

Participatory Action Research. A pathway to reconcile theory and practice in Environmental Education of Mexican Primary Schools

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ABSTRACT

There has been a constant clamour for a change that seeks that EE shifts from a perspective that is focused on conservation, scientism and positivism paradigm to a proactive, interdisciplinary, contextual, critical, holistic, action oriented and participatory approach. In formal education, this approach arises the importance of flexible curriculum, transdisciplinary work, new methods to teach based on participatory and critical inquiry, and improvement of the relationship between homes, community and school. Nevertheless, the implementation of those theoretical requirements has failed in the practice of primary school, especially in Mexico. Participatory Action Research is an alternative to reconcile theory and practice. EE is linked with this method because it provides a coherent path to implement innovative EE theory and it directly involve participates in the development of their own practice.

I. BACKGROUND. THE ENVIRONMENTAL PROBLEM IN MEXICO AND THE WORLD

The United Nations Environment Programme (UNEP) (2002) recounting the events from 1972 to 2002 indicates that a series of environmental disasters have happened in the world, which are now considered environmental problems. Some of the global issues are climate change, biodiversity loss, overpopulation, poverty, and competition for limited resources (Department of Environment Water Heritage and the Arts 2009). Additionally, Bowen (1994) asserts that climate change is the result of the interaction of different environmental problems, such as: ground degradation, deforestation, pollution and ozone hole. Furthermore, other important environmental concerns are related to ‘...food security, poverty, sustainable tourism, urban quality, women, environment and development, green consumerism, ecological public health and waste management...’ (Fien & Tilbury 1998, p. 5).

In Mexico, even though is called the basin of abundance, is in great danger because of misuses and abuses of the natural resources. This has left a trail of degradation in the soil, deforestation, generation of high volumes of solid waste, shortage and contamination of water resources, especially in urban zones, where toxic waste is generated and contributes to the climate changes of the world. Among the damaged regions, the Yucatecan Platform is one of the least affected and yet 90% of the area is damaged (Aguayo 2000). Furthermore, the Secretary of Urban Development and Environment (SEDUMA) (2008) reports that the state of Yucatan, Mexico, generates 1300 tons of garbage every day and the capacity of institutional response to the problem of disposition and handling of waste has been exceeded. This has generated severe and non-reversible impacts on the environment, human health and life quality of yucatecans. For example, in the whole of the state of Yucatan there is one single landfill located in Merida

and 31 trash dumping sites, and only 12 of them work properly, therefore, the solid waste from urban areas has as its final destination open spaces like the forest or courtyards, where is incinerated in most cases (Secretaria de Desarrollo Urbano y Medio Ambiente (SEDUMA) 2008).

This situation has generated:

1. Gas emission, which goes directly to the atmosphere and contributes to global warming;
2. Runoff to the aquifer, contaminating 95% of the underground water of Yucatan State;
3. Soil contamination;
4. Dioxins emissions;
5. Proliferation of harmful fauna and plagues; and
6. Sickness caused by mishandling the trash and odors.

Consequently, against the above panorama, international organizations such as the UNEP (2002), encourages development of significant and efficient actions to solve the detected problems. One important international commitment is the Agenda 21, where education is recognized as vital to deal with environmental and development issues. In this document formal and non formal education is essential to develop attitudes and behaviours, which are necessary for a sustainable world (Sitarz 1994). One of the educative alternatives that would contribute to establish that international discourse and represent a contribution to solve environmental problems is Environmental Education (EE).

In Mexico, the National Plan of Development 2007-2012 set out as a priority to develop an environmental culture in Mexicans, which allow them to valorise and participate to take care about the natural resources. This government state that education is the path to develop environmental culture (Gobierno de los Estados Unidos Mexicanos 2007). Similarly, In the southwest of Mexico, the Yucatan State Development Plan 2007-2012, seeks to: “To define and implement formal and non formal educational activities that promote a respectful culture and coexistence with the environment” (Gobierno del estado de Yucatán 2008 pp.38). Both plans could be considered as an attempt to meet international policies and an effort to solve national and local environmental problems, which might contribute to resolve global environmental issues.

II. ENVIRONMENTAL EDUCATION AT PRIMARY SCHOOLS. A POSSIBILITY THAT NEED TO BE IMPROVED

Over the world, in EE field there has been a constant clamour for a change. This claim seeks that EE shifts from a perspective that is focused in conservation, positivism and scientism approaches to a **proactive, interdisciplinary, critical, holistic, action oriented and participatory approach** (Barraza 2000; Barrett 2006; Breiting 1993; Dillon & Teamey 2002; Fien 1993; González-Guadiano 2003; Jensen & Schnack 2006; Potter 2010; Robottom & Hart 1993; Smyth 2006). In formal education, this approach arises the importance of flexible curriculum, transdisciplinary work, new methods to teach based on participatory and critical inquiry, and improvement of the relationship between community and school (Barraza 2000; Dillon & Teamey 2002). Furthermore, well recognised international formal organizations such as UNESCO encourage the adoption of an Education for Sustainability Development perspective (ESD) (UNESCO 2005). Nevertheless, this approach may be a new discourse that only seek to keep politic control (Huckle 1996; Sauvé 1999) or may represent a possibility to achieve the goals of critical, holistic and participatory EE (Jenkins 2009; Lang 2007; Marcinkowski 2010).

