Integrating Sustainability into the University: Past, Present, and Future

Filomena Amador and Carla Padrel Oliveira

Abstract The idea of evolution is deeply rooted in Western culture as since the eighteenth century the concept of continual development. Indeed, the latter commenced with the Industrial Revolution with the intent of improving the standard of living and thus quality of life. Higher education is necessarily part of this requirement and has been enacted by Universities that provide graduate whom typically become active and responsible citizens often internationally and usually supported by Government. To an extent, Universities control education, research, and training and thus provide a pivotal role in the dissemination of any concept. In this chapter, we examine the concept of sustainability and, based on an analysis, demonstrate the historical significance of sustainability and outline the significant contribution made by Universities with regard to the elucidation of sustainability. Indeed, it is our perception that Universities should use the concepts of both sustainable development and sustainability to reinforce their mission and improve the quality of the learning process. Although the University is seen as the most traditional of all institutions, it has of late become the major instrument of change in social, economic, and political systems, by adopting a new educational paradigm based on multidisciplinary education concerning environmental issues, stressing the values of equity, justice, cultural, and environmental sustainability, and viewing the learning process itself as lifelong.

Keywords Higher education · Sustainability · Sustainable development · Historically view · Future

F. Amador (✉) · C. Padrel Oliveira
Universidade Aberta, Departamento de Ciências e Tecnologia,
Rua Escola Politécnica n° 141-147, 1269-001 Lisbon, Portugal
e-mail: famad@uab.pt

C. Padrel Oliveira
e-mail: carla.oliveira@uab.pt

Introduction

A discussion concerning sustainable development frequently proves to be confusing owing to the different concerns of each and every stakeholder as well as the differing opinions, after all that is all that they are, over the method to be adopted to achieve sustainable development. The current meaning of the word sustainability and, more specifically, the expression sustainable development, became part of our daily vocabulary in the late 1980s with the publication of the report entitled Our Common Future (WCED 1987). It is accepted that the concept of sustainable development commenced in about 1969 with the National Environmental Policy Act (NEPA 1969, pp. 91–190), which was according to the text of the act to "foster and promote general welfare, to create and maintain conditions under which man and nature can exist in productive harmony and fulfill the social, economic and other requirements of present and future generations." However, sustainability can be traced to the eighteenth century and arose owing to the potential scarcity of resources, in particular energy (a scenario familiar to us today), for a growing population entering an industrial revolution that was made possible by fossil fuels in particular coal (Mebratu 1998). Thomas Malthus (1766–1834) is considered to be the first economist to foresee the limits of growth based on limited resources. According to Malthus, the land was the limiting factor and he argued that as the population grew, the standard of living would necessarily decrease toward a subsistence level, and eventually the population would reach a plateau. Although this philosophy is neither universally obeyed nor the consensus of all it is considered the first statement of what is now called sustainable development (Jackson 2009).

The most common definition of sustainable development refers to the use of resources to meet our needs without compromising the availability of those resources for future generation (paraphrased from the Brundtland report, WCED 1987). The current debate concerning a sustainable future was developed for the concept of renewable energy with an emphasis on the more efficient use of the known resources that included increasing the efficiency of automobiles. The majority of people would acknowledge these are matters that must ultimately change but when asked to do so would not wish to do so if those proposed changes would impact their own personal lifestyle. The same attitude is invoked with arguments concerning climate change which is in general regarded as a "problem that will be solved" through the use of some "innovative technological solution" (Cohen et al. 1998).

Similarly, sustainability and sustainable development are concepts that cannot be defined in a scientifically precise manner. Nevertheless, descriptions of these concepts are required to both establish and broaden their adoption and it is to the definition of both sustainability and sustainable development that we now turn.

Sustainability and Sustainable Development

Sustainability can, and in this contribution we will argue with some vigor, must be considered the goal of a process that is known as sustainable development. Thus, a sustainable society is one that has reached sustainability through sustainable development, which is a concept different from *sustainability* because change is required within society to do so; this does not, as often assumed, become synonymous with zero growth and this need not be the case. It is clear, we hope to all, that world requires sustainable development to prevent further the environmental matters that have arisen from rapid development. For example, the Industrial Revolution was certainly responsible for the degradation of the planet's ecosystems because the number of species has declined and the average global temperature has increased; the latter is otherwise known as global warming. It is our conjecture that neither of these matters are in contention. To reduce and even mitigate the environmental damage that has arisen from human development requires that humans adopt the concept of sustainability.

