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BARBOSA, Joao Carlos Lutz

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Published version

BARBOSA, Joao Carlos Lutz (2009). The Undisciplined Nature of Ecological Design. In: Undisciplined! Design Research Society Conference 2008, Sheffield Hallam University, Sheffield, UK, 16-19 July 2008.

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The Undisciplined Nature of Ecological Design

João Carlos Lutz Barbosa, Centro Universitário da Cidade do Rio de Janeiro, Brazil

Abstract

The author evaluates the results of a participatory action research that takes place amidst a private design school located in Rio de Janeiro, Brazil. The objective of the research is to verify if it is possible to steer design education towards ecological sustainability. This paper presents a case study that reports on strategies and actions that were undertaken by a group of teachers in order to advance Ecological Design methods and thus contribute to sustainability building.

Keywords

Design Education; Ecodesign; Ecological Design; Participatory Action Research.

Accepting, for the sake of the argument, that ecological sustainability depends on adequately balancing issues from the "triple bottom line", financial, social and environmental, it is possible to perceive that we, as a global society, are far from achieving it.

Environmental catastrophes are mounting as science reports the loss of habitats, the destruction of whole ecosystems, the mass extinction of species, the pollution of atmosphere, of rivers, lakes, seas and even oceans. Global warming, climate changing and related storms are further evidence of environmental imbalances that affect us all.

On the financial aspect we are testimonies not only to the huge concentration of richness and the spread of poverty that resulted from the last 20 years of global economic growth but also to the depletion of natural resources necessary to economic activities and the fragility of the existing financial regulatory systems.

The social bottom line could not have fared better and consequently ignorance, hate, blind violence, alienation, drug abuse, environmental refugees and wars are everywhere. So, the ecological crisis is already a daily, even if not recognized, matter.

The ever most visible and pressing ecological crisis led to the introduction of EcoDesign as a possible contribution to ease the pressure derived from the ecological crisis. This new discipline implicitly recognizes that Design activities are partially responsible for the maintenance and development of the mentioned critical phenomena. Among other hidden issues stands the designers role in the designing of the relations between consumerism, environmental death and spiritual vacuum.

Thus, initiatives from international organizations such as the United Nations, the WBCSD-World Business Council for Sustainable Development, the International Standardization Organization (ISO) and many other nongovernmental

organizations (like the Rocky Mountain Institute and universities like Delft) were developed and aimed at proposing methods and approaches that could drive eco innovations, change consumer patterns from buying goods to buying services and so ease the consumption of natural resources and the resultant pollution.

All these initiatives can be deemed reformist, in the sense that they will not produce a significant alteration of the production/consumption status quo or even contribute meaningfully to decrease the consumption of raw materials, energy or pollution levels. EcoDesign, like many previous ideas that criticized and contested the market economy, has been co-opted by the operating system and is now used as a distractive marketing tool aimed at changing in order to keep all the same.

Sustainable development is an unattainable target because humankind has already gone beyond the sustainability threshold, meaning that the living systems that form the base of our dwelling in this planet are already overburden. Following this kind of reasoning authors like Sarkar (1999) believe that we, as a global society, need to reconsider our consumption standards and develop a kind of eco socialism in which eco regenerative activities and social solidarity should substitute the quest for material abundance. Fry (1999) also believes that most of our present design activities contribute to sustain the unsustainable, meaning that we, living inside the affluent society, don't even realize how our production and consumption patterns contribute to negate possible futures. On the other hand, even reformist actions have their value in the sense that they may buy us a little more time or, hopefully, represent a first step in the direction of sustainability.

Ecological problem solving may be a powerful tool to overcome alienation.

But can designers and design teachers see the real problems that relate design and the ecological crisis? How teachers and design students understand concepts like ecological crisis, sustainability and EcoDesign?

What commitments and actions should a design school adopt if EcoDesign, even if reformist, is considered a desirable goal? Is it possible to steer design education towards ecological sustainability? Can existing EcoDesign tools and theories be used globally or do they need to be adapted to local and regional conditions?

