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**Participatory Action and Drought as a Symbolic Context:  
The Case of Aldama Chihuahua, Mexico**

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**Paper Presentation/Empirical Study**

**Abstract**

This paper presents a field-based project and a theoretical framework for work with an Action Research paradigm. The complexities of process are illustrated and synthesized in two theoretical models. The design of the study required constant change in the focus of projects due to the action produced from genuine involvement. As a result a working template of the execution of the action research projects involving multiple educational institutions was generated by bi-national collaborations. Participants were ecological researchers and schoolteachers actively engaged in schools and in the education of the community at-large, on the effects of drought in their lives. Through formal and informal field based observations, group narratives and technology based communication distinct sources of results illuminate an on-going and spiraling venue using drought as a symbolic system. This project documents transformative knowledge in education to enhance multidisciplinary approaches toward social change and ecological awareness.

## Introduction

The aim of this paper is to extend the dialogue to a bi-national perspective (U.S. and Mexico) concerning environmental justice and education. Action research in teaching and for researching practice is a useful framework for documenting and facilitating change. In this paper, the researcher presents the approach used by Mexican teachers who used their reflections as a tool for developing awareness and understanding of what they do as educators to mitigate the adverse effects of environmental change. This focused professional development process forges interdisciplinary methods for linking education to sustainability through reflective action. By using an action research paradigm which include multiple dimensions, we recorded our progress through narratives that for certain were influenced by phenomenology in which “narratives constitute reality in context: It is in the telling that we make real phenomena in the stream of consciousness” (Young as cited in Kohler-Reissman, 1992, p. 22). We used *drought* as an environmental concept and as a symbolic representation of community life for our multidisciplinary project conducted in the Chihuahua desert of Aldama, Mexico during the first nine months of the action research process.

## Purpose

The purpose of this project was to develop teachers’ emergent consciousness in generating environmental pedagogy and to document the dynamics of our collaboration for praxis with groups of desert science researchers. The central question was “What fundamental knowledge base had been established for a transformative commitment to ecological inquiry through participation and praxis for effective community engagement?” This presentation recounts the spiraling effects of an interdisciplinary participatory action process. Specifically the original teams of researchers were concerned with forging new directions in the way that research data on the conditions of drought (hydrology, meteorology, climatology, geographic data) in the Chihuahua desert region could be disseminated in local schools. Schoolteachers concerned with generating pedagogy on the ecology of their community volunteered to participate as reflective practitioners. By the use of a participatory framework we formed collaborative teams to document a process model of education. Over the span of four years (i.e., from 2001 to 2005), the consistent documentation illuminated complex issues of human interaction within our teams and the institutions that we represented. Spiraling questions were generated through a recursive loop of reflection and action. The project was initially funded through a Fulbright grant awarded to the researcher from California for the academic year 2001-2002. Narratives were included in a book along with research findings on drought edited by the researcher and published by the *Instituto de Ecología A.C.*, Garcia, S.S. (2005) *Educacion Ecologica Praxis Interdisciplinario en Torno a la Sequia en Chihuahua*, <http://www.academia.edu>. As mentioned, the collaborations were the work teams that consistently used multidimensional perspectives to document

efforts and problems that emerged during the process and were continually dialoged among us to clarify meaning and interpretation.

The employed inquiry methods changed through the distinct phases of the project. The initial mode was a dialogic interpretation, both orally and in writing. By the time we reached the second phase and completed the edited book, the teacher teams had generated a spiraling figure to document changes in their work and emerging visions. The project coordinator posed questions constantly to facilitate thoughts and actions as the participants were consistently documenting their ongoing work. Thus not one particular approach was sufficient, as the projects evolved both oral and written communication via technology, emails, video, and iMovie were used. In the following sections these approaches are described in detail and include a recent interpretation done by the field project director who also has been the facilitator of group process. For this paper, selected testimonies shared by three of the project participants are presented, which are translated from Spanish to English. These narratives report a synthesis of a representation of the groups' reflective visions.

### Theoretical Models

The two illustrations that follow are labeled as Figure 1: The Cyclical Interdisciplinary Model of Drought as a Symbolic System, and Table 1a: Theoretical Framework of a Multidisciplinary Project. The Figure 1 entitled The Cyclical Multidisciplinary Model of Drought as a Symbolic System captures the interdisciplinary process portrayed as a connected system of complex concepts, *Drought* or (*Sequia*) as central, a symbolic core, framed by Action Research (*Investigacion Accion*). Also Illustrated in Figure 1 are the intervening variables of Collaboration (*Colaboracion*), Environmental Education (*Educacion Ecologica*) and Vygotskian Theory (*Teoria vygotskiana*).

