## Os desafios do tema sustentabilidade no ensino da pós-graduação

## The challenges of the sustainability theme in postgraduate education

## Los retos del tema de la sostenibilidad en la enseñanza del posgrado

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**Resumo**

As universidades estão convocadas a focalizar na sustentabilidade. Frente a esse desafio, o objetivo do presente artigo é identificar e discutir elementos essenciais para a implementação do tema sustentabilidade nos programas de pós-graduação nas universidades brasileiras. O artigo aplica, então, um conjunto de características que serve como um primeiro esboço de pontos-chave. Quanto ao currículo, devem ser tratados os diferentes aspectos dos meios biótico, físico, químico, cultural e socioeconômico. Quanto ao modus operandi, o programa deve ser interdisciplinar, olhando questões críticas de interface e indissociabilidade dos temas inseridos na sustentabilidade. Para construir um alinhamento e uma coerência com o tema, é necessário operacionalizar progressivamente visão, valores e princípios presentes nesse paradigma.

**Palavras-chave:** Sustentabilidade. Programas de Pós-Graduação. Currículos.

**Abstract**

Universities are required to focus on sustainability. Given this challenge, the aim of this paper is to identify and discuss key elements for introducing the sustainability theme to postgraduate programmes in Brazilian universities. The paper, then, applies a set of characteristics that work as key points for the framework of a first draft. As for the curriculum of programmes, the different aspects of the biotic, physical, chemical, cultural and socioeconomic environments must be addressed. As for its modus operandi, the postgraduate programme must be interdisciplinary, looking at critical issues concerning the interface of themes related to sustainability. In order to build alignment and coherence with the theme, it is necessary that the vision, values and principles that are present in this paradigm be progressively made operational.

**Keywords:** Sustainability. Postgraduate Programmes. Curricula.

**Resumen**

Las universidades han sido convocadas a centrarse en la sostenibilidad. Frente a este reto, el objetivo de este trabajo es identificar y discutir los elementos clave para la aplicación del tema de la sostenibilidad en los programas de pos graduación de las universidades brasileñas. Este artículo apunta, por lo tanto, a identificar un conjunto de características que sirven como un primer borrador de puntos clave. En cuanto al currículo, deben incluirse los diferentes aspectos de los medios biótico, físico, químico, cultural y socioeconómico. En cuanto al modus operandi, el programa debe ser interdisciplinario, analizando cuestiones críticas de la interrelación e inseparabilidad de los temas incluidos en la sostenibilidad. Para garantizar la coherencia con el tema, es necesario poner en práctica progresivamente la visión, los valores y los principios que son parte de este paradigma.

**Palabras clave:** Sostenibilidad. Programas de Posgrado. Planes de Estudio.

## Introduction

In the second half of the 20th century, the world lived important changes; currently, society perceives and demands greater participation in political decisions. The environmental issue is more present in the speeches of Governments, business sectors, and civil society, and there is a growing recognition of the urgent need for actions to reduce poverty and the consumption rates of natural resources (PHILIPPI JR; MALHEIROS, 2012; DUARTE; MALHEIROS, 2012; VEIGA, 2010).

In this context, Brazil once again hosted the United Nations Conference on Sustainable Development (Rio+20) in 2012, whose outcome was a final document focusing on policies and practices for measuring the implementation of sustainable development.

The document The Future We Want highlights the elimination of poverty as one of the main challenges to build sustainable development and

reaffirms the urgent need to insert sustainability as a central axis of actions at all levels of governance, endeavoring to integrate dimensions and having interfaces recognized (UN, 2012; UNEP, 2012; WWF, 2012).

Among the major objectives of sustainable development are the reduction of huge socio-economic inequalities; respect for socio-diversity; and changes in unsustainable production and consumption patterns. The aim is to meet fundamental human needs and protect and manage the natural resource base, as pillars of resiliency in view of new and upcoming challenges.