Stevenson’s article (“Schooling and environmental education: Contradictions in purposes and practices”) has been and still is a key document to understand the schooling of EE. Since 20 years ago, he has been arguing that there is a gap between EE theory reform and its practices, he claims that

‘...The socially critical and political action goals of environmental education are contrasted, first, with the nature study and conservation education, and then with the uncritical role of schooling in maintaining the present social order...Such (reform) educational ideals... conflict with the dominant practices in schools, which emphasise the passive assimilation and reproduction of simplistic factual knowledge and unproblematic truth’ (Stevenson 1987, p. 69; 2007a, p. 139).

To support, Fien (1993) states that school has led to accept hegemonic ideologies without criticize the dominant groups. For example, Posch (1993) participated in the implementation of a project that was based on critical and participatory inquiry. In this project, he identified that some of the most traditional dogmas in schools are: dominance of systematic knowledge, subject specialization, hierarchal communication and teaching style transmission. In this way knowledge is separated from action. Educators hope that to behave for the environment it is only necessary to provide information. Elliot (1991 cited in Robottom 1992) identified that in 11 participant countries, problems that teachers faced when applied this kind of EE included: a) difficulties implementing interdisciplinary procedure, when the school curriculum is based on individual and separated subject; b) dealing with the complexity of the causes of environmental problems, and c) evaluating the dynamic qualities, concept that were a key goal of the project. Additionally, Kyburz-Graber & Robottom (1999) found that teachers using critical and participatory inquiry are concerned about how to plan, to start and facilitate an open process that does not have a specific structure and it is focused on critical and conflictive problems in local environment.

Posch (1993) identified that some of the problems faced by facilitators were: 1) the teachers’ tendency to keep dominance academic tradition; 2) teachers were expecting specific guidance, 3) teachers’ previous environmental experience that inhibit reflexion.

Other constraints on implementation EE in the participant schools were: a) difficulties to beyond the school limits, b) conflicts between teachers, when some of them felt that their traditional methods were threatened, c) pre-organised curriculum system that led teacher to divide knowledge, d) a tendency to reform the curriculum and maintain the same organization of timetable and students’ organization, e) difficulties in the use of interdisciplinary, f) lack of EE pre and in service training to develop reflective capacities, g) level of involvement of school administrator, h) necessity of the learning of new roles and i) disagreement from communal authorities (OECD 1988 cited in Robottom 1994). Similarly, Papadimitriou (1995) provides another example, asserting that in his experience teachers indicated that some of the problems that they faced implementing EE were: their concern about interrupting the established timelines, peers negatives attitudes, lack of experience using innovative methods, lack of support and lack of confidence working in an unstructured process.

After more than 20 years that Stevenson (1987) wrote his key article, he (2007b) asserts that the gap between theory and practice is still a EE problem that even it is increasing. Nowadays, Stevenson (2007b) emphasis that to find further possible solution it is vital to understand the development of the theory and analyse the practice considering four factors:

1. Change and continuities in policies approach. Some discourses have remained and others have been introduced such as ESD. Thus, it is important to study how the discourses have been incorporated by teacher in their own conceptions of their practice and transformed into actions.
2. Varying contexts. Education is frame by a national and global context, which have specific characteristic in precise times. For example, in the last decades in Western countries economic globalization and neoliberal policies have affected the economic and educational procedures.
3. Teachers’ practical theories. Teachers have their own dominant practical ideologies, which may shape or constrain EE practices.

4. Opportunities. The author recommends taking advantage of the development of educational field. In developed countries, he has identified five space of opportunity that may help to implement EE: 1) technology development, 2) more recognition of constructivist learning, multiple intelligences and postmodernism approach, 3) professional development that seeks teachers agency, collaboration and critical training, 4) new curriculum that provides importance to environmental, cultural and normative elements, and 5) more opportunities to develop inter organizational collaboration.

The above general panorama was given by studies mainly elaborated in developed countries. In the following subsection, we will analyse what is the situation in the place of study, aim of this paper, in particular, how EE have been schooled in Mexico.

A. A look in Mexican primary schools

Mexico, like the majority of Latin American countries, has a singular discursive background in EE. International EE discourses coexist with claims that are particular of the region. Some examples of that regional framework are popular EE, perspective based on critical pedagogy, political traditions (e.g. Theology of liberation), and discourses derived of the work of educational thinkers such as Paulo Freire. As a consequence, EE contour in this area is confused and has a strong political component (González-Gaudiano 2007; González-Guadiano 2003). This makes difficult the identification of main tasks, conception and messages of EE (González-Gaudiano 2007).

In Mexico EE has been mainly promoted by the environmental sector, which included EE in the General Law of Ecological Equilibrium and Protection to Environment. This law with the Mexican Green Party discourse have contributed to make confuse the EE conceptualisation and its scope (González-Guadiano 2003). Furthermore, it gave rise to dominant conservationist perspective in the educational sector. Nevertheless, in this area EE has been recovering its social component. The incorporation of the social factor is very important in a country with conditions of poverty (González-Guadiano 2003). Further considerations explain that the majority of EE activities in Mexico have been developed to provide information about the environment. In general, environmental educators based their work on data collection and receptive and passive learning (Barraza 2000).