Public x Private education in the Brazilian context

In Brazil, since the seventies, the private sector of the economy has been having an increasingly important role in the superior education segment of the educational market. According to the 2004 academic census developed by the Brazilian Ministry of Education, the private sector is responsible for the education of almost 72% of population enrolled in superior education.

This overwhelming presence of the private sector in the Brazilian university educational field derives from a strategic option of the military governments which, starting in the 70ties, decided to concentrate federal investments in physical substructure like hydro electrical plants, telecommunications, nuclear energy and auto road building. The educational field was "opened" to private entrepreneurs who adopted managerial approaches that privileged the administrative over the pedagogical sphere. A simile of the North American credit system was introduced nationwide as a modernization tool.

The result was the fragmentation and isolation of curricula disciplines, teachers and students.

This educational privatization phenomena also led to the consolidation of the "part time fragmented teacher". A professional educator who, to make a living, has to teach in many different schools or to teach only as minor and complimentary activity. This situation does not propitiate the construction of major bonds between the teacher and the institution, and even the relation between teacher and students is contained and inadequate to deepen their studies. Teachers will work strictly by the clock. In this context research activities were deemed too expensive and the private schools started to dedicate themselves more to training and less to true education. This approach to education walked in tandem with the military dictatorship that understood true investigative education as a potential menace to the imposed public order. This understanding of education goes back to colonial times and lingers on even today whenever you find teachers working to train and not to educate, to replicate and not to develop knowledge.

 During the beginnings of the nineties, after the end of the military dictatorship, a new evaluation program targeted at the university education was introduced by the Brazilian Federal Government. Among diverse items the evaluation criteria include not only the teacher qualification (academic titles, professional experience etc.) but also their dedication (measured in allotted hours and scientific production) to the institution. Together with the evaluation program came also a new taxonomy for the superior education system. This classification works with the following typology:

- An isolated graduation course.
- A set of different graduation courses
- University Centres
- Universities

The main difference between University Centres and traditional Universities is that the first are not obliged to develop research but have to concentrate on offering high quality professional education. Universities follow Humboldt's traditional model and necessarily engage in education, extension and research activities. It is possible for a Brazilian educational institution to expand and improve its practice, moving from one classification to the other and in this way progress towards bigger autonomy and independence from the government rules.

This new reality contributed to heighten the value of teachers who actually knew how to develop research projects for, beyond a certain level, it is not possible to improve the quality of professional education without research. Most of these researchers came from masters and doctoral programs offered by public Universities, which historically maintained its commitment to education, extension and research.

As there is a growing competition among the different private educational institutions for the tapping of a restricted number of possible students, the symbolic value of good results in the governmental evaluation process became tantamount to the perceived quality of the educational services provided.   Brazil still needs to expand and improve its university educational system to receive a growing number of youths who reach the age for superior education. Nowadays there are 4.163.733 students enrolled in superior

education and this represents only 2% of the Brazilian population. Presently, as the education of the population becomes increasingly strategic to the nation states, it is reasonable to suppose that the trend towards the valorisation and qualification of teachers will continue.

Design Education in Brazil

Design education in Brazil is linked to the foundation of ESDI, in 1963, at the city of Rio de Janeiro. ESDI, an acronym that stands for Superior School of Industrial Design, was the first South American school of design. Strongly influenced by the Ulmian educational principles brought to Brazil by some teachers who studied at the *Hochschule für Gestaltung* in Germany, ESDI became a model for other private and public design schools that began to operate in Brazil from the 1980ties onwards.

As a new profession struggling to establish its bases in a market then dominated by architects and artists, Brazilian design educators were not very open minded to interbreed themselves with other areas like fashion, advertising, marketing, cinema, architecture and art. When incorporated in ESDI educational design program some of the educational principles of the mentioned Ulmian tradition were misinterpreted by the academic community of ESDI and that misinterpretation led to too much emphasis being placed on hands on practice and to the devaluation of reflective and theoretical studies. In this context design research was not able to thrive and consequently design education lagged behind other professions that already were developing researches inside masters and doctoral programs.