The current framework for sustainable development has evolved between 1972 and 1992 through a series of international conferences and initiatives initiated by the UN Conference on the Human Environment held in Stockholm (1972). The recommendations that arose from this meeting were further elaborated in the 1980 World Conservation Strategy, which aimed to advance sustainable development by identifying and prioritizing conservation and also suggested the plausible policy options that would require adoption to do so. The first important use of sustainable development can be traced to the 1980 World Conservation Strategy (IUCN et al. 1980) while the process of combining environmental and socio-economic matters was eloquently expressed within the so called Brundtland Report that states a definition for sustainable development as follows: 'the needs of the present without compromising the ability of future generations to meet their needs' (WCED 1987, p. 43). This philosophy requires a balance between human activities and the ecological processes that sustain all life both now and in the future.

Since 1987 sustainable development has been continually expanded to encompass other principles with the intent of clarifying the otherwise rather vague term. The additional principles to be included are as follows: intra- and inter-generational equity, the precautionary principle, and triple-bottom line. These items are either explicitly or implicitly part of any definition of sustainable development. It is to an understanding of these terms that we now turn.

Intra- and intergenerational equity refers to the sharing of resources among a generation and between current and future generations. The term considers the distribution of economic, social, and environmental capital in a fair and just manner between all generations.

The precautionary principle, which was defined in 1992 by the Rio Declaration (United Nations 1992), promotes the consideration of the impact of an action on the environment particularly when the action results in a negative environmental impact. This principle requires decision-makers to anticipate potential harm before

it occurs and ensure adequate measures are taken whenever scientific uncertainty exists to reduce and preclude any plausible impact on the environment.

Triple-bottom line theory considers environmental, social, and economic factors in the decision process taken by stakeholders (Norman and MacDonald 2004). The inclusion of these principles, elucidated above, have assisted in the clarification of the concept of sustainable development, and permitted implementation within a number of different applications. Of course, attaining sustainable development is still a matter that requires further research and analysis. However, governments, businesses, and individuals around the globe are embracing sustainability and thus ultimately will permit its achievement.

Sustainability permits humans to exist almost indefinitely by operating within the finite natural resources offered by the world within the natural cycles. Clearly, a central concern of sustainability is the dynamic that occurs between the need for economic activity and the resultant impact of this on the natural environment. Considerations of both the philosophical and ethical aspects of the definition of sustainable development have resulted in concepts of sustainability that give priority to either economic or environmental objectives: these concepts are often referred to as "weak" and "strong" sustainability (Hediger 2006). Within the economic concept, capital is anything that has the capacity to generate benefits valued by humans. We can then further subcategorize capital as:

- Natural capital incorporates both nonrenewable and renewable resources, that includes the atmosphere, sources of raw materials and sinks used to either store or recycle waste products, and other ecological resources and ecosystem services;
- Physical capital which is based on manufacturing as well as other related economic activities including the use of machinery, buildings, houses, roads, railways, and infrastructure; and
- Human capital that is knowledge, technical know-how, and health.

This is a simplified model and the three types of capital are commonly called environment, economy, and society. Figure 1 depicts, through a Venn-type diagram, the interlinkages of the three dimensions of sustainability.

Figure 1a depicts economy, society, and environment that are completely unconnected and thus, corresponds to a time in our history when the focus was solely with economic development utilizing unlimited natural resources and neither environmental impact of any action nor the plausible limits of natural resources were known. In this scenario, economics prevail over considerations arising from both environmental and societal matters. The link between economy, society, and environment is shown in Fig. 1b where matters of economy are viewed as partially independent of both social and environmental matters. The three components are considered during development but, as shown, the majority of the area of each circle remains unconnected. Therefore, this representation does not yet reflect the environmental impact of human activity; this factor has become increasingly apparent over the past two decades.
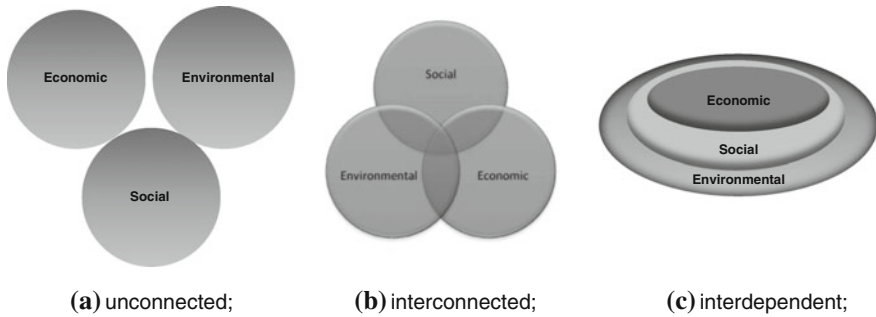
(a) unconnected; **(b)** interconnected; **(c)** interdependent;

Fig. 1 Evolving views of the connections between environmental, economic, and social dimensions of sustainability (Adapted from http://www.sustainablemeasures.com)

Figure 1c, which differs from both Fig. 1a, b shows that each circle is within each other and illustrates the concept of sustainability (Deller et al. 2006). In particular, Fig. 1c shows economic activity which lies *within* society, and together they exist and function within a finite environment and are all totally dependent on each other.