In formal education, González-Gaudiano (2007) asserts that the situation faced in Latin American countries, Mexico one of them, is almost the same that the scenario described by Stevenson (1987), namely there is a gap between theory and practice in the schooling of EE. González-Gaudiano (2007) indicates that in Latin American countries, some characteristics of the educational system that constrain the schooling of EE are: inflexibility, closed structure, curriculum based on disciplinary work, lack of teachers' interest to adopt new perspectives, low governmental investment, overcrowded teachers' workload and lack of quality resources.

Another factor that has not helped EE schooling is its late incorporation in the formal educational system. In this sense, it is important to clarify that the EE beginning in Mexico was outside the periphery of the formal educational system, limiting its schooling (González-Guadiano 2003). EE was considered a topic of the curriculum in the educational reform announced by Mexican government of 1982-1988 (Barraza & Walford 2002). Since 1985, the government has attempted to implement EE as a National policy in primary level. This incorporation considered curriculum analysis and teaching training (Barraza & Walford 2002). Nevertheless, the implementation in the curriculum did not happen (Wuest 1992).

Even though, formal implementation of EE did not occur, De Alba et al. (1993) analysed the curriculum and textbooks of the scholar period of 1985-1986 to identify if it regard EE contents. They indicated that the National Plan of that period was integrated by four areas: social science, Spanish, mathematics and natural science. For the analysis, they used five analytical criteria: 1) environmental dimension to analyse if the curriculum considerer the relationship between human being and environment; 2) concept of environmental, 3) genesis, development and possibilities to solve environmental problems, 4)

psychological implications of the relationship between human being and environment, and 5) discursive barriers.

With the first criterion, they found that natural and social science subjects provide elements to understand the environmental dimension, namely they identified factors that enable the understanding of the relation human being-environment. In natural science, this element was found in the first and second scholar grade. On the other hand, De Alba et al. (1993) assert that environmental dimension was not structurally incorporated in every area of the curriculum and it is especially absent in mathematics.

The results of the second criterion show that concept of environment through the curriculum is incongruent. In some areas it is simplistic and in others it is complex. A simplistic conception is when environment is only related to a physic-biologic study of living being, without considerer social aspects. A complex concept regards the social element. Considering the third criterion, De Alba et al. (1993) found that environmental problems are indicated. Nevertheless, their genesis and development is unclear, without consider the historical context. This, results in barrier to understand the consequences of industrial and technological development regarded in environmental crisis. Furthermore, some solutions for environmental problems are presented without reflect on who is the responsible of these issues and what level of participation is required to solve those problems.

The fourth criterion indicates that the educational contents included in natural and social science as well as in Spanish may contribute to develop a physiological relationship, which is necessary to protect environment. Finally, De Alba et al. (1993) discovered that some discursive barriers included in the curriculum are: marginalization of indigenous groups; emphasis on positive aspect of industrialization, minimizing their negative effects, and absence of social aspects in topic related to environment. In general they recognized that in Mathematics there is not environmental content.

We think that this study represents an important outgoing to understand how the EE contents were in the syllabus of that period. Nevertheless, the results do not provide insight about how those contents were implemented in practice by the direct users, that is to say, teacher. Neither, it does provide elements to identify if with those contents children developed environmental behaviour. Barraza (2001) and Viga (2007)' studies provide more elements to understand the impact of EE content in the development of children' environmental knowledge and behaviours, as well as they suggest new directions for research.

Before to explain those studies, it is important to clarify that the curriculum and textbooks analysed by De Alba et al (1993) were valid until 1992. This year, a National educational reform was elaborated, which included Spanish, Mathematics, Natural science, History, Geography, Civic education, Artistic and physical education as subjects for primary school. This new national plan was implemented in 1993 (Garcia 1996). One of its bases was that students should acquire knowledge to understand the natural phenomenon, regarding health care, protection of the environment and preservation of natural resources. This base was considered as a mayor topic (environment and environment protection) and should be incorporated as a cross curriculum perspective. The other mayor topics were: living beings; human body and health; raw material, energy and change; and science, technology and society (SEP 1993).

Similar to De Alba et al. (1993), Barraza (2001) analysed this new curriculum and found that it is rich in environmental context, which is specially found in natural science and social science subjects. Gonzalez-Gaudiano (2004) provides further insight, arguing that EE has been incorporated mainly in natural science, technology programs, and geography subject (González-Guadiano et al. 2000). He asserts that EE has a subordinate position in the curriculum, other subjects as mathematic are more important (González-Gaudiano 2007), indeed he claims that it is necessary to improve environmental elements in social science (González-Guadiano et al. 2000).

In addition, Barraza (2001) analysed the textbooks that are part of the curriculum of 1993 and found that they provide elements to interest students about environmental issues and its solutions. Nevertheless, the information provided in the curriculum and textbooks has not been enough to develop knowledge and

environmental concepts in students. This suggests that, although, textbooks provide solid information about environmental issues, it is necessary to investigate how it is used by teachers in practice and in what level they are effective to develop environmental positive behaviours (Barraza 2001).