**Figure 1: The Cyclical Interdisciplinary Model of Drought as a Symbolic System**



The framework of theoretical models used in this study is provided in Table 1a. It presents key concepts identified for multidisciplinary action. This approach articulates and strengthens the *plurality* of accepted theoretical models of learning as the basis for the work in Aldama. Vygotskian scholars utilize action research (Riviere, 1988; Silvestri & Blank, 1993; Steiner & Holbrook, 1996; Steiner, 2000) to illustrate the nature of social cultural constructs ascertained by Vygotsky's zone of proximal development (ZPD). The blending of these theories coalesce into *action*.

Table 1a: Framework of Multidisciplinary Theoretical Models Applied to Action Research in Aldama Chihuahua, Mexico

Premise: All Education is Environmental Education



A course was offered to public school teachers in Aldama Chihuahua by the California project facilitator and Santa Clara University professor at the *Centro de Investigacion Sobre Sequia* (CEISS) on action research. There were great expectations and motivation but also uncertainties. Although a methodological plan to guide the research process was generated and approved by the *US/Comexus Fulbright Commission* the project proposal is only one dimension of the research. Attaining praxis is always an abstract concept and it is never certain that action, agency and change will occur. The original plan was generated with a limited context perspective, but initially based on basic premises of action research theory and vygotskian principles of social interaction. During the conceptualizing of the work plan the project director made two

spurious visits on dates prior to taking residence in Aldama, a rural community twenty miles east of the city of Chihuahua.

The professional development needs of the Mexican teachers from Aldama were based on a lack of environmental educational programs offered in the region. Also initially the crisis level of *drought* in Chihuahua was determined as an abstract concept. The intensity of motivation that would propel teachers to learn, through a formal scientific explanation of why the phenomenon of *drought* existed was again considered abstractly or with no real data except what was presented in the media and informal observation of communities affected by drought. Central to this study was the 'human' aspect of *drought* and its impact on the social, cultural, and ecological economy. These were topics discussed during the formal class dialogs presented by scientists at the Research Center (*Centro de Investigacion Sobre Sequia*, hereafter referred to as CEISS). The CEISS was a regional center in the Chihuahua desert and part of the *Instituto de Ecologia A.C.* based in Jalapa, Veracruz, which is a federal research institute. The CEISS served as the host institution for the Fulbright recipient researcher and also for all educational and research activities associated with this project that evolved over time.

The dialogic aspect of the action research-method was an important starting point of this study's implementation process. The majority of the group participants did not understand the collaborative process modeled by collective reflection. In addition, the participants did not clearly understand the projected action, neither for educational change nor for the need of community involvement in the work in which we were embarking. During the applied methodology and the collaborative dynamics of the course, the vygotskian notion of the *Zone of Proximal Development* (ZPD) created confusion among participants, which included teachers of primary school levels, middle school and advanced professional education levels. Some participation by the Rural Development Brigade No. 59, which is a field based education group working with illiterate adults was also included. The initial group of participants totaled eighteen educators and six researchers. Through the final phases of the project only six teachers and five researchers, which were part of the original group, remained active with the work. The reason for such a high attrition rate of the participating teachers could be explained by the workload that required readings and discussion to continue even after the initial course offered in the first phase of the study was completed. Through the process of project implementation the groups of teachers worked closely with the facilitator and the science researchers. More than half of the original group of teachers did not want to give a commitment to the amount of time and effort for the continuation of the work. All teachers were provided with a certificate of completion for the course work which was required by their schools. The six teachers that did continue beyond the course offered to all participants also varied in the amount of time committed to see the local school projects through to the next cycle. The book project was a climatic collaborative achievement but soon after, several mini field projects once again

generated other forms of learning that initially had not been anticipated and included new members. The ongoing activities continued for several years (i.e., from 2001 to 2006) and as the teams were reconfigured the projects again gained momentum.

