, and produced in Brazil in the last 10 years. Indeed, we

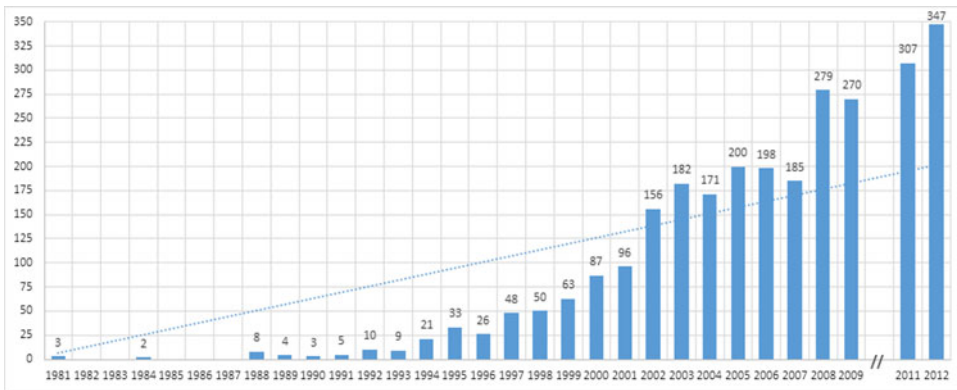


Figure 1. Total number of master's theses and doctoral dissertations on environmental education in Brazil from 1981 to 2012. Source: Carvalho et al. (2016).

Table 1. Number of theses and dissertations on environmental education developed in different fields of knowledge to which graduate programmes are linked.

Knowledge areas	Master's theses	Doctoral	Total
Education	748	81	829
Interdisciplinary	373	32	405
Science and mathematics teaching	191	9	200
Engineering	114	22	136
Geography	90	17	107
Biological Sciences (including ecology and environment)	69	35	104
Agricultural Sciences	71	10	81
Health	27	21	48
Law	36	4	40
Psychology	26	5	31
Business administration, accounting and tourism	28	2	30
Social sciences	17	7	24
Architecture and urbanism	8	3	11
Physical education	10	0	10
Social work	7	2	9
Economics	2	0	8
Urban and regional planning/demography	6	1	7
Anthropology and archeology	3	1	4
Others	14	0	14

can observe the growth rate consolidating around 2000, after which approximately 90% of the studies performed to date (2896) were developed. We can also note an association between the organisation and hosting of the United Nations Conference on the Environment and Development, held in Rio de Janeiro in 1992, and the increase, as of that date, in the number of completed dissertations and theses (Figure 1), mainly, from the year 2000. Such a tendency has also been pointed out by other authors too (Tomazello 2005; Reigota 2007; Carvalho, Tomazello, and Oliveira, 2009; Kawasaki and Carvalho, 2009; Carvalho 2009; Kawasaki et al. 2006; Megid Neto 2009; Carvalho and Farias 2011; González Gaudiano and Lorenzetti 2013).

Most of the theses and dissertations catalogued in EArte were developed in the Southeastern and Southern regions of the country (1934 out of 2765), especially in the states of São Paulo, Rio Grande do Sul, and Rio de Janeiro (1498 out of 2765) (Figure 2).

This trend is also observed in articles published in annals of national events in the environmental education field (Carvalho et al., this issue). In agreement with Carvalho et al. (this issue), we can attribute such large concentrations of research to geographic inequalities related to economic, social and educational development that correspond to different Brazilian regions and states. This pattern of geographic concentrations in academic outputs confirms what has already been observed and debated in other fields of knowledge (Souza and Bianchetti 2007). The current National Plan for