Similarly, Viga (2007) conducted an analysis of the National Curriculum of 1993 focus on the environmental educative contents, in particular, teachers' and students' books and notebooks. The author found that in those official materials there are educative contents needed to promote knowledge, abilities, attitudes and values related to health, environmental care and local ecological problems. However, she also detected that in daily life, children from a biosphere reserve in Yucatán, Mexico do not show responsible conduct related to the environment; in other words, it was common for them to eat junk food, have bad habits while eating (they do not washed their hands, picked up food from floor if it fell), and to engage in games which promote violence to animals and plants. This research indicates that the EE objectives in the syllabi of elementary school are not being accomplished and that school, house and community, main socialization space of children are not integrated.

The problem described by Barraza (2001) and Viga (2007) could be explained for the fact that teachers do not provide practical opportunities in order to student experience those concept and knowledge. Barraza (2000) asserts that to understand an idea it is necessary to experience it. In this sense, González-Gaudio (2007) states that the main teachers' pedagogical strategies are lecture-type and that teachers are instructors that provide information in order to students pass their exams. Barraza & Walford (2002) maintain that the majority of Mexican teachers use vertical communication (top-down) to teach and that their main teaching strategy is reading of textbooks. This results in lack of students' active role in their learning process.

Barraza & Walford (2002) provide further explanation, indicating that in primary schools teachers feel more confidence when they just provide information about environmental aspects. Barraza (2001) explains that even though, it is compulsory to implement environmental topic, there is not a unique pedagogical method to develop it, schools follow their own educational approach. Additionally, González-Gaudio (2007) explains that EE is not including in pre service teachers' training and that educational system encourages learning communities and constructivist. Nevertheless, these approaches commonly are not reflected in teachers' training.

Teaching strategies seem to represent a vital factor for EE (Barraza & Walford 2002). Indeed, it is necessary to develop a EE training program for the whole teachers' community (González-Gaudio et al. 2000). This professional development should consider a pedagogical approach according to the necessities and features of the area (González-Gaudio 2003), as well as regard investigative methods and practical experience (Barraza 2001; Barraza & Walford 2002).

Another possible explanation of the gap between EE theory and its practice in schools is that teachers have not been included in the development of such complex theories, namely policy makers and academics are constructed it without consider whom finally should implement EE or ESD. As a result of this, for teacher those concepts are abstract (Stables & Scott 2002). Consequently, the development of EE or ESD policies should include local educators in a variety of contexts (Stevenson 2006).

Also, it is important to recognize that teachers already have their own theories about human-environment relationship and that they see environmental problems since their own lens (Stevenson 2006). Furthermore, as a result of lack of time and preparation to cover complex topics they oversimplify the facts, giving the impression that school are acting to solve problems. Thus, teachers select topics that they consider are more important and they are able to answer (Stevenson 2006), providing different priorities to different aspects (Smyth 2006). In this perspective, Barrett (2006) asserts that teachers' dominant educational theories constrain the implementation of environmental innovative educational proposals. For instance, he worked with a teacher and discovered that he believe that his role is to supervise and provide information. Thus the teacher tends to maintain his old own theory even when he is willing to adopt innovations and the school provides the elements to implement it. Barrett (2006) asserts that this could be

explained considering that teachers have been trained with traditional method for a long period, regarding part of their history as a professor.

Considering this panorama, Stevenson (2006, p. 279) argues that it is vital to emphasize that the theory should be developed with educator not for them. He asserts that

‘Educators do not need a vision to adopt, but do need to construct, preferably through a thoughtful process of critical inquiry, reflection and dialogue, their own understanding of sustainable development that can guide them in their curriculum planning and teaching. After all, it is their own understanding of this concept [theory] that will shape their pedagogical practices... In the absence of such understanding, teachers are likely to find it difficult to help young people acquire a sense of their place in co-constructing a sustainable society’.

Additionally to the above scenario, in Mexico a new educational national reform is occurring. During the scholar period of 2008-2009 a pilot test of the new curriculum was implemented in the first, second, fifth and sixth grade of primary schools. The plans of third and fourth grade are being testing in the current scholar period 2009-2010. This pilot test was conducted in five thousand of 96 thousand primary schools. It is expected that in the scholar period of 2010-2011 this new reform will be implemented in every Mexican primary school (SEP 2008).

Three substantive elements of this curriculum are: 1) diversity and interculturality, 2) development of educational competencies, and 3) incorporation of topics that are covered in more than one subject. EE is one of those topics. Consequently, after basic education students should be competent to promote and assume responsibility to take care of their health and environment, which are conditions that enable an active and healthy style of live (SEP 2009). Gonzalez-Gaudiano (2004) states that this new Mexican educational reform regards material and activities that seek to develop knowledge, attitudes, skills and values important for the environment and sustainability. This author explains that concepts such as biodiversity, environment and sustainability development were focus of analysis and updating. He claims that the materials of every subject to cover those concepts have been developed to enable transdisciplinary.

