

Innovations in Climate Change and Sustainable Management in Higher Education. Training and Evaluation

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Abstract Spain and Brazil have played two significant roles in the field of higher education through inter-university cooperation; on the one hand, highly updated contents relating to sustainability and, on the other hand, an innovative system for the evaluation of education through competencies. This chapter presents an analysis of the model of integral sustainable administration. This model combines social, economic and environmental factors based on the most outstanding contributions in this topic, and coins the concept of “socioecosustainability” as a necessary model for the 21st century. Furthermore, an educational process on the basis of the model of climate change is evaluated. Conclusions provide useful recommendations in order to improve higher education around sustainability from the point of view of acquiring fundamental competencies for the development of professionals in truly sustainably organizations.

Keywords Sustainability · Administration · Competencies · Climate change education · Distance learning

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243

Introduction

This assessment model is designed to verify the performance of the Education in Climate Change and Sustainable Administration project put into practice by the Applied Social Sciences Sector of the Department of General and Applied Administration at Brazil's Federal University of Paraná (UFPR). The project develops a model for instructing students based on an awareness of the fact that sustainable management models are now vital given the environmental and socio-economic conditions within which institutions operate; they are also crucial in terms of the social, economic and personal implications that are unfolding as a result of climate change and its effect on human and industrial development processes.

The project, whose prime movers are the UFPR and FIEPR (the Industries Federation of Paraná State), aims to provide an education in climate literacy as part of the sustainable management and climate change models, and is targeted at students on undergraduate courses in Administration; this investigation project aims to extract key guidelines in order to reformulate and update the training offered to graduate students so that it is more in line with the realities of sustainability and climate protection on an international level. The project includes the development of a course to train and prepare teachers with the idea of producing specialists capable of incorporating the principles of sustainability in their undergraduate students, as well as taking an active part in other pedagogical projects that focus on the new requirements that distance education demands, with special regard for the contribution that sustainability can make to the protection of the environment.

The experience acquired shows that it is important to analyse the results obtained from a perspective that includes the objectives of the agents most directly involved in their development, namely the students, the educational bodies responsible for providing the education and the FIEPR, within the PRME/UN¹ model. This involves an assessment model that is to be sustainable, given that it includes the demands of both the institution that has convened the course as well as those of the students who attend it; and by definition it respects current climate protection demands. This assessment model is innovative because the criteria used for evaluating the quality of the course imparted by the UFPR are not only marked by the professors but also by the students, who participate in the definition of the objectives of the education they receive, and hence in the appraisal of the Sustainable Management course.

This chapter examines in depth the concept of sustainable administrative management by describing the training project in Sustainable Management, and then presenting a model that can assess the students' level of climate literacy, to conclude with suggestions for new strategies to enable implementation of the educational model.

¹Principles for Responsible Management Education. <http://www.unprme.org/>.

The Concept of Sustainable Administrative Management

The meaning of sustainable administrative management is monosemic in that it cannot be applied to other disciplines as its context is strictly limited to the administrative processes that develop in all institutions, be they public, private, foundations, businesses or non-profit organizations. It is a holistic and ambitious concept that embraces social, political, economic and environmental elements, and which advocates a model for the usage of these elements that guarantees the “achievement of the objectives of today’s generations without jeopardizing those of future generations” (Ramirez and Sánchez 2009).² In this chapter, we present the concept of “socio-economosustainability” as an integrated vision of the analyses that must be made in order to guarantee the feasibility of the management model required by the complex and increasingly compromised times in which we live, in which humans must learn to coexist within an endangered world ecosystem (Houtart 2014). Human beings exist in an extremely complex ecosystem in which numerous factors intervene; when the fine balance between them is disrupted, the effects can be highly negatively (Global Conference on Business and Finance Proceedings 2014, p. 971). Thinkers in ancient times, referred to the need to find the right balance in each individual, as a guarantee of personal satisfaction and as the basis of personal development. Ancient civilizations had already worked out that neither power, money nor pleasure guarantee human beings complete satisfaction, and ever since we have been striving towards that goal. So, resolving problems must include finding solutions that account for human needs, and which respect not only the environment but also our own personal and social nature.