The difference shown between Fig. 1b, c is an illustration of the concepts of weak and strong sustainability, respectively. It is the definition of both the relative terms of weak and strong that we now turn. In the case of weak sustainability, this term refers to the balancing of economic activity with social and environmental responsibility. The proponents of weak sustainability (given the acronym WS) maintain that natural and built capital, in the long term, be interchanged or substituted one for the other so that the overall ecosystem relies on the ability of technological to compensate for environmental degradation and a decreasing stock of natural capital. On the other hand, strong sustainability (given the acronym SS) implies that human activity must acknowledge the interdependence of economic, social, and environmental aspects of life (Dietz and Neumayer 2007). In doing so, the claims are that certain functions performed by the ecosystems and the environment cannot be duplicated by humans as built capital, and that the existing stock of natural capital must be maintained and enhanced. The health of the worldwide economy is totally reliant on the existence of a healthy society, which is totally reliant on the existence of a healthy environment.

Thus, development must be reconsidered and ultimately transformed in light of sustainability and this ultimately means utilizing new approaches and models. Edwards (2005) commented that sustainability is indeed a revolutionary movement rather than a scientific revolution and, as such, represents a paradigm shift. In this regard, traditional science, which focuses on individual parts of broader systems, is being replaced by systems thinking (as has been applied to chemical plants), which expands the focus to include the interactions and relationships between the parts of these complex systems. Understanding the relationships between nature and society, which is between the biosphere and the human enterprise is fundamental to this shift.

Sustainability is often considered to be synonymous with *environmentalism* that is perhaps better termed environmental sustainability. Accepting this definition leads to a rather limited scope and neglects that sustainability must be considered to be a system of numerous interdependent factors and that a change in one factor will most certainly result in an unpredictable change in one or more of the others. Pappas (2012) suggests the oil spill resulting from an explosion on the Deep Horizon drilling platform operated for the lease owner British Petroleum, that occurred in 2010, provides an example of how sustainability might be applied in reality. The spill has created an *environmental* disaster that inevitably affected the local fishing industry and has generated a local economic crisis and these matters have combined to create further *social and cultural changes* within the communities. Thus, the approach required to solve the complex problems resulting from this disaster necessarily requires individuals across different disciplines with quite disparate skills.

In this regard, it is the task of higher education to undertake the education of students in the appropriate definition of sustainability and the application of the theory of systems to the problem of sustainability. In our opinion, environmental sustainability is an excellent point with which to start the study of sustainability, albeit from a rather limited perspective concerned with nature.

Universities Contributions to a More Sustainable Future

In the past two decades much has been written about sustainability and in particular the contribution of Universities and the process approaches adopted to do so (Leal Filho et al. 1996; Leal Filho 2002, 2005; Weber and Duderstadt 2012). A definition of a "sustainable University" has been provided by Scoulos (2010) with a "University which contributes to Sustainable Development (SD), is a University which is able to deliver the message of integration and progress in all aspects of SD, to promote socially just, economically prosperous and environmentally benign development, through the concepts, principles and methods of Education for Sustainable Development (ESD)." According to Scoulos (2010) it is possible to envisage three levels of analysis: (i), curriculum and programs; (ii), governance, processes, and "culture"; and (iii), infrastructure. Referring to Weber (2012) Universities are now a key driver of the knowledge society and are expected to do more and better research as well as to engage in public debate, serving the needs of the economy, the society, and their community. On the other hand, Tilbury (2010) referred to the "need to embed sustainability in the DNA of academic institutions, to ensure that policy, decision-making and practice are aligned with commitments towards sustainability" and in doing so, cites work conducted at the University of Gloucestershire. We can continue to quote different authors but at this point our goal is to show the existence of a great level of concordance, although we can envisage in some of them a more intensive focus in some issues.