Additionally to the reform and considering the objectives of the Decade of ESD, in 2007 and 2008 other educational materials were published to assist educators in the implementation of EE. The materials include: and the environment? Problems in Mexico and the world (SEMARNAT 2007); Mexico and the global climate change (Conde 2007); Climate change. A handbook for communicators (SEMARNAT & Gobierno Federal 2008a), and The bio-intensive familial garden (SEMARNAT & Gobierno Federal 2008b). The EE elements included in the national reform and those EE materials seems to provide again a solid base to implement EE education in the practice of primary schools. Nevertheless, we have not identified any study that reports, on one hand, what is the kind of EE contents and theory included in the syllabus, textbooks and materials and, on the other hand, how these conceptual and theoretical elements have been implemented by teachers in their educational practice.

In this sense, the researchers of the EE field in Mexico emphasize that it is necessary to investigate how the available material to teach EE are being used in practice (Barraza 2000; Barraza & Walford 2002), how the curriculum effects and has implications on students (Barraza 2001), what are the teaching strategies used to implement EE (Barraza 2000, 2001), and what are the teachers’ thinking and concerns about environment (Barraza 2000). To support, González-Gaudiano (2007) maintains that the tendency in Latin America is to incorporate EE as a cross curriculum perspective, which should be covered in every area of the syllabus. However, its development in practice has not been investigated. Barraza suggest that (2000) this investigation should regard participatory research as methodology axis and education for the future as a theoretical framework.

Finally, to provide a big picture of the situation in Mexico it is important to mention, what has been done in this country about ESD. Gonzalez-Gaudiano (2004) explains that in Mexico ESD is in an early

period of development. He asserts that there is not a clear Mexican national policy that encourages the development of ESD. However, he recognises that the Mexican Public Education Secretary have considered that some factors that may help achieving the goals of the ESD are: Evaluation of the ESD programs, Teacher Training in ESD, Teaching according to ESD principle, Interdisciplinary collaboration inside every school, and Improvement of school-community relationship (Gonzalez-Gaudio 2004).

In conclusion, this section shows that in this country there has been a clear and diverse attempt to implement EE in the policies and curriculum of primary school. Nevertheless, few investigations show that its implementation has failed in the practice. Consequently, it is necessary to develop research to analyse what are the factors that shape and constrain the practice of EE in the Mexican context. Considering the advisement of Stevenson (2007b), we think that this research should considerer that have been changes an continuities in Mexican educational policy, like the actual educational reform; that the field of EE in this country share particularities with Latin American countries and those are different from developed nations; that the analysis of the EE practice has been forgotten in research, and that research conducted in the field in other contexts could represent opportunities to understand and investigate this context. Considering those opportunities in the following section we will analyse how Participatory Action Research could be a key element to reconcile EE theory and practice at schools.

III. ENVIRONMENTAL EDUCATION AND PARTICIPATORY ACTION RESEARCH. A PATHWAY TO RECONCILE THEORY AND PRACTICE

Participatory Action Research (PAR) is a theoretical and methodological proposal that claims it is possibility to reconcile theory and practice. PAR represents a practical and theoretical proposal to develop critical thinking and action to work in environmental local problems through the school (Mordock & Krasny 2001). For this reason, in this section we will analyse the link between EE and PAR, and how PAR could help the implementation of EE in schools in order to reconcile theory and practice that we think seek critical, holistic, action oriented and participatory approach. According to Reason & Bradbury (2007, p. 2) PAR:

‘...is a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities’.

Similarly, other researchers explain that PAR is an approach in social research that seeks to transform the reality of the individuals for their own benefit and attempt to guarantee the total participation of the community in the analysis of their reality (Barquera 1986; De Witt & Gianotten 1989; Vio Grossi 1981). Unlike the traditional scientific research, PAR seeks the involvement of participants in the research and educational process in order to acquire knowledge and empowerment, combining social investigation, education and action (Hall 1989). The techniques that have been used to empower people are: ‘...Collective research, Critical recovery of history, Valuing and applying folk culture, [and] Production and diffusion of new knowledge... (Fals-Borda 1991, p. 8).

In PAR the research problem is identified, analysed and solved by the community or group that is facing the particular issue. The role of the scientific researchers is to take part in the process and to be a learner who has an authentic commitment to work together with a community (Hall 1989).

The process of PAR is represented in a spiral (see Figure 1) that indicates that to develop this kind of research it is necessary for a community to identify a problem for analysing, elaborate a plan to change it, and act together to solve it. The process includes observation, analysis and reflection about the result in order to replan, act, observe, analyse and reflect again (Kemmis & McTaggart 2005) or in other words; observing (look), analysing (think) and acting (Castillo-Burguete, Viga & Dickinson 2008).

Considering the above elements, PAR has participatory, practical, collaborative, emancipatory, critical and reflexive characteristics (Kemmis & McTaggart 2005). Other important features are that PAR is research oriented, educative and socio-politic-action based (Fals-Borda 1991).