The concept of socio-economosustainable administrative management is based on a perspective of nature as a whole. This holistic approach to the concept of “nature” coalesces, from the macro to the micro perception, in a single decision-taking form. So, sustainability is perceived not just as a form of decision-taking, by preserving the environment, but it also aims to guarantee quality of life and human, social and personal well-being based on the model Triple Bottom Line (Kannan et al. 2012; Giannetti et al. 2012). Far from considering well-being as society’s capacity to consume, we see it as a deep form of satisfaction with life and the decisions taken throughout (Sen 1999, 2002, 2004). Seen from this comprehensive perspective, sustainable management plays a fundamental role as it aims to reconcile human needs with the socio-economic requirements of organizations together with conservation of the environment and cultural heritage. According to the United Nations:

Concurs with the commission that the critical objectives for environment and development policies which follow from the need for sustainable development must include preserving peace, reviving growth and changing its quality remedying the problems of poverty and satisfying human needs addressing the problems of population growth and of conserving

²And also at <http://www.un.org/sustainabledevelopment/es/la-agenda-de-desarrollo-sostenible/>.

and enhancing the source base, reorienting technology and managing risk, and merging environment and economics in decision making (Comisión Brundtland. UNITED NATIONS 1987)

Traditional institutional problem-solving models formulated a need to be covered, and the necessary mechanisms were set in motion to invest sufficient resources to satisfy this need. For decades, the natural resources closest to hand were deployed to satisfy such needs but without applying the same criteria as those used in assigning economic resources.

Figure 1 shows how the traditional model, when dealing with a need to be satisfied, managed the resources within its reach in various ways according the model’s understanding of their availability. Natural resources were available and accessible. Exploiting them required certain means, human and/or technical, for their extraction and/or manipulation. Obtaining specific natural resources, or to access labour or technology, sometimes involved managing and adapting policies and regulations in order to get the product or service to cover a specific need; social resources refer to the political administration and management systems that each territory develops. In this figure, economy is understood to mean the management of scarce resources, so the figure as a whole describes economic management, to which monetary factors can be applied, or not.

The inefficiency of this model applied from the era of economic development policy of the 19th and 20th centuries has resulted in the creation of a growing and widespread awareness since the 21st century establish the need to attend to the equilibrium that climate change demands in order make it compatible with human life; it therefore requires that we design a suitable form of management in which all the elements concerned in covering needs are represented, so that the product and the process become part of an integrated management system and hence conceived in a global and sustainable way.

Figure 2 explains the sustainable management paradigm through a search cycle of sustainable solutions to needs or problems. This paradigm is based on the Triple Bottom Line and Leont’ev’s model. The question-and-answer cycle enabled us to generate what we have termed the Sustainable Organizational Response Staircase. Each stair represents a sustainable response which, in turn, then creates new contradictions to be resolved by new and improved sustainable responses.

The contradiction involves the dialogue between the solutions to certain problems and the conflicts that arise, which generate new problems or needs that up to then did not exist. The contradiction assumes that development is not attained by one single response but rather through a sequence of responses and resolution of

Fig. 1 Synthesis of the management of scarce resources model in the 19th and 20th centuries



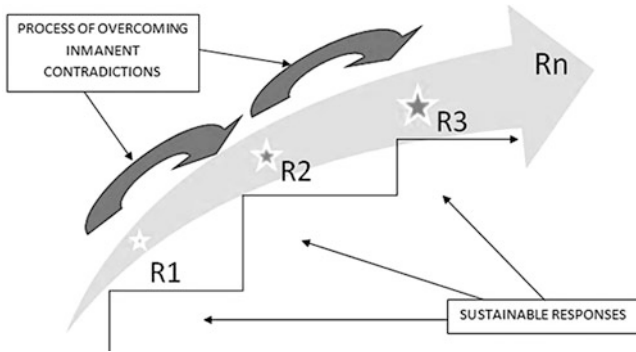


Fig. 2 Sustainable organizational response staircase

problems and needs that have emerged progressively throughout the history of Humanity. In this sense, Engeström (1987, p. 82) states that “(...) any specific type of production is simultaneously independent and subordinate to total social production (...). Within the structure of any type of productive activity, a contradiction is renewed as a conflict between individual actions and the total activity of the system.”

