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“CLEANER PRODUCTION TOWARDS A SUSTAINABLE TRANSITION”

## An International Review of Sustainability in Higher Education Studies: A Messy Concept with Contradictory Attitudes

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### Abstract

Sustainability in Higher Education (SHE) represents a comprehensive and complex set of plans and initiatives involving institutional context (universities and their management board for “greening the campuses”), and educational actors (students, teachers, community stakeholders) in pursuit of suitable ways for a sustainable environment in teaching, learning and promoting community values. This paper reviews 26 international selected studies on SHE from a pool of 137 identified in academic databases, published between 2000 and 2014. The analysis identified five constructs that pervade such studies: (i) students’ views on sustainability; (ii) students’ literacy; (iii) students’ attitudes; (iv) main pedagogies employed; (vii) universities’ roles. Based on these constructs it was found that: (i) students have a broad and confused view of sustainability, although they associate it with practice and attitudinal change, mainly towards the environment; (ii) they present low level of literacy for sustainability; (iii) their attitudes tend to be contradictory when compared with their beliefs, as they are inclined to remain in a comfort zone of no change; (iv) they are typically trained by technical means or business modules on sustainability, but criticise lectures and tutorials, preferring participatory activities; (v) universities’ roles are seen as promotion of sustainability awareness and adoption of environmental management, although these are not clear missions for the managers of these institutions.

**Keywords:** *Sustainability in Higher Education (SHE); environmental literacy; environmental learning; environmental attitudes.*

### 1. Introduction

Environmental Education (EE) is “a process of understanding and clarifying the value of the environment and the relevance of environmental resources with a view to encouraging people to use such resources in a more sustainable way” (Holt, 2003: 324). This concept emerged in the 1960s, and evolved from the focus on the natural environment and its respective assets, as resources to be harnessed and conserved. According to Christie et al. (2013: 387), EE gave place to Environment for Sustainability (EfS), which embraced “cultural, environmental, health, peace, social justice, scientific and technological dimensions of any given problem”. Such openness is the heritage of the United Nations Conference on Environment and Development that took place in Rio de Janeiro, in 1992. Chapter 36 of Agenda 21 launched at the Rio conference forecasts EfS, or Education for Sustainable Development (ESD), as a learning and literacy concept to support action on, through, and for environment (Ellis and Weekes, 2008). Christie et al. (2014) observe that this shift in the EE concept became gradually visible during the 1980s, and it is until now a complex concept that should be

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replaced by “living” in the sense of attaining the needs of human beings that suffer poverty.

More than three decades after the first discussions on sustainable development, the United Nations (UN) launched the Decade of Education for Sustainable Development, embracing the years from 2005 to 2014. It was promoted in order to stimulate holistic values and the incorporation of sustainability in all policies, especially in the educational system (Kagawa, 2007; Ellis and Weekes, 2008; Christie et al., 2013; Breunig et al., 2014; Christie et al., 2014). A year after the ‘decade’ concluded, this paper comes to propose an analysis of studies about Sustainability in Higher Education (SHE) published between 2000 and 2014. The choice of such period intends to capture studies published before the beginning of the UN initiative until the more recent ones. SHE embraces actions and reflections about academic community responses to sustainability challenges, involving curricula addressed to a transition society, teachers and students initiatives in this field, inside and outside campuses, mainly with community participation, as well as institutional movements for “greening the campuses and/or the curricula” (Evangelinos et al., 2009). The target of the present article is practical research that unveils how academics (including students) understand sustainability, to what extent they can be considered literate in this subject, whether their attitudes match their beliefs, what are the main pedagogical practices on sustainability, and those more accepted by students. Identifying universities’ roles on sustainability is a secondary, but no less worthy, aim. These questions are examined based on their recurrence in the overall EE, ESD, EfS and SHE literature. Nevertheless, they are not always investigated in practical form. Furthermore, practical research about understanding, literacy, behavior of students towards SHE, and the way higher education institutions embrace such initiatives are very dependent on context, on the sample size (in case of surveys), on the number of courses and institutions considered for the research application, and on the category of respondent – whether the questions are addressed to students themselves, or to their professors, or campus supervisors. Therefore, several situational aspects compete to limit an optimal selection of available studies. The selection of articles in this research embraced such complexity and attempted to offer a more reliable sample. The article is structured as follows: in the second section, methods of research and constraints are presented and explained; in the third part, results are described and discussed; and in the fourth section, conclusions are presented along with recommendations for future research.