In this event, as well as in others, the crux of the matter is sustainable development, that is, the state of the relationship between the availability and management of resources, so that socio-economic and ecological systems may continue to exist (MAX-NEEF, 2012).

Since sustainable development was described by the Brundtland Commission (CMMAD, 1988) as "meeting the needs of the present without compromising the ability of future generations to have their needs met", there has been a growing consensus about what should be included in the assessment of sustainability. They are: i) the integration of institutional, social, economic, cultural, spatial, and environmental aspects, and the interdependence and inseparability between them; ii) the consequences of past actions and their implications for the present and the future; iii) the existence of uncertainties in the results of our actions in the present and the need to act with caution; iv) the involvement of stakeholders; and v) considerations of (intra and inter) generational equity (GASPARATOS; EL-HARAM; HORNER, 2008; GASPARATOS, 2010; VEIGA, 2010; DUARTE et al., 2013; GIBSON et al., 2005).

This implies that the studies and research on the sustainability of social and ecological systems cannot be made in a reductionist and disciplinary fashion, but rather in a comprehensive and interdisciplinary one. This is because human societies and their development influence the ecological systems, which, in turn, affect the development patterns of societies.

Thus, the challenge of sustainability is not only a problem for the management and implementation of effective policies. It is also a challenge and an invitation to the development of integrated interdisciplinary and intercultural knowledge, and to the investigation that will motivate actions, technological development, and education processes in educational institutions, especially at universities.

Universities worldwide and particularly in Latin America, as centers for the production of knowledge and players of actions in teaching, research and extension, have therefore been convened to expand research and academic offering in the area of sustainability and to adopt more sustainable guidelines in the management of their college campuses, that is, moving from speech to action.

Hence, higher education institutions are no longer seen only as the single source of disciplinary knowledge and training of professionals who will be part of society and contribute to its economic progress, but rather as important players that provide examples of sustainable projects, having as their main factor education as a tool for inducing collective and positive changes that stimulate their emancipation. In the same context, one cannot forget that universities have a key role in the success of these sustainability policies, and that they are key players to ensure sustainable development along with political and economic players.

Therefore, this scenario of strong demand of society for human capital ready and able to face the challenges of the complexity related to sustainability increases the role and importance of universities as one of the pillars for the operation and consolidation of the very concept of sustainable development. One must also keep in mind that universities are institutions that generate public opinion and methodological paradigms for the governance of social progress and protection of natural resources (AGUIRRE, 2007).

Within the discussion about the role of universities in promoting and developing social and environmental themes, several perspectives involving its mission arise:

- to increase the academic offer directed to the training of professionals able to apply sustainability to their professional lives;
- to develop research projects that address the themes of sustainability;
- to promote extension activities that develop the themes with the community, the Government and the business sector; and
- to rethink curricula that incorporate interfaces of sustainability dimensions in academic programmes.

In this 2013, nearly three decades after the presentation of the concept of sustainable development (CMMAD, 1988), the following challenges are still posed to universities: to contextualize, to develop, and to put into practice the theme of sustainability as part of their mission.

Facing these challenges, this article's aim is to identify and discuss the main elements to implement the sustainability theme in postgraduate programmes in Brazilian universities. The methodological phases used were: to identify the postgraduate programmes enrolled in Capes; and to examine these programmes' relationship with the theme of sustainability, as well as the interdisciplinary vision established. This has made it possible to have a more precise picture of the object under analysis. From the experiences of the authors who work in different postgraduate programmes at different Brazilian and Latin American universities, the content of such programmes was analyzed, especially in the academic aspect, showing whether they were relevant and coherent with regard to the theme of sustainable development.

**Postgraduate programmes in Brazil**

There is a significant number of programmes and courses – doctorate and academic and professional master's degrees – in the scope of postgraduate programmes that award Master's or Doctorate degrees, recognized by the Capes system, upgraded in October 2012, which suggest, even though generically, themes correlated with sustainability, as shown in the Capes publication on Rio+20 (CAPES, 2012a), which brings the contribution of Brazilian postgraduate studies to sustainable development.