The presence of contradictions within the solutions found to resolve problems or cover needs occurs naturally as one solution is implemented and interacts with other factors. This dynamism sees the environment evolve and new problems or needs generated as a result of those contradictions that must also be resolved in a sustainable way. Figure 3 shows an administrative functioning paradigm to find socio-economically sustainable responses. This paradigm is built on a sustainable approach that must act as the pillar, base and substratum of any change in organizational behaviour for taking decisions in the areas involved.

As already mentioned the paradigm is cyclical, since a new organizational response, through its process of implementation and application, poses a new set of contradictions. The new problem or need takes shape around three axes which have been called the Triple Bottom Line and which considers that the problems or needs that emerge in organizations coalesce around three key questions, the economic, social and environmental. So, any problem that emerges is the result of a lack of harmony between these three factors, and opens the possibility of achieving sustainable development in the solution of their contradictions.

At this stage of the process, a profound dialectic takes place between all potential options, with debate centred on each possible solution during the analysis of the interaction between these three key elements. This conflict embraces technological, technical, moral, philosophical, ethical, anthropological, geodemographic and political questions, among others, and the solution frequently adopted is not a total solution but one that is deemed to be the best possible solution at the time, as it must try to balance the social, economic and environmental axes. The model that we present is a paradigm, and so the response that is found materialises in a series

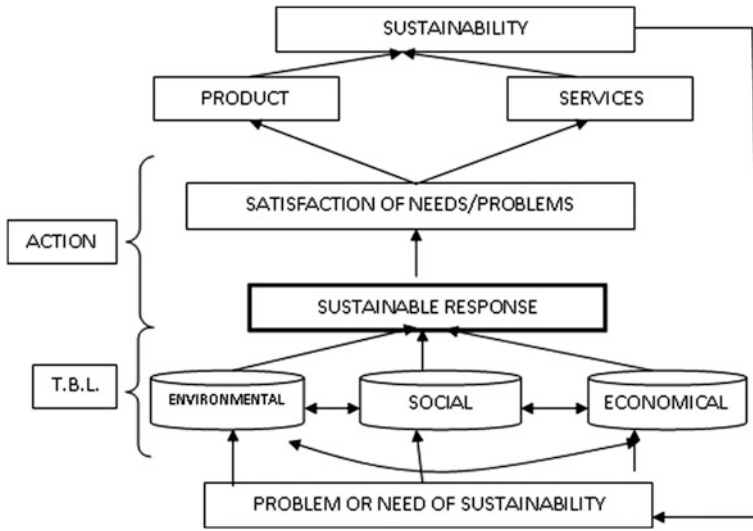


Fig. 3 The sustainable management model

of actions that affect products and services that are either new or which already existed and which had to undergo sustainable modifications.

Proposal for the Assessment of Climate Literacy

Assessment plans are often ambitious and cover a wide range of aspects for evaluation. A typical assessment plan considers elements that go beyond students’ learning, such as the methodology applied, the classroom environment, the didactic material, the management of the course and its impact. In line with the objectives of the training course presented in this chapter, assessment focuses on the students’ learning and the impact of the course in relation to climate literacy and education in climate change; so, the assessment in this work centres on the acquisition of attitudes that are appropriate for a manager in sustainability who is keenly aware of climate change.