Accompanying the already mentioned general expansion of the private educational university system, there was, from the 80ties onwards, a huge expansion of the design educational system, with new courses being offered at the main Brazilian cities (nowadays it is believed that there are around 200 design courses spread all over the country). Most of these courses followed the distorted Ulmian approach to design education that did not consider research as a fundamental activity to further develop design practice and education.

This state of affairs lingered on until the 90ties, when a small group of designers began to organize biannual design research conferences. These conferences promoted an important exchange of information among nascent Brazilian design researchers, opened up new discussion forums and helped to establish focused networks and specific communities among the design researchers. The conferences proceedings progressively presented a clearer panorama of what kind of design research work was being done at different regions of the country and formed a critical mass of design research knowledge. The average of "EcoDesign" published papers in Brazilian conference proceedings (11 conferences from 1994 to 2007) corresponds to 6.6% of the total published papers and amounts to 184 papers.

In 1993 the first design masters program was created. Nowadays, there are in Brazil nine masters and one doctorate design programs that contribute to develop and disseminate knowledge through papers presented at the now yearly conferences on design research.

The specific context of the research

In Rio de Janeiro there are presently seven design graduation courses, two masters and one doctorate program. Every year the design graduation courses bring four hundred new designers to the professional market. The competition among the private design schools is fierce and focus not only in prestige achievements but also in the enrolment of new students.

This research is being developed at UniverCidade's School of Design located at the city of Rio de Janeiro, which is one of the most important design centres in Brazil. The design graduation course is offered, since 1981, by a private educational institution that hires a staff of 50 design teachers who work with almost 1.000 design students. The institution that nestles the Design School is the second biggest private University Centre in Brazil, operating, only in the city of Rio de Janeiro, with 35.000 students and almost 4.000 teachers.

The design course is offered in two shifts: in the morning and at night. The morning students profile differs from the night student profiles mainly in terms of behavioural maturity which in the nocturne shift is more developed than in the morning one. The completion of the design course (in no less than three and a half years) leads to graduation in Graphic or Product Design. It is also possible to graduate, after two and a half years, in technological shorter courses dedicated to Fashion Design, Interior Design and Digital Design. A two years foundation course is common to all design graduations.

The opportunity to improve the educational practice of the mentioned group of design teachers appeared in 1996 when the institution decided to apply for a new category in order to become a University Centre. During this upgrading process one of the teachers of the mentioned group became the coordinator of the design course and, in this position, was well placed in the academic hierarchy to implement and advance some ideas on educational practices. These new ideas and practices were based on design research development and included the beginning of a design research project aimed at the introduction of ecological action in the design course mainstream.

Methods

Schools are collective projects that involve teachers, students, families and supporting staff who generally have different worldviews and objectives. By the end of the 20th century, in order to keep on offering design education of high quality it became necessary to start developing research projects inside the Design School. The high administration of the institution didn't believe that designers could do research and deemed it a waste of time and money. True research, they believed, was done in advanced countries of the first world and our task as teachers should be restricted to collect and transmit already existing operational knowledge. The institution had a tradition of preparing students to operate with proficiency in a professional market. But the professional market had changed and by the end of the century when successful professional designers were expected to be able to think, to discover problems and propose creative solutions.

In order to overcome this prejudicial understanding of research activities we adopted the strategy to create a design research nucleus, the NPD (1998), which would become responsible for the development of the special ecological projects. The NPD was then, formed by five teachers, all of them

masters and doctors partly hired to develop research projects (each one of these teachers started to receive some extra money, a fact which was a novelty in the specific institution).

It was also decided that to work in these conditions and social environment it would be necessary to adopt different working and designing methods. It was then decided to work accordingly with some precepts of what is internationally known as Participatory Action Research (or PAR), which may be summarized by 16 tenets of participatory action research as developed by McTaggart (1989).