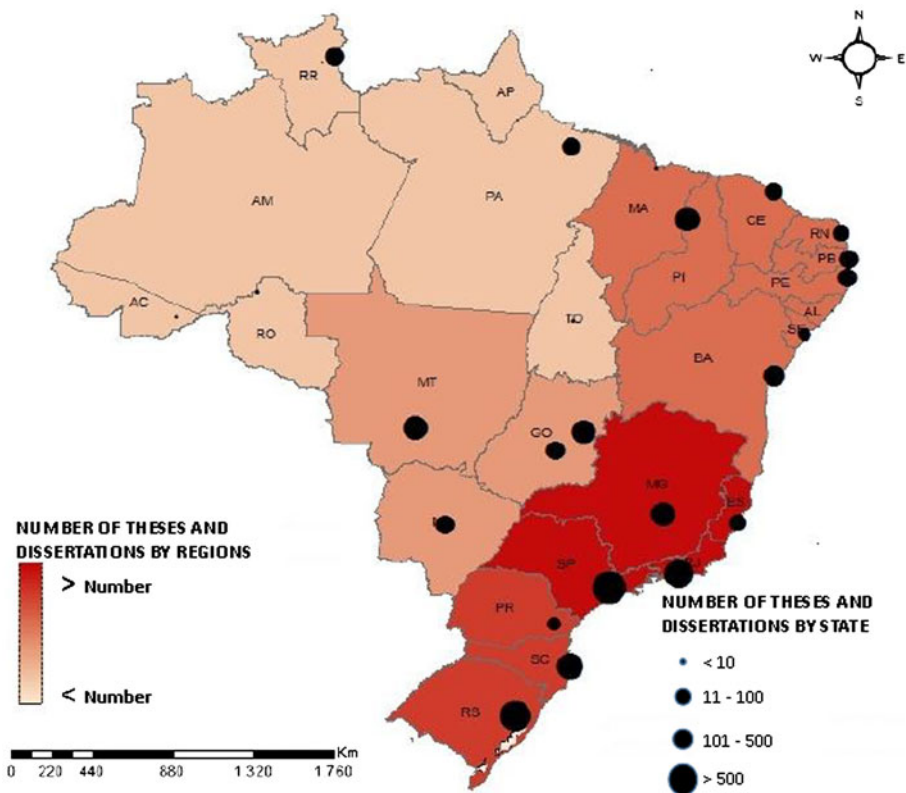


Figure 2. Distribution of dissertations and theses on environmental education completed in Brazil from 1981 to 2012 by region and by Brazilian states. Source: Carvalho et al. (2012). Designed by Farracini, J. C. B (2012) – Data from www.earte.net

Graduate Programmes in Brazil gives special emphasis to that issue by pointing out the urgency for public policies that can change this situation, in order to minimise the consequences of such regional differences in research and graduate programme activity in Brazil (Brasil 2010).

Research on environmental education in Brazil in the graduate context: a panoramic view

One notable characteristic of environmental education research in Brazil is the great diversity of fields of knowledge to which graduate programmes are linked (Table 1). As expected, there is a large concentration of studies in programmes linked to the Education and Teaching fields and to programmes of an interdisciplinary nature. Other areas of knowledge to note are those traditionally linked to scientific or statistical approaches, such as from the fields of engineering, geography, biological sciences, and agricultural sciences. Few studies are linked to graduate programmes related to the areas of philosophy/theology, biotechnology, computer science, political science and international relations, languages/linguistics, art/music, or history. When such studies are grouped into larger fields of knowledge (Table 1), it can be observed that a significant number was performed in programmes linked to the field of humanities, followed by health sciences, especially in public health, nature sciences, and the technology.

Considering the wider context of international production of knowledge on environmental education, to which areas has research in Brazil been predominantly linked? Has the diversity of areas reported herein also been observed in other countries? Data for the Brazilian context certainly corroborate what we see as a clear consensus among the authors who participated in the

Table 2. Number of theses and dissertations completed in Brazil from 1981 to 2012 whose abstracts mention the methodological approach used in the research.

References to methodological approach	Number of abstracts
Total number of abstracts that make mention a methodological approach	998
Qualitative	401
Quali-quantitative	129
Action research / participatory	248
Case study	240
Bibliographic	160
Documental	160
Ethnographic/ethnomethodology	57
Life history/autobiography	13
Oral history	16
State of the art	05
Historiography /historicist	05
Social research	08
Narrative	06
Survey	07
Quantitative	02
Experimental research	12
Quasi-experimental research	02
Piaget's clinical method	02
Experimental psychology	01

publication of the International Handbook of Research on Environmental Education (Stevenson et al. 2013a), namely there is an often a multiplicity of fields of knowledge, disciplines and research traditions present throughout the production of research on environmental education. In the introductory text to the handbook and with reference to the aforementioned characteristics, the editor note that:

Over the years environmental education has been researched by scholars who bring a variety of disciplinary (and interdisciplinary) perspectives to the field. Among them are Education and its subfields (e.g. Educational Psychology, Sociology of Education, Curriculum Studies), Environmental and Natural Sciences (e.g. Biology, Ecology), and Environmental Social Sciences (e.g. Environmental Psychology, Sociology, and Philosophy) (Stevenson et al. 2013b, 2 and 3).