We therefore need to formulate these expectations in an objective way, and clearly define the type of graduate profile the course wants to achieve. The aim of the course is for students to acquire skills that complement their training to ensure that they can apply and develop sustainable management models in accordance with the requirements of a new society committed to the human being and its habitat, and respect for the environment and its various ecosystems.

Sustainability can be considered an end in itself, and in these circumstances it constitutes a suitable medium for protecting the environment. However, the evolution of the project presented in this chapter reveals that sustainability is not just an

objective but it is also a means by which decisions influenced by the very features of sustainability are adopted. Sustainability is an end in itself, and also a means for achieving a goal, and in this working group we see that it also responds to a particular attitude that is suitable for searching for solutions and resolving problems within their corresponding economic, social, cultural and personal framework. This has led to the main rectors of the course to add attitudinal aspects to the instruction of sustainable managers, and these aspects are:

- A holistic and systematic vision of the world and its natural, economic and social relations
- A collaborative and inclusive approach instilled from the beginning
- A research-action-research attitude
- Respect, integrity and solidarity
- An “everyone’s a winner” work model
- Dialogue: a space to express oneself and understand
- Discover and consider mutual interests
- Experimentation
- Commitment and responsibility
- Vision of the future in reflections on the world that we want and the world being built around us
- Reformulate the meaning of short-term success

This holistic attitude responds to a profile of a person with special managerial and administrative characteristics that can provide the organization with a new focus on management models according to tried and tested general systems theories. The course we evaluate defines the features of a sustainability manager as:

- Innovation and Openness to change
- Enterprising
- Leadership
- Sustainable values
- Collaborative working method
- Research and sustainable development
- Association and systematic work
- Dialogue and organizational communication

The assessment of the results took into account that the student who did the course had previously been selected in accordance with strict criteria. The selection process involved the UFPR’s Department of General and Applied Administration and the FIEPR, and it considered the student’s academic record, a piece of written work presented by the student and a personal interview by each body involved in the course.

The assessment model we propose is based on the analysis of the competences acquired in relation to four categories. Checking whether skills had been learned and assimilated was done by monitoring interaction in four categories that we subdivide, and which the course aims that each student attains. The categories are:

- **Content:**
This is the most theoretical part of the course and relates to concepts, categories, classifications, models, paradigms, authors, etc., all of which a student must know in order to undertake the sustainable management of the organization and uphold respect for the environment within the entrepreneurial sphere.
- **Skills:**
This deals with learning processes whose goal is products and concrete results. These include procedures; the operational nature of what one needs to know to get something done in order to coordinate spaces and tasks in a sustainable setting and produce services or products that respect the environment.
- **Attitudes and values:**
These are of an intrinsic and extrinsic nature, and constitute the most intangible but significant aspect of the changes that the course aims to foment in the new managers.
 - **Intrinsic:** the student's own values that have been adopted in a responsible way; these are non-transferable and difficult to know without dialogue and acquisition of a deep knowledge, with emphasis on the student's sensibility towards caring for the environment.
 - **Extrinsic:** these are acquired by interactions that the students establish; they refer to their setting and each element that forms part of it, emphasizing a markedly sustainable innovative spirit.
- **Learning strategies³:** especially those related to team work and leadership.

What follows is a formulation of the items for validation derived from the course and the information extracted by coaching experts.⁴ It is a tool to be applied by the promoters of the course to the students to verify the validity and quality of the education they have received. It is important to note that the categories are not closed but act as keys for commitment in the assessment and acquisition of knowledge that is global and applicable to the world of management from an innovative and sustainable perspective.

Here we describe the indicators extracted from the information obtained. The leadership characteristics we identify are:

- **Ability to communicate,** communication being an assertive act that understands the interlocutor's points of view and respects his/her interests without losing sight of your own.

³The student undergoes a self-management process of change and improvement based on the learning they acquire. At this undergraduate level, the student is associated to processes of metacognition, meta-comprehension, self-training and transference.

