

*Full Length Research Paper*

## Curricular greening is deficient in universities

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**The objective is to describe the environmental awareness of undergraduate courses at Federal Institute of Education in Goiás State, Brazil. The data are described using qualitative and quantitative approaches. It is a non-experimental descriptive research. Among the 201 disciplines from courses of Animal Science, Chemistry and Biology and Bachelor Degree areas, only 17 were found, that is, 8.4% had features that characterize the concern with the commitment to the transformation of relations between society and nature.**

**Key words:** Curriculum, network environmentalization, sustainability in Higher Education.

### INTRODUCTION

Tbilisi Conference (1977) achieved in the domain of International Environmental Education Programme (PIEA), coordinated by the United Nations for Education, Scientific and Cultural Organization (UNESCO) and United Nations Environment Programme (UNEP), and has summoned Member States to include curricular adjustment in their policies of environmental suitability. The conference recommended that the Environmental Education (EE) should understand the entire context of the levels of school education and adopt a global focus and marked out a wide interdisciplinary basis, from which one takes the interdependence of ecological, social economic and cultural factors.

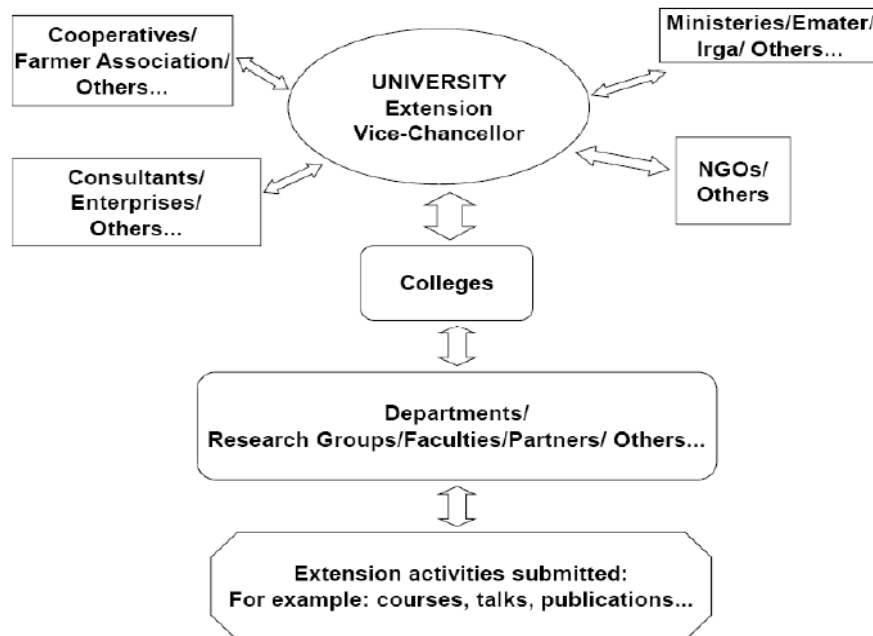
With support in the Chicago Statement, prepared at the International Conference of Holistic Educators, it

appeared in 1997 the term Holistic Education (Perini-Santos, 2004). According to this Declaration, the educational processes of the twenty-first century should be supported in the fundamentals of holism. It emphasizes the challenge of promoting a sustainable, equitable and peaceful society in harmony with the earth and its life. The holistic view seeks to enhance the way we visualize and the interdependence we have with the world, magnifying our innate human potential: The intuitive, emotional, physical, imaginative and creative as well as rational, logical and verbal.

The environmentalization of the university covers besides teaching, research and extension also human relations and environmental management of the campus, because a dynamic process of sustainable educators

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**Figure 1.** Experimental approach to transfer research information in a Brazilian public university system. Source: adapted from Marchesan et al. (2010).

spaces (Guerra, 2014).

Since the 90s of the twentieth century a cumulative number of higher education institutions (HEIs) have been engaged in incorporating and institutionalizing sustainable development (SD) into their curricula, study, actions, outreach, rating and reporting. In spite of a number of efforts by HEIs, SD is still an innovative idea in most universities, and has not yet permeated into all disciplines, scholars, and university managers, or throughout the curricula (Lozano, 2010).

The lack of communication between researchers of institutions and various users of technology limited the usefulness of research done to initially develop the technology. The interactions between the various users allow for anticipation of future potential needs, identifying new agribusiness opportunities (Marchesan et al., 2010).

According to the authors technology validation is fundamental, not only to producers and technicians, but also to researchers. In some cases, technology adaptations are necessary due differences in climate conditions, soil characteristics, field management methods, farm culture.