## 2. Methods

This research is based on an exploratory literature review using some of the main academic databases: Scopus/Science Direct, Web of Knowledge, Emerald, and Taylor & Francis. Search terms were “sustainability” AND “higher education” using the advanced search mode (Boolean operator) in all these databases, considering the years from 2000 to 2014. Given the high number of results in the initial search, mainly due to the fact that “sustainability” is a very widespread term, only articles related to SHE, in the academic context of teaching, learning, and managing sustainability were considered. Duplicate articles found in more than one database were excluded. This process identified 137 articles deemed valid for the research purpose. A new selection was performed in order to include only articles presenting empirical research. This last selection delivered 26 articles. Figure 1 summarises these studies, including details of the respective year of publication and country of origin. A point to highlight is the publication of special issues about EE, including SHE in the Journal of Cleaner Production, in the years 2000, 2006, 2009, and 2010, as well as the existence of a journal dedicated specifically to this subject (International Journal of Sustainability in Higher Education). After the selection, it was found that the main empirical research included gathering students’ views and attitudes on sustainability, and also examining the pedagogies employed in EE. To a less extent, some studies examined students’ sustainability literacy, and the roles of universities regarding SHE. Such approaches were taken as constructs for the present review.

<b>Year</b>	<b>N of studies</b>	<b>Author(s)</b>
2003	1	Holt (England)
2006	4	Bremer and López-Franco (Mexico); Ramirez (Australia); Stir (Australia); Velazquez et al.(Mexico).
2007	2	Kagawa (England); Murray and Murray (England).
2008	2	Carew and Mitchell (Australia); Ellis and Weekes (England).
2009	2	Erdogan and Tuncer (Turkey); Qablan et al. (Jordan).
2010	2	Davidson et al. (U.S.); Desha and Hargroves (Australia).
2011	2	Kitamura and Hoshii (Japan); Mingue et al. (Spain).
2012	3	Glassey and Haile (England); Richter and Schumacher (Germany); Wright and Wilton (Canada).
2013	5	Christie et al. (England); Mintz and Tal (Israel); Shephard and Furnari (New Zealand); Yuan and Zhuo (China); Zsóka et al. (Hungary).
2014	3	Breunig et al. (Canada); Christie et al. (England); (Zsóka et al. (Hungary)
<b>Sum</b>	26	

Fig. 1 – Selected studies

### 3. Results and discussion

The positions of Australia and England as the top countries publishing on SHE research (Figure 1) is noteworthy, given the strategic role of education for promoting environmental values within and outside of the academic environment. Regarding the predominant method of investigation, Figure 2 shows survey as the pivotal strategy. Figure 3 identifies as prevalent constructs the questioning of the researchers about students' concepts on sustainability (their worldview related to a sustainable society) and the pedagogical practices they experience. To a lesser extent, researchers explored students' attitudes when facing sustainability challenges and their literacy in terms of their acquaintance with sustainability ideas and values. In smaller numbers still, there were studies analysing universities' roles in SHE's domain. These results are presented and discussed in the following subsections.