It is not without reason that book editors assume that one of their 'missions' is 'to bring together divergent perspectives, methodologies, methods, and findings of this broad community of scholars' (3). This perspective, as expressed since the first reviews of research in this field (Robotton and Hart, 1993; Hart and Nolan, 1999), has been given additional momentum by different authors that explore this issue in the handbook (e.g. Gough 2013; Marcinkowski et al 2013; Hart 2013; Reid and Payne 2013). Yet, in addition to aspects of an epistemological nature, there are others directly related to national science and technology policies that must also be considered. In the Brazilian context, it is not possible to deny the centrality of graduate programmes in the country's scientific programmes and outputs. In Education, this primarily takes place in, and as a consequence of, graduate programmes. It is also recognised that graduate programmes in Brazil, especially those in public higher-education institutions, are responsible for most (around 90%) of scientific outputs (Dantas 2004; Goldani et al. 2010; Santos and Azevedo 2009). Thus, as Carvalho, Tomazello, and Oliveira (2009) have already noted, attempts to understand 'the production paths of research on environmental education in Brazil requires understanding the paths followed by Brazilian graduate programs' (21).

Methodological trends in graduate research on environmental education in Brazil: early approaches

Graduate research on environmental education in Brazil has been developed with methodological guidance from qualitative approaches (Gutiérrez 2003; Avanzi and Silva, 2004; Freitas and

Table 3. Topics mentioned in the abstracts of theses and dissertations on environmental education developed in Brazil that allow for an approximation of epistemological perspectives.

References to epistemological perspectives	Number of abstracts
Total number of abstracts that make reference to epistemological perspectives	469
Critical methodological perspective	252
Dialectic	32
Marx/Marxism	19
Phenomenology	80
Hermeneutics	37
Existentialism	07
Cultural studies	18
Post-modernism	13
Post-structuralism	06
Post-colonialism	01
Feminism	06
Positivism/neopositivism	01

Oliveira 2006). The data that can be systematised from the analysis of abstracts for theses and dissertations also confirms this trend.

Of the 2765 documents already catalogued in the EArte database, approximately 1000 present a textual indicator that enables us to identify the researchers' methodological preference for the project; of these, 527 make explicit reference to a qualitative approach (Table 2); only 2 documents make explicit reference to a quantitative approach. However, closer inspection of approaches and frameworks in which a quantitative perspective is valued shows that 12 studies mention an experimental methodology (with experimental groups and control groups), and 2 of these make reference to quasi-experiments as the methodological framework.

The fact that some research designs are reported in the study abstracts – namely action research, participatory research, ethnography, case study, life history, autobiography, oral history, narrative – clearly point to associations with qualitative approaches too. Considering such a trend, we concluded that approximately 90% of the theses and dissertations registered in the EArte database adopted a qualitative approach.

This 'hegemony' in the field of environmental education research in Brazil is important to note in light of methodological macro-trends in environmental education research both nationally and internationally. The scenario clearly differs from those trends observed in North America and some European countries, where quantitative approaches once occupied a prominent place in environmental education research (see, among others, Robottom and Hart 1993; Hart 2000; Marcinkowski et al. 2013; Gough 2013). However, it is important to recognise that the simple mention of terms, even if explicitly linked to a qualitative paradigm without further elaboration, tells us little about the fundamentals or the epistemological and methodological commitments that guided an investigation. Moreover, according to Chizzotti (2003), diverse orientations and methodological aspects are hidden within some public designations of the 'qualitative'. Reading the thesis or dissertation in full can reveal multiple, competing and/or incompatible paradigmatic perspectives of various inspirations, such as positivism, phenomenology, hermeneutics, marxism, other critical theories and constructivism. Robottom and Hart (1993) also raised the question of relevance and accuracy of designations when discussing research on environmental education in Australia and Canada.)