There are several systems of technology transfer for rural areas. One is the Training and Visiting (T&V) was used in many developing countries from 1975 to 1998, especially in Africa and Asia with the objective of helping increase the adoption of Green Revolution technologies. It was a rigorous training program demanding discipline and leadership. The system was called top down technologies, without interaction with the community where it was implemented (Marchesan et al., 2010).

In this respect, the objective of this study was to describe the environmental awareness in the curriculum and the curriculum of undergraduate courses of the Goiano IF, Rio Verde Campus, Goias State, Brazil.

The question is how to effect a plan of action for the Brazilian agricultural systems. An approach is presented below (Figure 1), in which there research groups consolidated within the Brazilian university system.

The research problem arose from question: what characteristics of greening nine graduate courses in the Goiano IF, when considering Network Greening Curriculum in Higher Education.

## MATERIALS AND METHODS

To describe the curricular environmentalization, reports coming from the web site of discipline plans and courses plans were carried out. The data is described using diffusion of innovation theory. The level of adjustment in the formation of undergraduates was verified to know about the introduction level on thematic areas of environmental nature. This information was obtained by describing the curriculum and teaching plans of undergraduate disciplines to diagnose the theme environment. The description of the subjects occurred at two levels of complexity. Condition 1: Environmental characteristics of teaching plans (menus, objectives, contents and references) from the disciplines of the undergraduate courses. Condition 2: Environmental characteristics of the curriculum (menus, objectives, contents and references) of undergraduate courses.

The investigation about the adjustment of education in Rio Verde Campus, was conducted with all nine undergraduate courses that existed on campus in 2011. It was taken as reference of two sources of information of institutional nature, namely the

**Table 1.** Ten characteristics of an environmentalized course.

Characteristics	Understanding of its meaning	P	M
Commitment to transform society-nature relations	Reconstruction of attitudes, individual and collective practices that generate actions to transform the socio-cultural and natural environment		
Complexity (worldview)	Presence of complex thought and of the interdisciplinary paradigm in the way of looking, feeling and being in the world		
Disciplinary order: flexibility/permeability	Facilitate dialogue with the differences of philosophical, metaphysical and epistemological positions in a permanent analysis of the training processes		
Contextualize the local-global-local	Integrate the knowledge / concepts to daily social life		
Consider the subject in building knowledge	Build diverse environment for the manifestation of personality differences, which ensures the participation of students in the intellectual and emotional field		
Consider cognitive / affective aspects of those involved	Provide material, structural, pedagogical, psychological support to form skills, construct knowledge and produce forms of expression (art, philosophy, religion, politics)		
Consistency and reconstruction of theory and practice	Exercise of reflection in knowledge production that combines theoretical and practical movements		
Forward-looking of alternative scenes	Commitment with building visions of science, society, technology and environment in a responsible perspective with the current and future generations		
Methodological adequacy	Link between educational practices and theories that justify them, from evaluative models that support the link		
Space for reflection and democratic participation	Creation of strategies for democratic participation, with autonomy to make decisions and implement them (political, administrative, material, economic support)		

Source: Adapted from Freitas et al. (2003).

Curriculum Matrix (M) and Plans for Teaching Subjects (P).

From the explicit understanding of the ten characteristics (Table 1), was adapted the theory proposed by Lozano (2010), because the author focuses on the SD incorporation into curricula.

Taking as references the scales M (curriculum of undergraduate courses) and P (teaching plans of undergraduate courses) sought to identify the presence of indicators for the ten characteristics to nine undergraduate courses that the Rio Verde Campus offers to the community. For the scale M, which described the number one characteristic of an environmentalized course, it described the curriculum menus, objectives, contents and references; to the scale P, which described the other nine features which verified the characteristics of an environmentalized course, it described the menus, objectives, contents and references of the disciplines that constitute the undergraduate courses.