<b>Types of studies</b>	<b>N</b>
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Survey	15
Experimental	4
Multiple case	2
Interviews	2
Delphi	1
Focus group	1
Theoretical and experim.	1

Fig. 2 – Types of studies and respective quantities

Identified constructs	Freq.
Students' views on sustainability	12
Students' literacy	4
Students' attitudes	5
Pedagogical practices	12
Universities' roles	2

Fig. 3 – Identified constructs and respective frequency

### 3.1 Students' view on sustainability

Twelve studies investigated the view of higher education students on sustainability. Holt (2003) analysed 53 students' opinions (from social sciences and business) based on 28 questions using a scale assessment. Business students were more inclined to see sustainability as social justice and commitment with future generations than social sciences students, although, according to the author, informal knowledge obtained from family and media was regarded as being of more influence in the sustainability world view than formal knowledge originating in a university environment. Glassey and Haile (2012) identified concern on professional future as the reason for a sustainability perspective adopted by chemical engineering students in the first years of study in university. Through an Enquiry Based Learning technique, under successive questioning, such students were challenged to find solutions to complex real life problems. Using the same strategy, around 50 students scrutinised by Ellis and Weekes (2008) were asked to solve practical problems involving themes such as waste management, environmental restoration and healthy food, typical issues of urban centers. Erdogan and Tuncer (2009) also assessed sustainability solutions involving real life cases presented and discussed through 53 questions, applied to 85 students of Education, Engineering, Economy, and Management degree courses. Bremer and López-Franco (2006) found that activities such as recycling helped to form a practical view of sustainability for students that engaged in formative-informative studies. In all these cases (Holt, 2003; Bremer and López-Franco, 2006; Ellis and Weekes, 2008; Erdogan and Tuncer, 2009; Glassey and Haile, 2012), practical perspective means the way sustainability is understood in students' mental models. In two other articles (Zsóka et al., 2013; Breunig et al., 2014), the pivotal aspect leaned on change. Some focus groups with 13 and 20 students respectively organised by Breunig et al. (2014) concluded that sustainability consists of striving for transitions even when facing constraints. The struggle for change is deeper for high school students than for university students according to a survey that managed to get opinions from 2,998 respondents from 70 universities, and 770 respondents of three high school institutions (Zsóka et al., 2013). In this case, it is noticeable that a high level of knowledge does not mean more inclination towards environmental change, because university students have shown a superior standard of awareness on sustainability, but secondary school students were regarded as being more inclined to adopt pro-environmental behavior than university students. In contrast, a survey with five open-ended questions responded to by 1,889 students of universities about the foundations of sustainability indicated environmental issues

were preferred to social and economic ones (Kagawa, 2007). Another investigation using Enquiry Based Learning identified diffuse ideas on sustainability, mainly that it is a complex activity (Murray and Murray, 2007). Notions about the sustainability concept are significantly diverse, described as holism, appropriate design, changing development paradigm, participatory philosophy, entropy, integration – according to Carew and Mitchell's (2008) investigation with students of engineering. An online survey carried out by Christie et al. (2014) answered by 1,819 students also found a plural view on sustainability, and another survey addressed to 1,134 university students revealed that sustainability is regarded as a positive issue in curricula, but it is not well understood (Yuan and Zuo, 2013).

From these findings, it is possible to summarise that academic students tend to perceive sustainability as a practical activity more than a theoretical one, although this situation changes depending on their practices; they do not have a clear concept of what sustainability means because it is a wide open and contested concept.

### *3.2 Students' literacy on sustainability*

Few studies specifically address students' literacy on sustainability, because it is difficult to capture to what extent formal and informal knowledge about this issue can be translated into skills and abilities to face sustainability problems. An assessment with the staff of 12 universities, performed by Ramirez (2006), involving their comprehension of design students' literacy, showed that 38-50% were believed to learn through other means than design classes, and 11% were believed to marginally learn. Erdogan and Tuncer (2009) state that literacy is more related to exposure to real life situations, independently of the employed methods. Richter and Schumacher (2011) scrutinised 20% of 1,000 engineering students in ten German universities, and concluded that they experience a lack of sustainability knowledge and skills in engineering curricula, in addition to conflicts between curricula content and practical demands of society. And in a survey by Zsóka et al. (2013) of 2,998 students from 70 universities of 23 countries, 52.1% have shown awareness of the need for consumption patterns change, but they do not tend to change significantly their own consumption levels. This indicates a mismatch between formal literacy which is clearly effective, and real literacy which clearly is not effective. Such findings must be contextualized in the respective frames and places of the research, but they show that knowledge, skills and awareness, and even curricular adjustment, are not necessarily associated with achievement of student literacy in sustainability.