⁴Interview with L.E. Munevar, an expert in coaching with over 15 years' experience in the field. The interview discussed the leadership characteristic of Charisma; however, we did not include this feature as an indicator in our model given the nature of the course. We understand coaching to be "*as a process of growth and change*". (Williams and Menendez 2007).

- Understand and control your feelings and, in the medium term, those of the interlocutor. Recognize that what moves people is not application of pressure but the emotions, and how to apply that to motivate people to take action, because involving people on an emotional level elicits better results.
- The ability to visualize yourself and your team in the way and a place where they want to be seen. Establish the mission and plan objectives coherently with good use of human resources, materials and time with regard to the sustainable organizational focus.
- Know yourself, identify your own strengths and weaknesses and know how to identify them in team members, in order to be able to cover the various needs posed in the achieving of established objectives, based on the team's potential. Encourage and enable each person to do what they know how to do best.
- Maintain a constant level of personal growth and development, and promote the development of each group member.
- Letting go of control of the projects by knowing how to delegate functions. Ability to allow group members to carry out independent actions when performed responsibly, naturally and efficiently.
- Ensure you are always well-informed.

To understand the entrepreneurial features that respect environmental sustainability, and which are based on a climate perspective, requires an analysis of the person's own development. Its starting point must be what is to be achieved within a precise timeline, and what a line of personal and professional development is to be. These entrepreneurs must be able to see themselves in a personal and professional context, and view their project in the world which they are part of and which they want to form part of. The success of the entrepreneur occurs when both lines run in parallel. With this in motion, their main characteristics are:

- Persistence and perseverance, as the ability to be constant in striving to achieve an objective; even obstinacy in adverse situations in order to extract learning from each situation and readjust processes.
- Innovation as the capacity to create new settings and plan new ways of doing things that disrupt old routines and patterns of doing things in order to resolve old problems.
- Resolving situations with pragmatism and determination, even assuming that it is necessary to advance without the right resources. Ability to get involved in direct and coordinated action.
- Begin by operating in areas in which you are an expert, so that this interest deepens your involvement in these areas.
- Make your ideas attractive to others. Ability to convince others, which depends on four factors: creativity, innovation, usefulness (offering society a valuable product or service) and sustainable benefit.
- Flexibility and adaptability to the real environment without deviating from the direction of the base idea.

- Ergonomics in products and facilitator of services that simplify people's lives, respecting the medium in which we live.
- Positive attitude. Keep reactions balanced: sensitive to people and their bioclimatic medium; optimism and capacity to create an optimum climate and atmosphere.
- Being realistically aware of the potential of the situation and the expectations for balanced sustainability between profit and respect for the environment.

Finally, the indicators that describe "openness to change and innovation" are the following:

Disrupting paradigms, which means being open to proposals for new ways of doing things. Innovation only really occurs when the product or service is successful because if it is not spontaneously successful it has no value. The key to innovation is mass use⁵ (Figueiredo 2009, p. 31) of the product or service. Disrupting established patterns of behaviour and routines enables vital transitions on the path to innovation. It is necessary to work with these established ways in order to introduce innovations. These routines are related to people's paradigms so it is important to modify the paradigms. Changing the paradigm depends on the personality of the team member.

- Be alert and pay close attention at all times to understand the barriers to change, identify old patterns of behaviour, routines and paradigms in order to anticipate their responses and help to break them down.
- Emotional intelligence, which is achieving a balance in order to withstand the personal pressures that can build up at work.
- Understanding that needs can be turned into opportunities that can promote change in the team members and in the material aspects of the organization, and especially in harnessing the needs and potential of the biological, environmental and climate setting.
- Keeping communication channels open between all working groups, both vertically (superior-subordinate) and horizontally (among coordinators).

The information in Tables 1 and 2 enables us to formulate the keys to the questions that we need to assess.

⁵"Ou seja, inovação implica unir diferentes tipos e partes de conhecimentos e transformá-los em novos produtos e serviços úteis para o mercado ou para sociedade." (Figueiredo 2009, p. 31). ("That is, innovation implies join different types and parts of knowledge and transforming them into new products and services useful for the market or for society" T.N.).