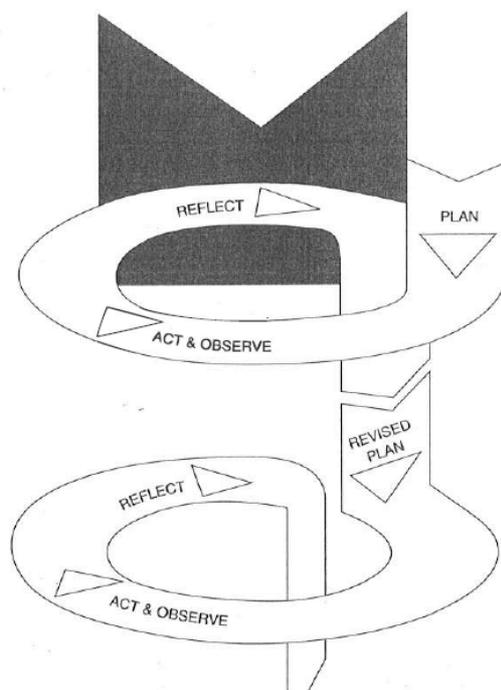


Figure 1. The Action Research Spiral (Kemmis & McTaggart 2005).

In the second section, we indicated that EE need to be based on proactive, critical, holistic, participatory, action oriented and holistic inquiry. For this reason, we assume that PAR could play an important role in the field of EE, as its characteristics match the new requirements of the emerging EE approach. Robottom & Hart (1993) take this view, asserting that PAR and EE are underpinned by the same emerging worldview. Furthermore, PAR is suitable for this field because it has a contextual methodology and praxiological approach (Robottom & Kyburz-Graber 2000), that it engages participants to guide research by analysing topics of their own concern (Robottom 1992). In this sense, Robottom (2006, p. 19) asserts that

...participatory, praxis-based approaches to research in environmental education...appear to have the most coherence with other dimensions of environmental education. Because they implicate biography, practice and the professional and social settings within which practice take place, they are essentially contextual...

To illustrate, the contribution of PAR in EE we will describe some projects that have used this methodology. Environment and School Initiatives is one program that used PAR in schools to develop a dynamic environmental education for the environment. It was coordinated by the Center for Educational Research (OECD) and implemented in 20 countries. This project focused on the development of dynamic qualities, which are based on critique, action and community performance. The main aims of the project were: 1) to develop complex understanding in students about the relationship between humanity and nature, as well as environmental awareness, 2) to develop dynamic qualities such as: showing initiative, taking responsibility and being willing to act to solve environmental issues of their concern (Posch 1991, 1993; Robottom 1992).

The premise of the project was that it is necessary to develop a form of EE that encourages active learning rather than transmission of information and provide professional development using PAR premises (Kyburz-Graber & Robottom 1999). Its principles were that students should: a) identify problems in their local environment, b) analyse the environment as part of interdisciplinary learning and investigation, c) determine the environment as an element of social actions and d) take the challenge of responsibility, initiative and independence for the environment (Elliott 1991 cited in Robottom 1992).

Analysing some case studies from that project, Kyburz-Graber & Robottom (1999) support that PAR is a potential method to develop EE that allows reflection on environmental issues and consider the context and the necessities of participants. In addition, Elliott (1991) contends that PAR has been identified as a process that fosters practice and develops theory and forms to conduct that practice. In educational contexts PAR enable educative innovation in curriculum, its successful implementation and the improvement of it. In this form, PAR develops knowledge that is used by participants during the research and educational process. For example, teachers in Switzerland hesitated to participate in that EE project. To overcome their unwillingness the project provided a space for reflection, where teachers could talk about their professional concerns, indecisions, and resignations. This allowed teachers to analyse their preconception about what they consider an appropriate teaching process or not, as well as they reflected on the forms of EE, their students' situations and the school context (Kyburz-Graber & Robottom 1999). Posch (1993) adds that teachers involve in EE using PAR can create a better professional development; build a network to support each other and acquire recognition in the discussion of the educational system development.

One experience in Austria reports that using PAR can give rise to emancipation. For example, a teacher of that country studied why his project was more interesting for girls and he discovered that it was because the project gave the opportunity for girls to liberate from their limited rural family background (Schweitzer 1991). Another teacher in the same country found that through the project students: were more cooperative; took personal initiative in a positive atmosphere; developed environmental awareness; were motivated to participate in environmental activities, and received approval, which encouraged the development of environmental activities. Moreover students behaviour had effects in their parents, who were motivated to analyse environmental issues (Haas 1991).

Similarly to the above case, in Greece another project was organised using PAR to implement EE. The objective of this project was to prepare teachers to overcome educational barriers, to improve their professional development and apply EE in primary schools. At the beginning of the project, it was identified that the teachers' EE concept was to provide information about environment and that they did not agree with traditional methods in schools. Nevertheless they felt that they had no other options. Using PAR, the following results were achieved: a) teachers' EE concept changed. Now, they consider that it is an educative action oriented process, b) teachers adopted a holistic interpretation of the research problem and assumed a critical perspective in their practices, c) teachers felt more confidence to adopt initiative, and d) PAR allowed implementing EE in their practice and improved their teaching methods (Papadimitriou 1995).

Other authors that have conducted investigation in this field are Mordock and Krasny (2001). They analysed some cases to identify the contribution of PAR to the EE field. One example of the cases studied was one where an educator worked with students from a middle school of Brooklyn. The problem identified and investigated by students was high levels of lead poisoning in children of their community. They discovered that the possible sources of contamination were the building of a bridge and a smeltery located close to their school. The construction of the bridge was stopped as a result of their investigation. Furthermore, students wrote letters for the directly involved in the problems and newspaper articles for general public, as well as they were involved in health committee planning.