### *3.3 Students' attitudes on sustainability*

Bremer and López-Franco (2006) identified pro-environmental attitudes and engagement in a group of almost 300 Masters students. Zsóka et al. (2013) also found an escalation of commitment with the idea that EfS brings positive attitudes in university students but most of them keep such commitments only in discourse, because when it comes to practice, they tend to stay in their own comfort zone, avoiding any actual reduction in consumption levels. Based on the broad scope of the research across 70 universities from 23 countries and 2,998 respondents, this is a compelling finding. Furthermore, it matches the results of the Breunigs et al. (2014) study, according to which students sense they can make a difference for sustainability, although they refrain from action when it demands personal efforts, or brings costs, or defies self-convenience. However, Qablan et al. (2006), using a scale ranging from one (strongly disagree) to five (strongly agree), found that there is a moderate level of attitudes towards ESD among 46 interviewed members of three Jordanian faculties; besides, in this case, indoctrination was detected as an usual practice, aimed at inculcating self-belief in students, leading them to neglect authentic points of view. In the same direction, Christie et al. (2014) questioned 1,819 students from 38 universities, and found that engagement in the sustainability debate is more likely to happen in other fields than those of hard sciences, that is, in knowledge areas she called creative, such as design and arts. From this pool of studies, it is possible to conclude that there is a gap between willingness to engage and change, and effective action that satisfies such convictions.

### *3.4 Main pedagogies and practices in SHE*

There were identified pedagogies and practices in 12 of the 26 analysed studies. Holt (2003) explains

that business students are used to being exposed to fundamental concepts and blocks of knowledge that enable them to get concrete ideas on sustainability practices for avoiding negative environmental impacts in business organisations. Ramirez (2006) mentions as pedagogical resources conference attendance, project building participation and self-learning. Kagawa (2007) emphasises the need for full practical work, such as cleaning beaches and managing wastes. Nevertheless, in some cases the meaning of sustainability is posed in a top down direction, which leads to underscore ideologies more than pedagogies, as mentioned by Qablan et al. (2009), and results in a lack of pedagogical strategies for ESD. Besides, as Desha and Hargroves (2010) observe, students' pursuit of practices above all can undermine efforts for the building of sound sustainability constructs; therefore, practices usually get performed without sufficient understanding on how they are connected with theories. A different situation is observed by Kitamura and Hoshii (2010), regarding Japanese students of 19 postgraduate and 23 undergraduate programs on the conceptual aspects of sustainability. These authors observed that at both levels, students suffer from a lack of practical tasks and interdisciplinary collaboration. Christie et al. (2013), questioned 1,891 students in 38 universities and found a tendency to reject lectures and support critical discussion in classes. This is a similar finding to Mintz and Tal (2013) based on a multiple case study with 140 students: they conclude that courses with a high degree of participatory learning promoted the highest achievement of, and most varied, learning outcomes, in contrast to courses based on lectures, that delivered the fewest learning outcomes. It also gives support to Glassey and Haile's (2012) study, that showed positive evaluation of complex case studies by students, as well as to Murray and Murray's (2007) results that identified the majority of students' opinions (34 out of 35) inclined to prefer the adoption of sustainability in the whole curriculum instead of separate blocks by discipline, or isolated topics inside diverse disciplines.