Participatory Action Research

- Is an approach to improving social practice by changing it
- Is contingent on authentic participation
- Is collaborative
- Establishes self-critical communities
- involves people in theorising about their practices
- requires that people put their practices, ideas and assumptions about institutions to the test
- involves keeping records
- requires participants to objectify their own experiences
- is a political process
- involves making critical analyses
- starts small
- starts with small cycles
- starts with small groups
- allows and requires participants to build records
- allows and requires participants to give a reasoned justification of their social (educational) work to others

Design schools are places where it is possible to maintain or change the destructive traits of traditional design activities. Design schools are also places where cognitive states can and should be developed, especially because designers deal with problem solving. The work of the Brazilian educator Paulo Freire, who dedicated his life to education, developing methods and strategies to use education as a tool against alienation and social inequalities relies on the creation of collective cognitive states of mind. Freire`s work is well known in Brazil and the teachers involved in the project already used some his ideas and strategies in their daily life teaching. The coordination of the design course promoted Freire´s work through the dissemination of one of his books (Pedagogy for Autonomy - Necessary Knowledge to Educational Practice, 1996) which were given to every teacher. Also during collegiate meetings every effort was made to overcome the "banking" concept of education, in which the scope of action allowed to the students extends only as far as receiving and storing the information teachers/bankers deposits on their "inferior minds". The construction of "cognitive states", in which teachers and students deal equally with the unknown in search of collective built solutions, may find fertile ground in design courses for design deals primarily with problem solving. Design activities are connected to world building and design teaching should be carefully constructed having this connection in mind.

Formally the introduction of ecological themes was done with the creation of a specific discipline called "EcoDesign", which is offered in the first semester of the course. The idea was to present and discuss, since the beginning of the

design course, some basic ecological concepts and some of the existing tools for the practice of EcoDesign. Every semester the Design School receives approximately 150 new students that go through the EcoDesign discipline. A bigger fraction of the design students begin their studies in the morning shift but, as times goes by and they begin to take part in apprenticeships, there happens a dislocation towards the night shift.

Special projects

So, beyond the creation of a new discipline, the most important action the course coordination took to really start moving towards the creation of sustain abilities was to work on some especial ecological design projects that could mobilize teachers and students to demonstrate that it was possible to act differently and accomplish positive results in the desired direction.

EcoOuro Project

In 1998, the first especial project to be developed was named EcoOuro (EcoGold) and consisted in the development of products using materials from the Amazon forest. As a first experiment the course coordination decided to work with a material known as vegetable leather (cotton textile impregnated with natural rubber) that had been used for decades by the inhabitants of the Amazon forest. Four classes of the fifth semester of the design course (circa 80 students) received this assignment and produced dozens of different products with sheets of "vegetable leather" bought by the institution. The design process received of course especial attention and in this sense a seminar was organized with vegetable leather producers (Yawanawa Indians from the north western Amazon) and transformers (designers and other professionals like tailors), that had some previous experiences with the material and processes. The results were exhibited in the school gallery and published in the Designe magazine, which is printed once a year by the institution. The success of the initiative can be measured by the growth of the small company that started to produce and sell products with vegetable leather, by the maintenance of friendships links with the Yawanawa people and also by the development of new different products for the same client (graphic patterns inspired in traditional Indian motives and a stand to sell vegetable leather products at airports).

Catacumbas Trail Project

The second project was inspired by Orr's (1994, pp.58-59) comments on commitments that every school should take:

> I propose that restoration be made a part of the educational agenda. Every school, college, and university is within easy reach of streams, rivers, and lakes that are in need of restoration. The act of restoration is an opportunity to move education beyond the classroom and laboratory to the outdoors, from theory to application and from indifference to healing.

In the school's neighbourhood there was a hill belonging to an Environmental Protected Area managed by the city mayor. In this hill, during the fifties, grew a slum then known as the Catacumba (catacomb) slum. It was later removed in the sixties and since then, after a reforestation program, was left untouched as part of a park in the heart of the city south zone. Only a small number of

youngsters that lived in its neighbourhoods knew and visited the place. After closing a deal between the institution and the city mayor, the hill was adopted by the institution and the NPD began to plan what could be done in the place.