In light of this, some Brazilian researchers have point out a need for greater clarification of frameworks in the studies that have been carried out (Goergen 2010; Trein 2012). Our analyses have shown that approximately 15% (470) of the 3180 studies registered on the EArte database clearly refer to their epistemological affiliation. Among the different possibilities, we note a tendency also reported by other authors (Lorenzetti and Delizoicov 2006; Cavalari, Santana, and Carvalho 2006), of a close approximation to perspectives described as 'critical', associated, in varying degrees, with Marxist, Frankfurtian or even Freirean perspectives. However, we cannot but fail to recognise that the data in Table 3 show the fairly frequent presence of references to

features and markers of research that are affiliated with so-called interpretivist currents, such as phenomenology, hermeneutics and existentialism.

Brazilian researchers have also begun to address the challenges of epistemological approaches associated with a multiplicity of perspectives regarded as 'post-critical, post-modern, post-structuralist, post-feminist and post-colonialist', as pointed out by Gough (2013) and Marcinkowski et al. (2013) in their discussions of the international and North American environmental education research field. It is quite clear that a larger proportion of theses and dissertations, from 2000 onwards and with evidence of growth in recent years, are trending towards an affiliation with such perspectives.

In Brazil, we can also observe that the research field in environmental education reflects the main research traditions of the human sciences, particularly of Education. However, it receives little nourishment from quantitative research traditions and where investigations are of a historical character or descriptive, inventories and other non-experimental approaches predominate (Gatti 2004; Ludke and Cruz 2005). In the late 1980s, whether it is in Brazil or in other countries, the conviction that the issues and educational problems studied, such as 'learning deficits', 'school dropouts' and 'grade repetition' required different interpretations from those used by experimental or quasi-experimental methods, gained much ground (Toast 2011; Ferreira 2009). For Brandão (2010), another risk is when education problems marked by a certain intensity, urgency and complexity, result in a desire for intervention that overlaps with the objective of the investigation. Research on environmental education in Brazil has not escaped this either (Cavalari, Santana, and Carvalho 2006; Freitas and Oliveira 2006; Pato, Sá, and Catalão 2009).

Given this situation, we note that Gatti (2001) teases out the relations between the national political context and what can be observed from the viewpoint of trends in education research in Brazil. According to Gatti, the 1970s and 1980s were marked by a dictatorial military regime that outlined a political and social context of major restrictions on individual and collective freedom. In response to this context, social resistance movements began a period of intense political struggle in pursuit of liberation and the reconstruction of democratic practices. To a certain extent, educational research became integrated into that movement by seeking frameworks for studies that referenced or applied critical theories of social change. For example, action research methods and conflict theory gained particular prominence in attempts at understanding educational problems beyond the immediate context of the classroom. In large part, this context explains the priority given to critical emancipatory perspectives, and which have preoccupied much of the field of environmental education research in Brazil ever since.

Another issue that has been addressed by some Brazilian researchers relates to particular political and ethical aspects of the knowledge production process, such as those related to methodological choices in research development. Methodologies involving action or participatory research come to be seen as compelling possibilities, giving voice to the researched and bringing the researcher closer to the subjects involved in the study (Loureiro, 2002; Higuchi and Moreira Jr, 2009). The researcher, therefore, is committed not only to 'unravelling a scenario' (Higuchi and Moreira, Jr., 2009, 172), but to working with other social agents too. When they are involved in the research, together they can participate in a search for solutions to their problems, identifying and undertaking actions that lead to social transformation. Thus, the task is one of moving 'forward as protagonists of a transformation of society with sustainable behaviours' (Higuchi and Moreira, Jr., 2009, 172), carried out through dialogues between academia and social movements.

Concluding remarks

The development of the EArte database helps enable the analysis of the state-of-the-art research on environmental education in Brazil. It also makes possible various understandings and critiques of the context and meanings of instances and trends in such projects, particularly at the level of

graduate research. Some of this work requires mapping and inventory studies, and this, in itself, can be a contribution to wider self-awareness of a particular field of knowledge when this is fed back to the research community, nationally and internationally.