As learning groups and through collaboration, we recreated a natural ensemble of work teams. We applied the vygotskian focus explicitly through the collective action of both teachers and researchers. To support the learning group of teachers' activities, the researcher in the role of constant facilitator continued guiding process throughout the duration of the project. As the facilitator I (the researcher) played multiple roles, for example I worked and participated in reflection with each of the groups of teachers and also the researcher group from CEISS. In hindsight, we learned that the ideal would have been to have group participation represented at all levels of the project instead of the researchers as separate teams. The researchers from the CEISS should have been involved as an integral part of the collective teacher team effort, and not only as presenters of their respective areas of expertise, from outside of the teacher groups. Basically the science researchers were not readily accepting the teacher groups as researchers and they participated in a traditional manner by using top-down models to impart science concepts. The very aspect of community work they set out to change initially in order to work directly with the schools continued being used unchanged to disseminate their research results on drought. These researchers initially did not fully consider the theoretical premise that underpinned this work, they were participating without an understanding of the social theories of learning on which the project was based. This aspect of the work was remedied, in part, and mediated through a teaching approach by conceptualizing a series of questions used by the teachers before each of the presentations by CEISS researchers. My main purpose as a researcher-facilitator was to encourage reflection on key scientific concepts related to community ecology from the teacher point of view so that we, as active participants, could dialog about and share our classroom application perspectives.

It was clear to me as the facilitator from the beginning that the teachers had not included local ecology concepts in a scientific way nor which were reinforced by science related data, in their teaching and for classroom application until participating in our project. Through the group reflective approach, which was not punitive, we as educators became well acquainted with a dialogic discussion and group analysis of the content of each scientific presentation given by the CEISS researchers. We generated these dialogic discussions and data-driven presentations intermittently and continued to apply these in real classrooms well after the first phase of the study was completed. The application of these concepts was introduced and applied in the first phase and interspersed throughout the entire study at distinct levels.

As the facilitator I put great effort on active team reflection and insured that the individual CEISS teams of researchers integrated actively in the application of concepts at the school classroom level alongside the teachers. This integration of work teams forged an emerging process, which connected the CEISS with local school

communities. A serious compromise to the work by all participants reached higher levels of perseverance of personal enrichment and professional growth, which is similar to what Csikszentmihalyi, has defined as *flow*, an example of a fluid psychological growth and enriching flow experienced as an optimal experience. "The state of "flow" includes 'a deep involvement,' without effort, separate from preoccupations, frustrations or everyday concerns" (Csikszentmihalyi as cited in John-Steiner, 2000, p.168.). This usually happens in the best of times, when the body or extended personal limits are made in an effort to achieve something difficult and valuable. This state was reached in several phases of the project, especially when teacher groups managed to create and execute two separate school based action research projects related to the problem of drought.

We worked continually to generate complex levels of interaction and collaboration within and between different groups, all participants reached a compromising position for greater understanding. Every interaction became dialogic and enriched the group work. Important to note is that on several occasions, the interactions were filled with tension, exhibiting social interaction through a dialectic, this is explained by a vygotskian *zone of proximal development* (ZPD) (John-Steiner, Holbrook, & Mahn, 1996). The use of a central dialectic has the concept of union with contradictions. The conceptual interrelations have elements that integrate various opposites that create dialectic units. Equally the interactions can be seen as lived experiences of the ZPD ("*zona of desarrollo próximo o potencial*") in and between distinct groups; we were all learning from one another. In this manner we achieved the organizing of a "community of learners" (Rogoff, 1994 cited in John-Steiner, 2000, p.171).

The *zone of proximal development* (ZPD) is described as the distance between an effective development level determined by independent problem resolution, and the higher level of potential development, achieved through the resolution of problems guided by one adult in collaboration with more adult partners who enables change (Vygotsky as cited in John-Steiner, 2000, p.177). In this project emergent problems were considered in collaboration with peers with similar capacity for thought and action. That is, working teams were assembled (formed) naturally (spontaneously) into groups of teachers working at distinct educational levels and of the same age or younger. The teams had more or less the same academic preparation (degree), but not all were career teachers, as some, such as the community educators had different educational backgrounds. However, all participants had similar common social experiences, and similar cultural and educational histories. The groups of investigators at the CEISS were researchers and technicians, as well as the facilitator/coordinator of the project; all had advanced degrees (masters or doctorate). Despite the differences, all members had something valuable to contribute to the group's knowledge. John-Steiner (2000) notion of "a community of learners" (Rogoff as cited in John-Steiner, 2000, p.171) is a vygotskian concept that was first identified based on mutual reciprocity among members and respect for all participants.