In the case of pedagogies addressed to university professors, the situation is poorly investigated. For instance, Mingue et al. (2011) conducted research with 331 teachers, from hard (45.9%) and social sciences (30.8%) which indicates that 25% are unaware of what they are doing, and 40.2% deal sporadically with sustainability – in all cases, teachers need to provide their own training and knowledge building to teach their students. Opinions on how teachers must proceed to educate themselves on SHE also varies. Shephard and Furnari (2013) questioned 43 academic professors, and captured their assessment on this subject. It resulted in four groups: those that advocate full integration of sustainability in higher education; another moderate group that believe teachers have to be committed with liberal ideals of higher education, but only in disciplinary contexts; a third group that is favorable to interdisciplinary collaboration but not to education for sustainability; and a last one that is convinced about the supremacy of the anthropocentric paradigm, which means teaching without positioning on sustainability. From this description, it can be inferred that most students prefer practical pedagogies and sometimes despise theoretical efforts, but are inclined to pedagogies that give examples through participation and debate. On the other side, teachers have usually no support for learning to teach in sustainability, and they are dependent on their own efforts and resources.

### *3.5 Universities roles' in SHE*

This approach has not much attention in research investigation. In the selected articles, there were identified only two studies about the role of universities in fomenting SHE. Evangelinos et al. (2009) conducted - personal interviews with 155 students about the role of universities in promoting sustainability at the regional level – their results show a balance between students that think universities' roles should be awareness stimulators (43.9%) and those that think they should be environmental management promoters (41.9%). These are often very different roles, although they can be complementary, because universities can encourage awareness through curricula change in their courses or through offering of new courses and programs, without bringing the possibility of application of sustainability experiences into real world of the students – pursuing an environmental certification, for instance. Another study –by Davidson et al. (2009) – is more assertive on the need for curricula reformulation in order to incorporate sustainability in regular under- and postgraduate courses. Davidson et al. (2009) surveyed 364 academic staff members teaching on engineering courses in three American universities, and 23% reported bachelors and/or masters programs with some content on sustainability. According to these respondents, courses taking a conceptual approach and enabling the use of sustainability tools made up half of the total types of offered courses in such universities, without cross-disciplinary integration. These studies suggest that there is a wide field for universities to act towards implementing SHE, mainly because they have more power as institutions

than individuals involved in education (i.e. teachers and students). Nevertheless, the role of universities in SHE is usually poorly investigated, and it happens with only two main lenses: of the environmental certification, and of the curricula reformulation.

#### 4. Conclusions and recommendations

SHE is a complex field that involves theoretical and practical actions and reflection for society's transitions from both, concrete-instrumental, and cognitive-formative places of higher education institutions. In this study, 26 selected papers have helped to draw a brief idea of what is happening through an investigation of recent research about what students think and learn (or do not), how they tend to act on sustainability, and what are the main pedagogies/practices and universities' roles on SHE.

Although several constraints can contribute to limit the results and respective interpretations – mainly due to the wide range of sustainability research, and given the diversity of contexts, cultures, and procedures in which the selected studies were performed – it was possible, through this analysis, to get a better understanding of commonalities regarding the identified constructs obtained through analysis content: students' views on sustainability; students' literacy; students' attitudes; pedagogical practices, and universities' roles on sustainability. It is noticeable that sustainability is still seen by students with the environmental perspective being the dominant feature, but it is also apparent that it is a messy concept, very dependent on what students experience, and how they learn.

Another significant conclusion relates to the gap between knowledge and attitudes of students: they usually declare awareness and knowledge about the need for changing behaviour for a better society, but tend to stay in their own comfort zone of no change. It somehow explains the ineffectiveness of their literacy in this subject, because action is mismatched with their understanding and/or conviction.

With respect to pedagogies, the findings of the preference for practical instead of theoretical methods confirms the trend of sustainability learning more through real life examples than through concepts, which could explain why students' views on sustainability are so diverse and confused. A point that cannot be forgotten is that teachers in charge of sustainability classes generally have no support for their own learning, and this situation brings more problems to an already complex context. The role of universities in SHE has a long way to go. As mirroring institutions, universities need to claim themselves means for organising their action with communities and, internally, the integration between curricula and academic activities that are often running in isolation on sustainability themes.

Finally, this study recommends the improvement of the analysis about what has been investigated in SHE's field, and to what extent and how it impacts changes in strategic planning of universities.

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