Table 1 Design of the items for assessment

Categories	Competences	Objectives	Items
Content	Openness, integration and context analysis	Integration of participants and social contract	Theoretical exams prepared by the teachers.
		Globalization, geopolitics and geo-economics	
		Sustainability and professional training	
		Evolution of the organizations	
	Cross-curricular subjects	Change and strategy in the Organization	
		Systematic analysis	
		Social and ethical behaviour	
		Innovation and sustainability	
	Functional and technical subjects	Marketing with sustainability	
		Production with sustainability	
		Logistics with sustainability	
		People management with sustainability	
		Social analysis of projects	
Consolidation of theoretical stages	Sustainable globalization: challenge and opportunity		
Skills	Practical work	Develop a sustainable project inside the company	Differentiate between a sustainable and non-sustainable project
	Leadership	Ability to communicate with a wide range of different people	Can you recognize the different types of emotions and feelings in people when you are speaking to them?
		Control your feelings	Can you control your emotions?

Table 2 Design of items for assessment

Categories	Competences	Objectives	Items
Skills	Leadership	Establish targets and plan objectives	Do you know how to plan targets and objectives?
		What are your strengths and weaknesses?	Can you identify your strengths and weaknesses?
		To be constantly growing	Do you know how to relate the disciplines of administration to the various social, economic and environmental contexts?
		Delegate functions	Do you know how to delegate responsibilities?
		Ensure that you are always well-informed	Do you read journals, chapters, blogs and websites covering a wide range of subjects?
Attitude and values	Enterprising	Persistence and perseverance. Extract learning	When things aren't going well, do you keep on trying?
		Innovation as the ability to create new ways of doing things.	Do you usually come up with new ways to resolve problems?
		Pragmatism and determination	Do you take the initiative in order to solve problems?
		Begin by working in areas in which you are an expert	Do you know the areas in which you are an expert?
		Making ideas attractive to others	Can you convince others of your ideas?
		Flexibility and adaptability	Do you adjust your plans according to events as they unfold?
		Make things easier for people	Are your ideas easy to execute?
		A positive attitude	Are you optimistic and cheerful?
		A realistic awareness	Are you objective in your thinking?
Learning strategies	Openness to change and innovation	Solutions applied on a large scale	Are your ideas accepted by other people?
		Disrupting established patterns of behaviour and routines	Do you usually accept that others do things in their own way?
		Be alert and pay close attention in order to identify barriers	Do you know how to read between the lines in terms of what people say and do?
		Emotional intelligence	Can you keep your emotions under control in personal conflicts?
		Taking opportunities	Can you identify opportunities for change and improvement?
		Maintaining communication channels open	Can you get people to communicate clearly?

Conclusions

The total population of students who received the training numbered 100, spread over two academic years. Of these, 68% of the students from one year and 18% from the other completed the questionnaires. We assume a bias in the results that could be significant, however we were unable to quantify it. The results of the questionnaires were then subjected to a quantitative and qualitative analysis (Fig. 4).

(a) Objectives achieved

The questions posed aimed to find out students’ objectives in attending this course. The answers have been grouped into a set of categories that synthesize the valuations expressed by the students. The direct data show answers that are fairly centred in which a single preferred alternative clearly predominates among the students who responded.

In general, students stated that their objectives regarding the theoretical part of the course had been achieved. It is worth considering whether there is a direct link between *Professional Development* (17%) and *Understanding Sustainability* (17%). If so, it means that a not inconsiderable percentage of students consider sustainability to be a key alternative in the future of industry and the labour market.

As these were the desired objectives, the results have proved satisfactory in the achievement of the targets proposed. The fact that no single student expressed total dissatisfaction in terms of personal objectives points to bias in the group (Fig. 5). This could be interpreted in two ways: considerable and unanimous satisfaction with the course; no deep dissatisfaction with the course to cause a student to give a specific negative response in the questionnaire. So, we can say that the course has more than satisfied students’ objectives.