May be the opening of the hill to public visitation could help to diminish the distance between city dwellers and the forest and, in this way, contribute to fortify the preservationist movement. Considering these facts and possibilities, it was decided to develop a signing system to inform and direct the visitor experience. A special set of equipments and furniture was also designed in order to offer safety and comfort to the visitors. It is important to state that the furniture and equipments were developed by the design students as part of their curricula and in this sense we could verify, through the engagement of students, teachers, forest guards and other actors involved in the project, the validity of Orr's statement concerning the importance of moving education to the outdoors, transforming "the act of restoration in an opportunity to move education beyond the classroom and laboratory to the outdoors, from theory to application and from indifference to healing."

Since the opening of the Catacumba Trail in 1999 more than 30.000 visitors have made the 30 minutes journey through the forest until the top of the hill, where a beautiful scenery can be enjoyed. On special occasions trees were planted (more than 500) as part of the festivities linked to important days related to the environment. The project received a motion of applaud from the mayor, stating it was considered of special interest for the municipality. Another positive result was the pioneering use of GRP (recycled Glass Reinforced Plastic) products as an adequate material to the moist conditions of Brazilian forests and the setting of a first standard to signing systems applied in other forested areas and municipal parks.

The Zorite Project

A third and last design research project, also started during 1999, dealt with the recycling of paper generated in the school itself. One of the design course's students created and patented a chemical solution that may confer different physical properties to moulded or assembled cellulose products. From this starting point a research project was devised and named the Zorite Project, in homage to the student, Pedro Zohrer, who created the chemical process. A laboratory was prepared to produce macerated cellulose, the fabrication processes were perfected and a series of products were designed and fabricated. These results were presented in different occasions and led to the participation of the design course in the *Salone Satellite 2000,* which is an experimental division of the Milan International Furniture Fair. Recently the Zorite Project also obtained an award from the German Industry Forum in 2006 (material award - IF 2006).

Evaluation

First evaluation

Due to a series of internal and external factors, the continuation of some of the mentioned special projects was not possible. Political changes in Rio de Janeiro mayor interrupted the Catacumba Trail Project , the EcoOuro project also had to be discontinued due to internal disagreements among the traders

of the vegetable leather. The Zorite Project is still running and has opened new roads in the ecological materials field for we are now developing new ecomaterials based on castor oil.

The experience gathered during the development of these special projects shows that although initially attracted by the ecological appeal of the proposed projects, the students tend to classify EcoDesign methods as tools to be used only in specific eco assignments and not as a must inside design methodology.

A survey developed with 30 Product Design students that had already gone through the Ecodesign discipline and completed the foundation course showed that if teachers do not ask them to use tools such as, for instance, the LIDS WHEEL (developed by HEMEL and disseminated by UNEP in partnership with Delft University of Technology) to compare different products, most of the students will stick to the traditional design problem solving methods. Students tend to understand ecological themes as dissociated with their daily lives. Also, to these students, EcoDesign is understood as a minor design activity linked, for instance, to the use of recyclable materials and the use of certified lumber.

The special projects attracted media interest and the resulting coverage in newspapers and magazines contributed to maintain the financial support to the NPD and the interest of the students in the EcoDesign projects. Unfortunately, media interest is always changing to different subjects and per se is not enough to galvanize and consolidate the use of Ecodesign methods by design students. Also, the traditional (and superficial) glamorous image of designers, connected to the creation of novelties and beautiful shapes is too powerful in the collective imaginary of young students. Finally, students do not think that EcoDesign, as a specific area of work, will provide much money and professional recognition.

Second evaluation

To evaluate the results of the school efforts to introduce EcoDesign methods in the design course, a second survey was conducted in 2008. The design teachers were asked how did they perceived nowadays the interest of students concerning EcoDesign and if this interest had grown or diminished when compared with the situation in 1998. Only 32% of the teachers answered the questions.

Most of the teachers who answered the questions, 78%, perceive considerable interest of the students towards EcoDesign and 30% of the teachers believe this interest has grown. On the other hand, 48% of the teachers see this interest as superficial (based only on common sense and media coverage) and without a consistent theoretical base. Almost a quarter of the teachers believe that this lack of theoretical base happens because the subject is abandoned or not promoted by the teachers after its introduction in the beginning of the course. The survey also revealed that 12% of the teachers perceive a bigger interest and engagement within product design students (compared with graphic design) and also that teachers who completed masters and doctorates are better prepared to deal with the subject. All teachers believe that the efforts should be maintained and increased to stress and use EcoDesign concepts and methods.