As we established our work teams the collaboration and participation became a process of building consensus: each person listened carefully and verbalized ideas for their colleagues. Through this process we generated connected ideas and we explored what John Steiner (2000) defined as "a mode of complementary social action" (p. 177-178). The ensemble of teams and representatives of different schools of the Aldama community, created a situation where teachers exercised reflection in their teaching plans with action that was team generated. This group extension was considered an internal manifestation of teachers as theorists in their own personal teaching and learning space. According to Schubert and Schubert Lopez (1997), the central idea of participatory action is "ongoing teacher reflection which develops focused on practice that enhances the inquiry process" (p. 217) and also aids in generating questioning assumptions about ideas often accepted without question.

My role as the facilitator was essential to guide the groups through the process, emphasizing stubbornly the importance of *mediation* to establish dialogue and monologue (as in personal reflections done in written form to share with the group) as interactive modes. Also as the facilitator I made a continual effort not to create passive recipients of information. This perspective was of principle exponent of the entire project because without interaction or space to create dialogic discourse, change will not occur, we constantly encouraged active engagement. Knowledge acquisition through dialogue was based on personal reflections and was social-interactive with little attention to individual accomplishment that did not depend on our group process. During Phase One of the study and the initial course taught to initiate the action research process, the participants were provided with two books on vygotskian theories (Riviere, 1988; Silvestri & Blanck, 1998) and one on action research (Elliot, 1994) to develop the theoretical basis for the action research projects in the schools.

### **Participatory Action: Findings and Reflections**

Stronger commitment to education concerning sustainability and local knowledge of ecology were the project themes from local to the establishment of bi-national perspectives. The pedagogy for use in the school context and in the community at large by the teachers focused on water resources, natural and those controlled by the structures of power with regard to learning and knowledge construction in the local region. Complexities of futility, frustration coupled with hope, care and expanding the possibilities toward change propelled the work, which continued at other levels through the use of technology to maintain bi-national communication. Transformation was evident in both the teacher and researcher teams through the continual participation with the creation of other mini projects linked bi-nationally with subgroups of the original participants. The phases of the action research took on different characteristics as the teams evolved in relation to the work that continually spiraled to higher levels of engagement.

To date there have been four distinct phases of the work done bi-nationally, (i.e., between Mexico and USA), specifically Phase I, 2001-2002; Phase II, 2003-2005; Phase III, 2006-2010, and Phase IV, 2011-2014. Teachers and researchers during the first phase of the study (2001-2002) were eager to share their findings of local ecology to the community. The scientist as well as the teachers gauged their knowledge by interacting, testing out results of research finding by interpreting them for the teachers, the teachers developed pedagogy and engaged their students in outdoor education in their own community. Even through prior to the study a small group of teachers at the middle school had been conducting field trips and sponsored an ecology club, after the transformative experience with the action research projects they became leaders for the school and community by becoming better informed and educated about the ecological devastation of the region and the need for praxis. This was evident in formal presentations to community leaders and parent groups about the sources of water and the effect of drought to the fresh water supply of Aldama.

Teacher *voices* signaled spiraling awareness of the scientific ecology of their respective local regions. The following testimonies were shared in January, 2014 by two of the participating teachers and one of the CEISS technicians that were translated from Spanish to English for this paper:

From the start we began to document both the plans and the activities made during our development, which we rarely conducted as teachers before the project. We participated in local field trips but we never recorded our actions. At first it felt strange to do constant reflection but it finally made us realize how important our reflections were for our learning and development. (Xochitl, 01/2014)

At first the class at CEISS seemed easy but in reality the project by its complexity required us to attend to our own learning, which was to read the readings that would base our actions and to then accompany us to reflect and discuss in group. (Myrna, 01/2014)

Through specialized materials that we generated from the research at the CEISS and presented them to the teacher groups, data became accessible to teachers. We involved them in the use of technology that was not offered to them at their schools but when engaged in the activities with the researchers they could also take the information they considered important and use it in their school pedagogy. (Carlos, 01/2014)

The above excerpts from the narrative testimonies of three of the original participants of the project start with concerns from the first phase (2001 to 2002) and are actively engaged with action research well into the fourth phase (2011-14) of the study. All three team members participated in all four phases. The teachers had constructed a social reality in their roles as environmental educators that furthered the awareness of the drought situation in their lives beyond the data sources generated by the CEISS Research Center.