The analyses that we have developed are still in the very early stages of a search for meanings though. On the one hand, analysing abstracts from approximately 3000 studies does not always enable the evaluation of all the nuances of the research. According to Marcinkowski et al. (2013), although studies of this nature have great potential to help raise questions, they do not always help answer them. Equally, studies seeking to analyse full texts are more limited to the number and corpus that can possibly be analysed, thus sample size is often a key question for offering panoramic scenarios or considerations. Studies of this nature should then, be seen as the first steps for subsequent in-depth investigations. In the experience of the EArte Project team, this process of studying full texts has already begun, based on the particular interests of various researchers involved in this project.

Despite these limits, returning to the notion of 'spots', the features and trends presented in this article enable us to raise various questions that are important to the construction of possible agendas for environmental education research in Brazil:

First, the identification of a wide range of disciplines and fields of knowledge covered by graduate programmes that develop research in environmental education leads us to the associated question of the formulation and tensions in a variety of ontological, epistemological and methodological positions available. Would it be possible to identify trends in onto-epistemological characteristics in environmental education research across various disciplines and fields of knowledge in Brazil? Or, does research on the field of environmental education in Brazil demonstrate a relatively consistent epistemological proclivity (e.g. a 'geo-epistemology?') that is present in the studies conducted, for example, from critical perspectives throughout programmes, including those related to the areas of engineering and in programmes of research anchored in the social sciences, or should some variation be expected and detectable?

More broadly, what convergences and divergences can be detected in relation to theoretical and methodological trends that have guided the research developed in these programmes in human sciences, biological sciences and in the healthcare and technological fields? Are there differences from both theoretical and methodological viewpoints, as well as a thematic level, when we consider the set of studies in these different areas of knowledge? What dialogues can we identify between the field of environmental education and these other different areas of knowledge?

Furthermore, would it be possible to identify any impact of the 'modus operandi' of environmental education research groups on the different research practices of other research groups, such as in what constitutes and directs various graduate programmes? The recommendations of Stevenson et al. (2013b, 2) seems pertinent for the Brazilian context here; namely to examine the relations between research on environmental education and general research in other related fields, such as science education, health care, social sciences, political education, social justice, citizenship, peace and conflicts, during and beyond graduate-level research.

Second, there is no doubt as to the predominance of qualitative approaches within the community of environmental education researchers in Brazil. However, while this situation can be seen as a response to historical processes that go beyond those directly related to the field of environmental education, such a finding poses challenges that deserve our attention. Nowadays, the potentials and limitations of qualitative research are well recognised both nationally and internationally, including when it is regarded by researchers as a political reaction to conceptions of science and knowledge production in which a dichotomy between human being/nature and subject/object only keeps us away from the fundamental principles of environmental education. So we ask, could the relatively small number of studies registered on the EArte database that explore quantitative approaches be seen as a distinct opposition to that approach, reacting to the possible contributions and limitations of qualitative approaches to the field, or is this an artefact of the graduate programmes themselves, or a legacy of the professoriate, and/or social

conditions for the constitution of the field? Are narrations of research problems, questions and objectives sufficiently explicit and open to a variety of interpretations and approaches? Or are those studies characterised as descriptive studies, cases or experience reports, which are common in the field of environmental education in Brazil, treated as only suited to qualitative approaches here, as well as in other countries?

Considering the continental dimension of a country like Brazil, an associated question is which further data could be useful to characterise research in environmental education so as to map the field, outline trends of various kinds, and reveal silenced aspects (e.g. by gender of the author, age group, socioeconomic status, and so on)? In other words, how might quantitative data provide insightful information on environmental education practices, capacities and trends in the country without necessarily requiring adherence to traditional models of scientific research? Have the studies associated with the qualitative perspective sufficiently explained the meanings and conditions that such questions rely on? Moreover, can they sufficiently account for the wider conditions that lead to preferences for such frameworks or the epistemological options available to an investigation more clearly?