Conclusions

The survey results show that teachers and students recognize the importance of EcoDesign and would like to maintain and develop EcoDesign teaching in the school. It also shows that there are some problems of continuity and that the course coordination should act in order to better prepare the teachers to deal with the subject and to keep the focus on Ecodesign approaches and methods, especially in the disciplines that develop studio design activities. The discontinuity problem de facto happened because there were only three teachers really engaged in EcoDesign teaching and one had to stop teaching in order to pursue the completion of a doctorate. A challenge would be to introduce EcoDesign in the Graphic Design course where the overuse of paper and toxic inks are not generally understood as an ecological problem. Some teachers also consider it necessary to create new disciplines to bring into the course subjects such as Life Cycle Assessment, Design Philosophy and EcoDesign Tools.

Another fact that emerges from this ongoing project is that, yes, it is possible to do differently. Individuals and groups of human beings, when motivated, can obtain meaningful results even with scarce resources. In this sense the efforts to introduce Ecodesign in the Design Course were partially successful and presently the Design School is in a position to further advance towards more sustainability. The initiative and specific projects dealt with the triple bottom line, demonstrating that designers can work with communities (social), using environmental sound methods and materials (environment) and generate increase in income (finance) to sustain new productive activities.

The locally developed knowledge base and portfolio of accomplished Ecodesign projects will be useful to build partnerships with other organizations also interested in sustainability. Nowadays as almost ever, the sustainable agenda for most of the world is very basic and demands the building of systems that provides everyone with meaningful work, good education, adequate healthcare and peace in a world inhabited not only by humans.

To proceed in this direction it will be necessary to implement specific programs to inform and better prepare teachers. The introduction of new disciplines related to EcoDesign is desirable but will meet opposition from higher administration and in this context the development of special EcoDesign Educational Research Projects, like the ones presented in this paper are effective to capture efforts from students, attention from the media and support from the institution but are not, per se, enough to accomplish the steering of pedagogical activities towards sustainment building.

The continuity of the EcoDesign approach within established disciplines and of the special projects themselves must be guaranteed. This long term effort can only be achieved through the commitment of persons that occupy positions of power. There are of course different levels of power positions within the hierarchy of school and they include coordinators, school head and the teachers themselves. History is not dead yet and this, specially in schools, should not only be stated but also demonstrated. Teachers can act as movers in this world and contribute to recover lost futures.

The undisciplined nature of EcoDesign may come from its hybridization, from its projective and technological interactions with disciplines that deal deeply with humanities and will, for instance, tackle issues related to designing for

climate change and for global ecological crisis. Parts of the ecological crisis loom unrecognized beyond the visible horizons and other parts are already with us.

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João Carlos Lutz Barbosa

Designer, researcher and teacher since 1982, holds a doctorate in Production Engineering (Ecological Design and Sustainability) at the Federal University of Rio de Janeiro. Involved with design research since 1986 has collaborated in the organization of design research conferences throughout Brazil. Nowadays presides ANPED, an organization dedicated to the development of design which promotes a design conference, the CIPED, every odd year. Since 1997 heads the Design School of UniverCidade in Rio de Janeiro Brazil and since 2005 coordinates the Bocaina´s Backcountries Green Room, an NGO dedicated to the dissemination of ecological knowledge in the northeast of São Paulo State. Presently develops a research project known as the TechnoForest which aim is to design equipment to build a forest interwoven with planned cities forming a new Ecological Corridor linking the Serra do Mar to the Serra da Mantiqueira. Serra do Mar is a mountain range that runs parallel to the Brazilian coast and was covered by the mighty Atlantic Rain forest. The Serra da Mantiqueira is the door to the Brazilian Central Plateau. Between these two ranges run the Paraiba do Sul River Valley, a strategic river to the Brazilian first conurbation between Rio de Janeiro and São Paulo cities.