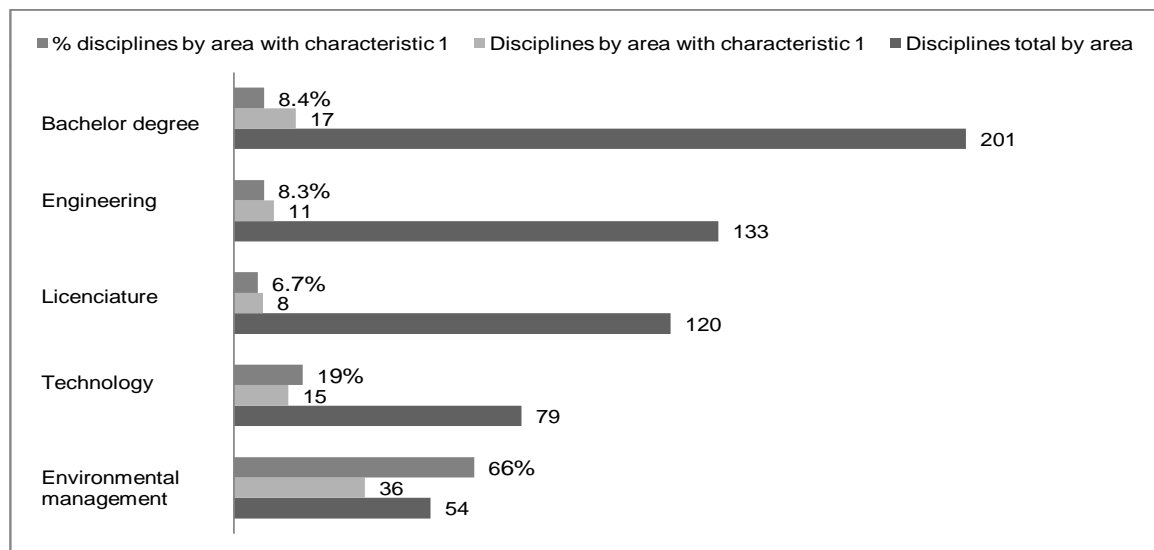
Data description was performed using a IBM SPSS Statistics software 19.0 and Microsoft Office Excel 2007 software.

## RESULTS

From the curriculum description (menus, objectives, contents and references) it was found that environmental management course showed greater integration into a

curriculum characteristic 1: Commitment to the transformation of society-nature relations. This is probably is related to the nature of knowledge since the objective of study in this area has an extremely close connection with issues related to the relationship between society and nature. In view of this specificity, the number of subjects which had an explicit concern with this characteristic was significant (66.6%), that is, of the 54 subjects that were analyzed, 36 of them study the relationship between society and nature (Figure 2).

On the other hand, when looking at areas of Bachelor (animal science, chemistry and biology) Licenciature (chemistry and biology), Engineering (agronomy) and Technology (agribusiness, environmental management and grain production), it was found that the number of environmentalized subjects in the curriculum per area was very low. Among the 201 disciplines from courses of Animal Science, Chemistry and Biology, Bachelor Degree areas, only 17 were found, that is, 8.4% had features that characterize the concern with the characteristic 1 (commitment to the transformation of relations between society and nature) (Figure 2). Among 133 disciplines



**Figure 2.** Subjects in the curriculum of nine undergraduate courses in Rio Verde Campus in 2011, which had a concern with the characteristic 1 for an environmentalized course. Source: Survey data using the Microsoft Office Excel 2007 software and IBM SPSS Statistics software 19.0.

**Table 2.** Teaching plans of 10 undergraduate courses concerned with 9 characteristics for an environmentalized course in 2011.

Área	Technology	Engineering	Bachelor degree	Licenciature	EM
Total of 9 characteristics	77	68	55	40	175
Average of 9 characteristics	8.5	7.5	6.1	4.4	19.4
% average of 9 characteristics	7.9	11.0	11.1	11.0	11.1

Source: Survey data using the Microsoft Office Excel 2007 software and IBM SPSS Statistics software 19.0.

from courses of Agronomy and Food Science, Engineering area, only 11 have characterized this concern with the characteristic 1 or 8.3%. Among the 120 subjects analyzed in Chemistry and Biology courses, Licenciature area in Rio Verde Campus, had eight points that characterize the concern with the characteristic 1, that is, only 6.7%.

Among the 79 disciplines from courses of Agribusiness and Grain Production in the area of Technology, 15 subjects, that is, 19% of the subjects marked the characteristic one (Figure 2). Among the 54 subjects of the Environmental Technology course, 36 subjects, or 66% of the subjects marked the characteristic one. For the classification of necessary information on teaching plans in the other nine characteristics, it was analyzed the disciplines of the undergraduate courses.

Among the 79 disciplines from courses of Agribusiness and Grain Production, Technology area, the average was 8.5 characteristics for the other nine characteristics of an environmentalized undergraduate course, whose average was equivalent to 7.9% of 77 characteristics (Table 2).