During the second phase (2003-2005) of the study, the participants organized community events with city officials that enhanced the local ecology such as tree planting ceremonies and organizing on-going community lessons gleaned from the research findings. Working teams of researchers and teachers were continually spiraling to other levels of knowledge building and collaboration. A website was developed through the collaboration of research technicians and the teachers at the CEISS computer center, which featured the action research projects generated by the teams. Plans were made to write a book, which then became a bi-national effort that continued until 2004 and well after the book was published in 2005.

Between the transition of the second phase (2003-2005) and the third phase (2006-2010), new members joined the teams and generated more resources for bi-national collaborations. Two events were funded by additional grants during the third phase are worthy of mention. One was the collaboration of two faculty researchers from Santa Clara University in California, USA, a biologist and an anthropologist that joined the field based projects in Chihuahua and a new member from the CEISS whose specialization is ground hydrology of the desert. We organized a retreat to the research laboratory in *Mapimi* (a research center bordering Chihuahua, Durango and Coahuila regions converging in the Chihuahua desert) an *Instituto de Ecologia* regional center similar to the CEISS. Fifteen participants engaged in a three-day retreat in the Mapimi research laboratory. Both CEISS researchers and Aldama teachers participated in this retreat with the two professors, one graduate student, and the field project director all from Santa Clara University. The field-based activities from this retreat are chronicled in a 16.5-minute YouTube video (Garcia, 2006 "My Great Movie Mapimi" 16 5 [Video file] <http://www.youtube.com>).

The other significant professional exchange was a visit by the Mexican teachers and researchers from the CEISS to Santa Clara University. Teams met with local community and campus organizations to explain their work with drought as a symbolic context supported by action research to build collaborations bi-nationally. Several significant endeavors were part of these exchanges. We collaborated in writing proposals for grants, projected a licensure degree in environmental education at the CEISS in collaboration with the University of Chihuahua and presented our work at a regional environmental education conference in Chihuahua City, Mexico.

## Conclusion

This has been a cursory view of a very extensive and complicated process that has affected the lives of the participating members in complex ways. It is not within the scope of this paper to present neither all aspects of the research project nor all the mini projects generated from the original. However, a good synthesis of the learning levels attained is articulated in the following recent testimony by one of the key participants of the project, Myrna Rodriguez Zaragosa, translated from Spanish into English. Myrna was the youngest teacher at the time of the initial phase of the study and a classroom science teacher in the middle school, *Escuela Secundaria* in Aldama, Mexico. She was involved in all aspects of the project. This exemplary member of our team was at a pivotal moment in her career and evolved cognitively, socially and intellectually into a strong action researcher focused on teacher education and mentored by our collaborative teams. She has now completed her doctorate and is a teacher educator at the *Escuela Normal* the teacher training institution in Chihuahua City, Mexico. Myrna synthesizes her professional growth in the following testimony:

However this project links Lev Vygotsky prioritizing him as a pedagogue and action research as a methodology, it had finally reached unplanned dimensions. That is, hard science ceased to exist for us, researchers at different times led in different ways, the regional environmental reality in which a range of technological devices became available to young students (in the schools). We as a team, complemented the researchers and as a group used more efficient cameras, and computers with updated software to be able to develop teaching and learning toward more of a real and full ecology. (Mstra. Myrna Rodriguez Zaragosa, Escuela Normal Chihuahua, Mexico January 2014).

Finally, we can attest that a myriad of successful activities were generated through an action research paradigm inspired through a multidisciplinary scope that evolved and engaged multiple groups in the distinct phases of the project. According to Elliot (2007):

'Action' involves initiating change in a social situation to bring about something new in the web of social relationships that constitute it. The consequences of 'action' for the agent and those affected by them, where they will lead, cannot be entirely foreseen. (p. 208)

After a decade all active agents in this project experienced a transformation. Certainly our actions could not have been foreseen in advance regardless of how we documented on what we had embarked initially. However, one aspect seems to be certain throughout the four phases of this project: all involved were committed to social change

through education. Further, all participants had a deep level of commitment to sustainability and to mitigating the effects of *drought* in desert environments, which also included the State of California. Educational activities through action research entail action, not to gauge effects through a reductionist vision but quite the contrary, to possibilities toward change by using multidisciplinary methods and to generate plurality in ideas of common concerns. Action research is a viable approach for social cultural change and for life-transforming experiences.

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