Among large areas, multidisciplinarity must be highlighted, as it encompasses, among others, Biotechnology, with 43 programs and 64 courses; Environmental Sciences, with 72 programmes and 89 courses; and the Interdisciplinary area, with 249 programs and 312 courses, as highlighted in Table 1.

**Table 1. Recognized master's/doctorate degrees of the large multidisciplinary area**

| LARGE AREA:MULTIDISCIPLINARY | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Evaluation Area | | Postgraduate programmes and courses | | | | Totals of postgraduate courses | | | |
| | Total | M | D | F | M/D | Total | M | D | F |
| Biotechnology | 43 | 13 | 3 | 6 | 21 | 64 | 34 | 24 | 6 |
| Environmental Sciences | 72 | 31 | 7 | 17 | 17 | 89 | 48 | 24 | 17 |
| Interdisciplinary | 249 | 110 | 5 | 71 | 63 | 312 | 173 | 68 | 71 |

**Source:** CAPES, 2012.
Note: M = Master's; D = Doctorate; F = Professional Master's.

The creation of large multidisciplinary areas within Capes signals a political-institutional response in recognition of the growing number of postgraduate programmes that incorporate more than one key theme in their curricula, in order to better answer the challenges of the complexity of problems and potentialities in view of a world in constant change. Similarly, the large multidisciplinary area keeps increasing its number of programmes, and upgrading itself to meet the sustainable development paradigm. The committee of the Interdisciplinary area and, more recently, the committee of Environmental Sciences, recognize that

> the complex nature of socio-environmental problems demands dialogues among similar disciplines, and among disciplines of different areas, as well as among disciplinary and non-disciplinary knowledge of society and cultures, depending on the level of complexity of the phenomenon to be treated. Given that, theoretical and methodological challenges arise for the different fields of science and technology. (CAPES, 2012b).

Likewise, the area document issued by the Coordination of the Area of Environmental Sciences reinforces the complexity inherent in the theme

of social and environmental development, which has an ethical aspect to be addressed regarding the demands of the current generation and the windows of opportunities for future generations. It highlights that the

> sustainability of development therefore demands the valuation and protection of this cultural heritage, based on the protection of ecosystems and natural resources. Accordingly, the environmental issue is, at the same time, an ethical, political, legal, economic, management, and technical challenge (CAPES, 2012c).

Although only recently has the term sustainability been present in the name of some postgraduate programmes, such as the newly created Postgraduate Programme in Sustainability at MSc and PhD levels of the Arts, Sciences and Humanities School of Universidade de São Paulo, and the postgraduate programme at professional master's level in Environment, Health and Sustainability of the Public Health School of Universidade de São Paulo, the theme has integrated research lines, disciplines and projects in several postgraduate programmes in many Brazilian universities.

Therefore, taking into account that the idea behind the concept of sustainability is the promotion of improvement and maintenance of quality of life and environmental quality, one can observe that this approach is quite comprehensive, and it includes bringing together the present and the future with regard to economic, social and environmental well-being. This means that adopting sustainability as the focus of postgraduate activities brings implications to its content and modus operandi.

As for content, the different aspects regarding the biotic, physical, chemical, cultural and socioeconomic environments must be tackled. And its operation must be designed and operated in such a way as to work in an interdisciplinary method, seeking thematic integration, and analyzing critical interface issues of themes related to sustainability.

The prioritization of dialogues with different players in the arena of sustainability building, on their different scales, is also a key factor in the operationalisation of postgraduate programmes in sustainability.

That is, identifying and creating credibility channels, and getting close to them, together with decision makers in government institutions, the private sector and civil society leaders, among others, demands from research groups greater flexibility. It, above all, demands courage, because by leaving their safe havens – laboratories and research rooms – they must then incorporate new tools into their scientific methods and procedures. Similarly, routines, time and duration of studies will permanently be tested.