A temporal dimension is essential in any analysis of both the present and future role of Universities in sustainable development. Indeed, if we limit ourselves to the present the risk will exist that the formulation so obtained was distorted. However, the need for major change is widely acknowledged and accepted, and discussions occur regarding the problems and their solutions albeit hampered by the rate at which changes occur. It is clear the complexity of globalization hinder a proper understanding of the phenomena.

To provide some context to the role of universities in society it is evident that they are required to provide expectations and a goal indicating the potential paths to achieve them.

Revisit History of Universities in a Sustainable Education View

The aim of this section is to provide a historical background to the debate concerning the relationships between Universities and society. It is of course imperative that Universities are open to change and integrate the concepts of sustainability into their courses and systems.

The first Universities in Europe were founded in the year of about 1088 and were preceded by episcopal and monastic schools as well as professional guilds Sheffler (2010). At about that time, Christian monastic schools had adopted as a method of learning placed a strong emphasis on dialectical reasoning to extend knowledge by inference, and to resolve contradictions. The same scholastic approach was introduced within Universities. The scholastic instruction—*quastio*, *disputatio,* and *quodlibet*—was intended to develop argumentative skills and promote knowledge and application within various disciplines (Mattoso 1997). The critical spirit fostered by the Franciscan priests Duns Scotus (1265–1308) and William of Ockham (1295–1347) began to undermine confidence in the scholastic methods synthesizing the philosophical and religious traditions in a comprehensive system of thought. In particular, Ockham advocated a reform of both method and content with the aim simplification. Ochkam is also known for the simplicity principle or Ockham's razor that states entities should not be multiplied unnecessarily. This principle of parsimony or simplicity can be interpreted as the simpler theory is more likely to be the correct one. This approach seems adequate for sustainability, which necessarily involves a complex world, requires deeper analyzes that will enable the problems to be defined but not by an exact formulation.

It is our opinion that the value of argument has been lost over time. Indeed, other authors have claimed University teaching methods that should be replaced by assigning value to the development of the skills of cognitive argument. This approach is particularly relevant for the education of sustainable development. Recently, Nussbaum (2010) appealed to a Socratic pedagogy as a reaction against passive learning. Students must be stimulated "to think and argue for themselves,

rather than defer to tradition and authority." To better understand the current situation, we must analyze the changes that have occurred in both society and Universities.

Universities were found with a structure to provide the intellectual renewal of society. The mission of Universities was hampered, particularly in Europe, in their early years by wars, epidemics and social upheavals. The remarkable expansion of education came with the Renaissance that preceded the late Middle Ages. New urban schools provided for the needs of an increasingly powerful merchant elite and monarchs, princes, bishops, and towns supported the foundation of new Universities from Scandinavia to the Iberian Peninsula. Although substantial barriers to education remained, there was an increase in literacy across a broad spectrum of society. The result was the creation of a substantial literate public whose skills served both to challenge and reinforce existing political and religious institutions.

If we take a different approach based on the analysis of curriculum development in Universities it is possible, from an historical point of view, to identify three major epistemological traditions: classicism, pragmatism, and encyclopedic. The classicism prevailed in the early European universities where access to university was preceded by the completion of the *Trivium*—preparatory arts of grammar, rhetoric, and dialectic or logic—and of the *Quadrivium*—arithmetic, geometry, music, and astronomy. If classicism marked the curriculum of the first universities, it was the encyclopedic tradition from eighteenth century that indelibly influenced the programs of educational institutions. The pragmatic tradition was consolidated in North America in the late eighteenth century. This approach broke from traditional academic subjects that were included in *curricula*, by emphasizing, in particular, the active participation of individuals in the development of their communities. It is worth noting that pragmatism did not have great influence in European institutions.

In the encyclopedic model, that was markedly adopted within Europe, knowledge is acquired solely for its intrinsic value. This approach resulted in the enhancement of certain disciplines to the detriment of others. In this context, it is important to underline the implications that took place in university *curricula* publication as a result of this approach that were documented in the *Système figuré des connaisances humaines*, developed by Denis Diderot (1713–1784) and Jean d'Alembert (1717–1783). Indeed, this classification of knowledge that the *Dictionnaire raisonné des sciences, des arts et des métiers* "imposed" to the educated elite, resulted in repercussions for Universities that included the selection of subjects as basic knowledge domains, and was ultimately concerned with the transmission exhaustive knowledge.

At this juncture, it is also important to emphasize the concepts utilized by the Humboldt Universities as founded by Wilhelm von Humboldt (1767–1835) whom was one of founders of University of Berlin in the XIX century. In these institutions, the methodology adopted included the concepts of autonomy and academic freedom, and avoided the possibility of influence from politics, economic or religion. The economic arguments were, however, adopted by Wilhelm von Humboldt, along

with a belief in the power of Universities in the development of states (Habermas and Blazek 1987).