Among 133 disciplines from courses of Agronomy

and Food Science, Engineering area, the average was 7.5 characteristics for the other nine characteristics of an undergraduate course environmentalized, whose average was equivalent to 11% of the 68 characteristics. Then from 201 subjects of Animal Science, Chemistry and Biology, Bachelor Degree courses, the average was 6.1 characteristics for the other nine characteristics of an undergraduate course environmentalized, whose average amounted to 11.1% of the total 55 characteristics. From 120 subjects analyzed in Chemistry and Biology, courses of Technology, the average was 4.4 for the other nine characteristics of an undergraduate course environmentalized, whose average was equivalent to 11% of 40 characteristics. Among the 54 subjects from the of Environmental Management course (GA), the average was 19.4 characteristics for the other nine characteristics of an undergraduate course environmentalized, whose average amounted to 11.1% of the total of 175 characteristics. Analyzing the percent average of these 9 characteristics, it was found that the lowest value was Technology area, with a value of 7.9%. For the other four areas these percentages were

equivalent to 11%.

## DISCUSSION

A fact which may help interpret this significant result of Environmental Management course was the marked presence in offering disciplines about environmental chemistry, environmental biology, environmental management, agroecology and solid waste.

A fact that could help interpret this result slightly lower in Licenciature area compared to other areas is the marked absence in offering disciplines about environmental chemistry, environmental biology, environmental management, agroecology and solid waste in teaching plans of Licenciature in Chemistry and Biology.

For all areas analyzed, did not occur the offering of elective subjects. Elective subjects were offered only for the Agronomy course from the second half of 2010. The compulsory subjects corresponded to approximately 100% of the curriculum of all other undergraduate courses.

In a study conducted in teaching plans of undergraduate courses at the University of Santiago de Compostela in Spain, Garcia (2001) found that teaching plans of the degree in Biology, Technical Engineering in forestry and degrees in Pharmacy and Chemistry were those who had the highest levels of environmentalization, with values that reached 27.4, 18.2, 11.9 and 10.7% of subjects, respectively. On the other hand, the curriculum of the Degrees in Law and Political Science did not have environmentalized disciplines, while a degree in Economics had 0.83% of subjects environmentalized. Averaging environmentalized disciplines of all undergraduate courses, this author found that the average total was equal to 10.2%.

In a research carried out in a Brazilian public university, Zuin et al. (2009) found that the total number of subjects (sample = 43) which composed the curriculum of the undergraduate course in Chemistry, 30% were directed to curricular environmentalization.

These results are similar to those obtained by Lozano (2010) on that study conducted in teaching plans of undergraduate courses; this author reported that the percentage of courses relating to SD has an important influence on the school's adopter categories. This indicates that the contribution to SD and its diffusion throughout the curricula is a fairly complex phenomenon that requires the consideration of economic, environmental, social, cross-cutting themes, and their inter-connectedness, as well as the percentage of courses in a school that relate to SD.

## Conclusions

Between 201 disciplines from courses of Animal

Science, Chemistry and Biology and Bachelor Degree areas, only 17 were found, that is, 8.4% had features that characterize the concern with the commitment to the transformation of relations between society and nature. Between the 54 subjects from the of Environmental Management course (GA), the average was 19.4 characteristics for the other nine characteristics of an undergraduate course environmentalized, whose average amounted to 11.1% of the total of 175 characteristics. The ten characteristics for an undergraduate degree considered with environmentalization have low percentages in technology courses in Agribusiness and Grain Production. The presence of the Technology courses suggested that this factor is determinant in the process of curricular environmentalization. The campus did not develop a policy that allows connection to empower the process environmentalization of the different undergraduate courses. There is definition of a set of elective subjects only in the course of Agronomy, occurring only from the second half of 2010. It is essential to reconstruct the practices of teaching and learning that occur in Goiano IF and in rural extensions. Given the premise that the processes of teaching and learning need to aim to methodology that results in a more sustainable society and more collective and humanitarian, becomes necessary a practice centered on dialogic communication together with farmers, in order to organize a new reality for the rural environment. The demarcation of new policies for sustainable agricultural development suggests that it is fundamental a method of production that is not only rooted in the transfer of technology through extension of the traditional and frequent exercise. The Federal Institutes of Education in Brazil should employ in their daily teaching participatory methods of joint construction of new knowledge between extension agents and farmers; the description provided in this research indicates that there is insecurity in the standing interconnections synergies that exist between the economic, social and transversal themes. The figure is indispensable for educators and teachers in continuing education for professionals with undergraduate course focusing on the extension aimed at disseminating environmental technologies directed to rural areas of Brazil.

## Conflict of Interest

The authors have not declared any conflict of interest.

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