**Need for curricular restructuring**

The way in which educational changes can be carried out in different contexts has favored the development of paradigms. One of these paradigms is the model of research and development, which has arisen from the relationships established between theory and practice in a dialectical manner. Another is the social interaction model, which actively involves participants both in the implementation and review process and in the construction of proposals that one wishes to boost. A third paradigm is the problem-solving model, which interprets the change from the point of view of those involved in the study and in the transformation process that it intends to accomplish, according to studies/assessments of the context that respond to the needs of communities.

These three processes are closely linked and must form the conceptual and methodological approach to a curricular construction on the theme of sustainability in postgraduate courses.

In the past decades, significant changes have been made to education and, therefore, to curricula. Such changes respond particularly to the results of investigations which, at different levels in the education system, had been carried out not mandatorily, but rather due to the permanent need to upgrade by incorporating new philosophical, sociological, pedagogical, psychological and scientific concepts that seek to obtain a comprehensive vision of the human relationship with oneself, with the community, nature, science and knowledge.

In the field of sustainability and specifically with regard to the postgraduate courses related to the theme, it is necessary to abandon the curriculum as an accumulation of disciplines to start working on problematic cores.

These cores must emerge from the analysis made on the realities and contexts of local, regional and national human needs, considering the impact of globalization on problematic cores, allowing the construction of effective interdisciplinary curricula, and incorporating the perspective of critical theory of the curriculum. The critical theory implies a different form of rationalizing the technical or pragmatic design assumed by some lines of thought.

The curriculum critical theory has dialectical reasoning as its central axis. Differently from the analytical logic or logic of understanding, dialectical logic deepens the analysis of relations among parties within larger, wider and more extensive totalities, thus producing deeper knowledge than in analytical understanding. Dialectical reasoning addresses overcoming simple dualisms and understanding problems that arise therefrom, thus advancing in integrated solutions, favoring the approach of teaching and research to real life.

In turn, the curriculum in process permanently adjusts because new, investigative experiences which are appropriate to the territory are developed and change the cultural reality. The curriculum is not conceived as a repetition of the same content year after year, but it aims at working from the diagnosis to the solution of concrete problems, which become facilitators of learning from the action research that generates its approach. In order to work and to address these aspects, it is necessary to work through problems and projects that allow, through self-assessment and integration seminars, to build common ground for students and teachers of the different emphases of postgraduate programmes to meet.

**Elements of change**

In order to enlarge the insertion of sustainability in postgraduate programmes in respect to the contents and modus operandi, it is possible to list a set of characteristics and aspects, as illustrated in Table 2. Such

characteristics are the first outline of key points to be observed in the creation, management and evaluation of postgraduate programmes. The more the issue of sustainability is present and explicit in objectives and concentration areas of the programme, the greater attention should be given to the aspects highlighted in Table 2.

In terms of characteristics to consider in the curricular content of postgraduate programmes, those with a multi-theme view and ecosystemic perspective, which seek to be a meeting point for various disciplines in identifying problems that must be addressed in work teams, are highlighted. Another characteristic to consider is the incorporation of themes and emerging subjects, i.e., viewing sustainability as a disciplinary field under dispute, and knowing that there is no better approach than studying it from the integration of knowledge, rethinking earlier models and prospecting new models aligned to the reality of current complexity.

As for its *modus operandi*, one should highlight interdisciplinarity as a method of building knowledge based on a complex problem that interlinks the tripod teaching, research, and extension and that goes beyond understanding it: it endeavors to solve it. It is necessary to create an environment conducive to the study of new fields of knowledge that were not needed so far or that arose from connections of disciplines and their yet inexistent unfolding. Interdisciplinarity takes place mainly throughout the process.

Another characteristic is to widen the participation of interested parties. To that end, one must stimulate the participation of players (Government, businesses, civil society) in the development of research, broadening the debate and the greater incorporation of discourse and perceptions in the research process itself. One should encourage joint plans, strategies and actions, formalized by means of institutional arrangements.