As noted before, analyses of such trends in research on environmental education both internationally and in the Brazilian context indicate an increase in the so-called in-depth qualitative studies, and in studies associated with post-critical, post-structuralist and post-modern frameworks too. Others, however, have sought to exercise criticism and question what this situation produces in relation to available ontological, epistemological, methodological and axiological options for students and supervisors too (Payne 2009; Reid and Scott 2013; Reid and Payne 2013; Stevenson et al. 2013b, among others). For us, and similar to debates about resistance to vectors of 'colonizing methodologies' noted in other regional special issues of this journal, this raises further questions as to what contributions such perspectives bring to the field of Brazilian environmental education, particularly if they do not originate from Brazil, or remain isolated from criticism and development by those interested in developing Brazilian environmental education and its research? In other words, we return to an early observation again: what possible dialogues have been enunciated between the investigations developed under such perspectives, including whose are they and in whose interest, particularly if these are based on paradigms constructed in a (post)modernity largely located elsewhere?

The very close relationship that has been established in Brazil between research on education and the proposition of solutions for educational problems is a case in point for some authors (Gatti, 2001; 2004; André, 2005; Ludke and Cruz, 2005; Martins and Varani, 2012). It seems plausible to relate such intra-national trends with that observed in relation to environmental education, which has also been associated with calls for immediate solutions to environmental problems and sometimes, also, to social transformations. Such findings require us to face challenges such as those identified by Higuchi and Moreira Jr (2009), who point to the need for 'methodological shifts' (171) in relation to innovation, engagement and promotion of participatory activities. This requires assuming a critical stance towards consciously and unconsciously preferred theoretical and methodological research frameworks too, an approach that affords novel problem identifications and explorations of the problems perceived, and to make good on the proposition that citizenship actions should promote the construction of democratic societies, not just academic traditions.

As Ardoin, Clark, and Kelsey (2013) note on wider considerations and preferences for future research in North America, there is a need to clearly explain one's political agenda geared towards certain interests, if one is to establish whether theoretical and methodological frameworks are coherent and effectively consistent with them. In Brazil, that means asking what points of traction might these be given, or conceded, or resisted, and from what perspectives (local or otherwise) have these studies been positioned in relation to environmental education practices?

Finally then, when we consider issues of this nature, we must ask whether those theses and dissertations on environmental education completed in Brazil exhibit features associated with a

'short-termism', simply because of the nature of these qualifications, but also noted as a trend more widely associated with environmental education practices and research with possible solutions for environmental problems that take on a more pragmatic character (Stevenson, Wals, Dillon, and Brody, 2013; Ardoin, Clark, and Kelsey 2013). Equally, not every graduate continues in their studies or field. So we might also ask, to what extent are we able to resist naive views about the role of environmental education in processes of change and transformation of reality, through a focus on the strengths and limitations of the production of graduate research texts? Or put differently, has the relationship between research on environmental education, environmental education practices and processes of change and social transformation been accompanied by a diversity in means and outputs for knowledge production?

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Notes

1. The proposal to construct a database of theses and dissertations on environmental education from Brazil was initially conceived, implemented and coordinated by Dr Hilário Fracalanza (whom we have included as an

'in-memorium' co-author), the project designer. Currently researchers from three universities in the State of São Paulo (Univ Estadual Paulista – Rio Claro Campus (Unesp, RC), University of Campinas (Unicamp) and the University of São Paulo – Ribeirão Preto Campus (USP, RP) have collaborated in the process.

- To select the theses and dissertations on environmental education developed in Brazil and catalogued by the EArte Project, we used the Theses Database organised by the Coordination for the Improvement of Higher Education Personnel – CAPES as the main source. CAPES is a Brazilian institution under the Ministry of Education that is responsible for policies of implementation and evaluation of graduate studies in the country. From 2011 to 2013, the CAPES database was reformulated, and the data referring to the studies completed in 2010 were not included in that database, and for that reason, do not comprise the documental corpus in this study.
- In 1971, under the leadership of José Lutzenberger, the first Brazilian NGO particularly targeted at environmental protection was founded. Lutzenberger's leadership as an ecologist was consolidated in the country with the publication in 1976 of his book entitled *The Brazilian Ecological Manifesto: The End of the Future?* (Manifesto Ecológico Brasileiro: o fim do futuro?), which had great impact and is now considered a mark of the beginning of environmentalism in the country.

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