We also need to examine the negatives revealed by the questionnaire, and Fig. 6 indicates students’ dissatisfaction with the distinct lack of practical and operational activities; so, the course needs to improve considerably in this aspect.

Fig. 4 Students objectives

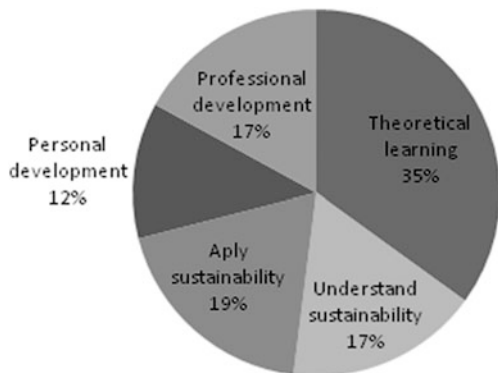


Fig. 5 Achievement of personal goals

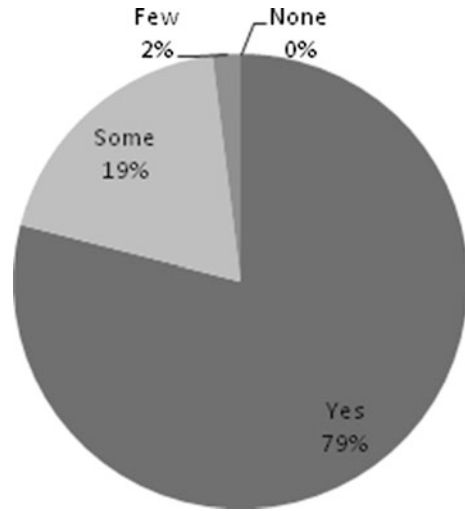
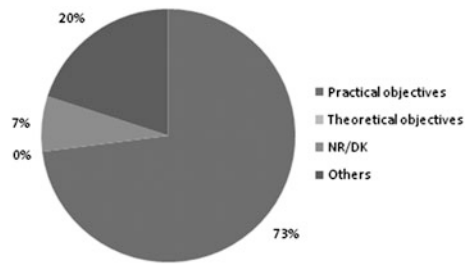


Fig. 6 Unreached objectives



The data marked “Others” relates to agreement among the students regarding a lack of cohesion among the academics in the development of theoretical content. Nevertheless, the quality of the content was not in doubt as the theoretical aspect of the course matched their expectations.

There are other types of learning that the students consider as novel and worthy of comment: these are the achievements of learning acquired by the students on the course although it was not specifically planned that way. The data reveal a wide range of accomplishments, some very general such as *Personal Development*, which includes the knowledge acquired in Philosophy, Ethics, Humanities and other aspects; and others that are more specific such as learning about *Regulations* and standards like the ISO. Students rated very highly their knowledge acquired in *Appreciative Inquiry* and *Leadership* as part of sustainable development and instruction in climate sensibility. We consider that this finding could be developed to compensate for the lack of practical activities in the workshops and seminars (“Oficinas”).

(b) Analysis of *Skills*

The responses in this category refer to a set of questions aimed at measuring two objectives: to evaluate the learning and achievements, and to stimulate reflection and acceptance of new guidelines on conduct that foster the appropriate attitudes and behaviour in administrators who promote sustainability.

It is surprising that the response to the question of keeping up to date by reading *journals, blogs, etc.*, scored low. This is an indicator for new challenges that the university must address. It is one of the responsibilities of the academic staff to form professionals who are up to date with, and well-informed about, current developments; they can do this by providing databases and references in the bioclimatic subject areas that come under sustainable management. Taking into account that the students selected to do the course are the best of their year, the conclusion is that teachers must strive to encourage their students to consult and monitor the relevant databases in the sector.