Transparency translates, throughout the implementation of the study, by making room for public consultation and for the empowerment and information of society. It is also recommended that balance sheets and results of the project's accounting be published on the project's website. It is essential to translate the process and the results into a

product different players and stakeholders can understand, enhancing the credibility and usefulness of the research and its products.

Another characteristic is the age group approach, whose intergenerational and intercultural aspects must involve the interests of various generations, such as children, youth, adults and seniors. Thus, incorporating interests from the gender and intercultural perspectives into the research process is also aligned with the idea of sustainability.

The sixth characteristic is the inter- and transdisciplinary approach as practice and concrete action to integrate several disciplines. In order to do so, it is necessary to draw teaching processes that foster support to the construction of interdisciplinary projects. It must be ensured that the contents are coordinated within (intra-) and across (inter-) disciplines towards transdiscipline. The content may be similar, but the educational format should lead to integration and critical vision. It must also be ensured that the different concepts and views of professors, students and stakeholders be met and discussed. An integrating strategy is the development of projects applied to solve problems that make it possible to integrate different disciplines.

In turn, the characteristic 'monitoring of implementation of research and learning project' points that, in addition to generating learning processes for the players involved, projects must allow the continued cycle of longer term projects, which does not end in the operation, but rather in the evaluation and follow-up. Likewise, a process of continuous improvement, based on the practice of learning, must be established.

Another characteristic is the construction of collective and structuring projects, which allows aggregating a group of professors, researchers and students in a specific research project to work around a theme, generating economies of scale and synergy that favor the enhancement of action research.

The last characteristic, a synthesis of results, refers to seeking actions that add up to the same goal. Thus, it is necessary to build projects and groups that focus on common problems, but with the strategy to add. Examples that may be highlighted are the construction of research

networks, theme projects or even macro theme programmes that are being encouraged by research funding agencies, such as Biota-Fapesp, on biodiversity, and Bioen- Fapesp, on bioenergy.

**Table 2. Characteristics and aspects to strengthen the planning and management of postgraduate programmes aimed at inserting the sustainability theme**

| Characteristics | | Key aspects |
|---|---|---|
| Content | 1. Multi-theme and ecosystemic vision | To integrate themes of several disciplines, going beyond the reductionist approach to the vision of inseparability. |
| | 2. Considering emerging themes | Incorporation of new sustainability assumptions and its discussion and practical performance to resilience and uncertainty challenges that underpin, in an intercultural perspective, governance, irreversibility, post-normal science, among others. |
| Modus operandi | 3. Interdisciplinarity | Several disciplines working on the basis of a complex problem, from the inseparability of the teaching-research-extension. |
| | 4. To widen the participation of players (government, businesses, civil society) | To encourage the participation of players and institutional arrangements. |
| | 5. Transparency | Clarity in decision-making and in the use of resources assigned to the project. |
| | 6. Age group, gender and intercultural approach | Integration of views of different generations and cultures, with a gender perspective. |
| | 7. Inter- and transdisciplinary approach | Interdisciplinary circles that incorporate complex problems and inter- and transdisciplinary approaches. |
| | 8. Follow-up on the implementation of research and learning project | To make possible the funding for a larger process and to stimulate projects and adequate funding to work the teaching, research and extension in the long run. |
| | 9. Construction of collective and structuring projects | From the point of view of institutional arrangements, to build agreed upon goals. |
| | 10. Synthesis of results complementary projects in solutions | To work on projects that add results to the solution to problems. |

## Final Remarks

The emergence of sustainability as a theme requires that it be inserted in graduate programmes, even if gradually, but that it be adjusted to the specificities of each area and program. In this way, the programs ensure that the products generated promote the focus on sustainable development and aim at the targets established by the Brazilian Postgraduate Plan.

In summary, with respect to parameters, so that the postgraduate programmes are more relevant and consistent with the theme of sustainability, it is necessary to pay attention to the following elements: ecosystemic vision; interdisciplinary perspective; participation of players; gender, intercultural and intergenerational approach; and new learning methodologies, promoting the construction of collective and structuring projects from socio-environmental issues.

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