Studying that and other cases Mordock and Krasny (2001) identified that during the research process students selected their own projects that were related to the real situation of their communities. This gave them recognition of their localities and allowed overcoming barriers of participation, as well as they were

more interested in science learning. These researchers concluded that educators of these projects used PAR, giving the opportunity for students to be engaged in the research process of environmental problems and facilitated the learning process through actions. Thus, PAR is a possibility to reach the EE goals, in that it provides opportunities to improve participation, engagement in actions, and development of skills and knowledge, as well as students' empowerment.

Other case was placed in Mexico, where a group of researchers taught PAR as a course for children in primary school. The topics covered were basic concepts, the process and stages of PAR, the importance of working in group, participation and application of this method. The evaluation of this course indicates that students acquired knowledge related to PAR. Furthermore, students improved their school behaviour, namely they were more participative in school activities and they enhanced their homework completion, as well as they were more focus on the classroom activities. The researchers consider that through this process student developed consciousness about their responsibilities and respect for their peers. The author of this project considers that these evidences indicate that PAR represent a possibility to EE reach their goal because promote and encourage active participation, work team, responsibility, respectfulness and empowerment. If this method is teach in primary school, students can acquire useful tools to overcome present and future problems such as environmental issues (Viga, Dolores et al. 1999).

Based on the previous research, Matus & Viga (2009) implemented a similar course in another generation of first to sixth grade of a Mexican primary school, located in the coastal zone of Yucatan. The purpose of this training was that students learn PAR and contribute to the development of an autonomous, responsible and environmental culture in order to be aware and use it for solving environmental problems that concern them. Their results indicate that students acquired knowledge about PAR and that students by themselves identified the local problems of their community. Between the issues are: rubbish problems and contamination of beach, sea and water. Additionally, they proposed solution such as pick up rubbish, working in community, and make advertisement to recommend that people put in bins the garbage. On the other hand, the researchers identify that outside the classroom students still do not deposit their garbage in container and that some students showed respect for the trees and others do not. For this reason Matus & Viga (2009) assert that the development of an autonomous, responsible and environmental culture is a complex task and require long and permanent process.

Considering the above result we think that PAR it is a possibility to reconcile theory and practice but is not a magic wand. In this sense Cooke & Kotharu (2002, p. 14) suggest

‘... that there are fundamental problems with participatory approaches... [between them]... the naivety of assumptions about the authenticity of motivations and behaviours in participatory processes; how the language of empowerment mask a real concern for managerialist effectiveness; quasi-religious association of participatory rhetoric and practice; and how an emphasis on the micro level of intervention can obscure, and indeed , broader macro-level inequities’.

Henkel & Roderick (2002, p. 182) assert that another element that need to be address in the implementation of participatory approach is that it is vital to recognize not only ‘how much people are empowered’ but also ‘for what they are empowered’. In this sense, we think that it is essential to recognize whose theory and whose practice educator and researchers are reconciling.

In conclusion, this section demonstrates that PAR is a real possibility to reconcile theory and practice in EE field. This is because PAR provides a coherent path to implement emerging EE theory that seeks a contextual, interdisciplinary, critical, participatory, holistic, and action oriented process in practice. Nevertheless, we consider that it is very important to investigate how the researchers are understanding the implementation and use of PAR and what other elements are involve in a successful implementation of EE, as well as whose theory and whose practice we are matching.

IV. AIM AND RESEARCH QUESTION

Considering that nowadays the New Mexican curricula regards as a policy that environmental education is a vital components to be teach in the classrooms as a cross curriculum perspective (Direccion General de Desarrollo Curricular 2009) and that PAR could help to implement it, the aim of this research is:

A. *Aim*

To analyse the national curriculum of Mexico, focusing in the part of EE policies, and provide evidences of how it is manifested in the practice of some specific cases at primary school.

Also we set out two **general research questions**:

- a. What factors influence (shape and constrain) the implementation of EE in primary schools in Mexico?
- b. How PAR could help to reconcile theory and practice in EE?

V. RESEARCH METHODOLOGY. CASE STUDY

To answer those questions, we designed a qualitative research-based project with some elements of quantitative methodology, using case study as the principal method. We chose the qualitative procedures because in this kind of process, the researcher sees the scenario and people in a holistic way, is sensible to the effects that may cause on the subjects of study, tries to suspend or separate his/her beliefs, perspectives and predispositions; all the perspective, scenarios and people are valuable and worthy of study and there is an emphasis on the validity of the research (Taylor & Bogdan 1996). From this methodology, we will use a case study method because according to Creswell (1998) and Stake (1978) will allow us to know in depth the selected schools, using various sources of information rich in context. For these authors in the case studies the data collection is done by several resources or techniques, such as: document and audiovisual review, interviews and participant observation. Thus, with the obtained information and its analysis, a detailed description of the case emerges, such as topic analysis and an affirmation or interpretation of that theme. The quantitative methodology elements will be used to determine overall trends in the results.