The general conclusion is that the students rate themselves on average as B-graders in terms of the skills required to be a dynamic manager of sustainability and for generating respect for the environment as part of sustainable management.

(c) Attitudes and values

This is probably the most complex aspect in the training of undergraduates who come to the course with their own set of values and expectations. In general, the results show an average of around B++, yet these stood alongside some very low scores that contrast markedly with the much higher valuations.

(d) Learning strategies

The priority in educating students within a society characterised by technology and access to knowledge is to teach them to learn how to process information and determine the reliability of the source of that information. The average results were quite satisfactory (B++) but again these stand alongside other scores that are considered too low for a group of high-performing students.

We present a general analysis of elements that constitute course competences, which are described below:

- (a) Content related to the theoretical and conceptual part of the course.
- (b) Leadership, understood as a skill that students acquire as a process that takes place throughout their undergraduate studies.
- (c) Enterprise in sustainability, defined as an attitude and a value for which students must acquire a special sensitivity.
- (d) Openness to change, being constantly alert to new developments and aspiring to self-improvement.

Of the results we expect to see, we believe that there will be little deviation from the standard in all the responses to various premises:

P1: The students have been selected on the basis of a standard model.

P2: The students have been selected according to criteria of excellence.

Table 3 Option A: validation and implementation as a university extension course

Design phase	Design of the educational programme with experts in the field, and development of the training in collaboration with the students the course is aimed at, these constituting an ideal universe of students selected from the middle years of the undergraduate course in Administration
Test phase	Having confirmed the relevance of the design of the training plan, and validated the material, the extension course is implemented and is open to a group of undergraduate students as heterogeneous as possible; it should always take place during the middle semesters of the Administration course <ul style="list-style-type: none"> • Compare the results obtained by students using the proposed assessment model, in the evaluation of the results and in the longitudinal evaluation • Promote the distance learning facet of the course, since a significant number of the students who might be interested in the course are working adults with personal and family commitments. It would help them achieve optimum results if 20% of the course was in the distance learning format, and would boost the opportunities for these management specialists without affecting those students who study in the traditional way^a
Implementation phase	Having confirmed the relevance, need, appropriateness and viability of this training course, as well as the results obtained, the final phase begins by opening this extension course to all students who request a place, to be imparted during the middle semesters of the degree in Administration

^aResolução nº 72/10-CEPE Regulamento na oferta de disciplinas na modalidade a distancia nos cursos de graduação e educação profissional e tecnológica presenciais de UFPR. Brazil

Table 4 Option B: specialist course or doctoral course

Design phase	Design of the educational programme with experts in the field, and development of the training in collaboration with the undergraduates the course is aimed at, these constituting an ideal universe of students selected from the middle years of the degree course in Administration. Compare the results obtained by the students according to the assessment model proposed, with particular attention to the monitoring and follow-up of students once the course is finished
Test phase	Having adjusted the training to the students' institutional demands, as well as considering social, political and economic changes, request approval of the training designed as a doctoral course
Implementation phase	Open this extension course to all students who request a place and who fulfil the conditions set by the doctoral committee; this enables the university to select the best students to form the ideal universe and guarantees maximum use of the course

The possibilities are considerable in terms of the aims of each higher education centre. Here we discuss some of the possible options and suggest strategic guidelines (Tables 3 and 4).

Another innovative application of this course could be the development of the Sustainability Adviser or Specialist Consultancies in Sustainable Management

whose training affords them a broad vision that respects the specific needs of the ecosystem in which human activity takes place, and they are qualified to search for syncretic solutions that respect the aims of the economy, society, culture, politics and people.

For this course to be successful, and in order for it to be implemented across a wide range of higher educational bodies in Brazil, it is vital to start by establishing an interdisciplinary group of teachers who are specialist researchers in sustainability that can serve as a national reference point, in order to develop the scientific and didactic documents with sustainable and innovative contributions, and to promote and advise on sustainable projects.

Reference

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