In this research, two cases will be analysed, which are part of a research and development project, where Viga's (2005) Environmental Education Model will be tested in public and private primary schools, located in Valladolid city in the state of Yucatan, Mexico. Viga's model objective is to contribute to biodiversity conservation, as well as to develop an Environmental, Responsible and Autonomous Culture in Yucatan State. In that model, Environmental, Responsible and Autonomous Culture is understood as a system of environmental values, elements and independent cultural decisions, which leads to individual and collective actions such as to recycle, avoid toxic accumulations and protect the ecosystems' natural capacity to restore by itself (Viga, D 2005). Furthermore, this model is a proposal to implement EE in primary school as a cross curriculum perspective.

In Viga's model, EE is understood as the teaching↔learning dialectic, integration process, which is dynamic and fluid. Throughout this process people socialize and re-socialize in a series of experiences, perceptions, knowledge, abilities and values related to the access, use, management and conservation of the natural resources and the environment, connected with the community development, and reflected in life quality and individual, family, community and environmental wellbeing (Viga, D 2005). As we can observe, this definition is wide and includes diverse scenarios of action from the implicated actors, among them the school. Indeed, we will adopt this definition to use in our research.

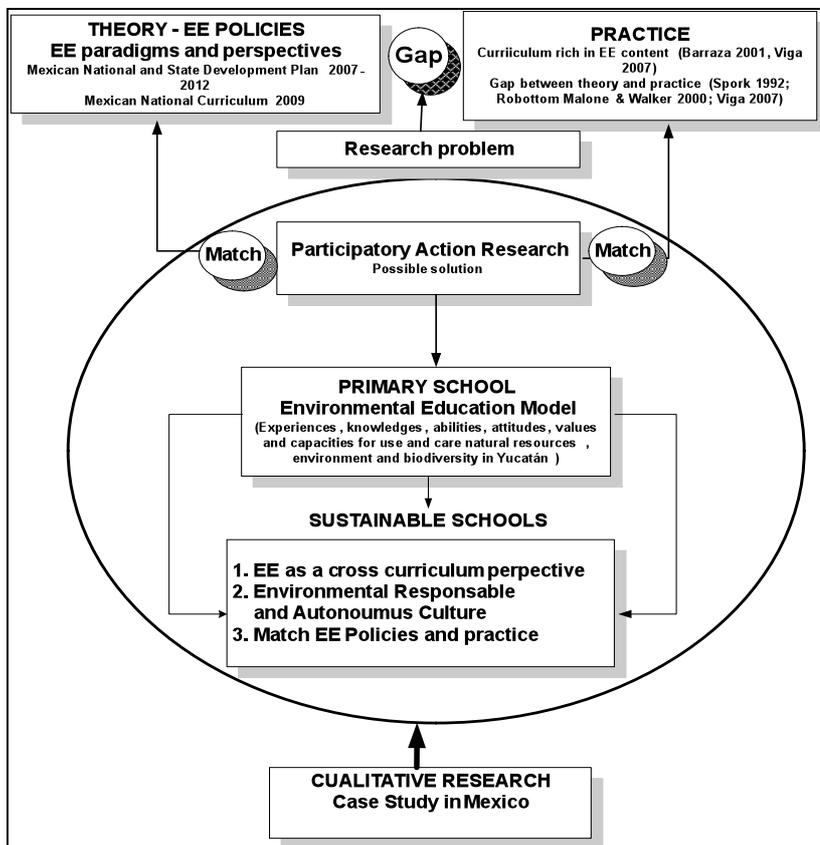
At this point is important to clarify that, the Model's authors recognized that one cause of the gap between policies and practice is that EE is not being developed in an interdisciplinary and holistic form, as well as it is not developing critical thinking and values, which can gives rises in actions to help to solve environmental problems (Mordock & Krasny 2001). To implement EE in primary school it is necessary to

develop in the students a critical sense (González 1996). Thus, the developers of the model believe that PAR could engage students, teachers and community in participatory actions to analyse the context where they live, identify problems, rank them and to design proposal to act to solve their environmental problems. Consequently, Viga's model has been developed incorporating PAR as its main work methodology; using both, EE and PAR. This model attempts to develop in the Yucatecan population a capacity for participatory actions to help to solve environmental problems, which negatively affect their community development, their health, and quality of life and contribute to development an Environmental, Responsible and Autonomous Culture in the population involve.

In testing Viga's Model the sample was divided in 2 groups; one control and one experimental (Viga, D et al. 2009). From those groups, the first case of this reported research is one public school that is part of the experimental group of the Viga's interdisciplinary and inter-institutional project. In parallel, to analyse what are the similarities or differences with and without the model in a similar context, our second case will be another public school from the control group. Indeed, with the first case, our research will analyse in depth over the implementation of a PAR proposal in EE. We chose the first case because Viga's model is an innovative proposal that use PAR, which could be a factor that helps to match theory and practice. The second case will be useful to identify what other factors influence the implementation of EE in a common Mexican school, where PAR is not being used.

In conclusion, we intent to analyse two cases in the educative context of Mexico, one using an EE model, which methodology of work is PAR, and another does not (see Figure 1). Finally, it is important to acknowledge that, because this research will be a case study, we cannot do generalizations with the results. These will apply for the schools where the study is conducted and for schools with similar conditions to this particular research.

Figure 2. Participatory Action Research. A pathway to match theory and practice in Environmental Education in Mexican Primary School.



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