Meanwhile, in France Napoleon created a proto-network system of state controlled education which is known as the Imperial University (Neave 2002).

The rational that guided the creation of the first universities and the development of them within the eighteenth and nineteenth centuries neither targeted a specific identify nor autonomy. The latter was influenced by both European and International developments rather than solely within a nation or institute. Universities were subjected to external demands that required radical reforms. These were achieved by the adoption of general guiding principles rather than a clarification of the Universities mission statement.

Today, when we consider the relationship between University and society some of the inevitable questions that arise are as follows: "What kind of University is required for what society?", "What expectations does a University have of society and vice versa?" (Olsen 2005), or, "What role can Universities perform in the construction of a sustainable future?"

Reflect on the Present to Rethink the Future

Universities worldwide have two core missions and these are teaching and research. Teaching has been provided since the Middle Ages with a mission that included both undergraduate and graduate education. Research first emerged as a topic in the pre-industrial German territories and in the German (Humboldtian) where it was integrated into classroom teaching.

The role of Universities in society is as important in the twenty-first century as it was in the middle ages and the question that always requires consideration is" what type of skills should students acquire while at university?". In general, Universities are research centers from the expectation are significant contributions to the progress of society are achieved. However, it is clear that new roles are emerging for Universities that necessarily require changes in both the academy and the relationships between stakeholders and decision-makers.

In this regard, a literature review concerning sustainability within higher education brings to light the difficulties that Universities face transforming a set of general statements into specific and concrete activities. It is evident that there exists a gap between ideological principles and the practicalities of their adoption and dissemination. All too frequently Universities appear to avoid assuming a greater commitment to this process and prefer to be seen "providing a neutral platform for open debate" (Katechi 2012, p. 120), when in fact neither Universities nor science itself can be considered as neutral. Lotz-Sisitka (2004) has concluded that deeper changes within Universities are not occurring because of the modernist dichotomy between theory and practice.

There are, according to Neave (2002), essentially two models adopted by Universities and the origin of these can be traced to the beginning of the nineteenth

century in both France and Germany. In the French Napoleonic system, the system was controlled by the state by a hierarchy imbedded within the so-called Civil Service rather than by an autonomous entity established solely for the pursuit of knowledge. In Germany, the Humboldtian University model was adopted and is now viewed as opposed to the Napoleonic system. The Humboldtian approach had three defining principles: (i) academic freedom and the autonomy of Universities; (ii) the pursuit of knowledge as a basis of culture and civilization; and (iii) the unity of teaching and research. The Napoleonic and Humboldt models provided the basis for a wide range of diversified educational systems both nationally and internationally. For instance, the German model contributed to the foundation of the research University in the United States that in turn had a big influence on the rise of the entrepreneurial university. Today most European Universities are national institutions, in sharp contrast with the United States where colleges or universities are either private or state controlled albeit with indirect Federal funding.

Recent studies of these systems by both Martin (2012) and Hemlin et al. (2008) conclude because we are moving toward a more knowledge-intensive society that requires knowledge-based innovation that ultimately provides economic value Government is increasingly involved in the education process. Indeed, Martin (2012) states "This has been characterized as a fundamental change in the 'social contract' between universities and the state, with the latter now having more specific expectations regarding the outputs sought from the former."

The "knowledge society" presents complex issues for the research mission of universities and requiring a balance between teaching and research, and for the latter a compromise between basic and applied research that is ultimately linked to the economic activity and through taxation the availability of other social programs and the overall public service mission of Government. The research, particularly applied form funded by both Government and Industry, function of Universities also requires attention given to intellectual property, technology transfer, the formation of companies, and competition within and between nations. According to Smith (2001) these changes require new collaborative arrangements in the natural and social sciences and in turn these challenge existing policies and institutional autonomy. The research mission of Universities is significant because they ultimately provide improvement within society and stability that arises from a skilled workforce that permits economic growth and thus, for example, improved healthcare.

The concept of Universities as drivers of economies necessarily requires the adoption of a set of principles that are intended to maximize the economic value of the two University missions of research and education that was described by Thorp and Goldstein (2010) as the concept of so-called entrepreneurial universities. However, Universities follow the scientific logic that requires operation with the "traditional" principles of curiosity and freedom to select topics for research. Scientific logic obtains results with which society can ultimately benefit but does not necessarily do so in the time scale required for commerce that requires measurable financial results on a quarterly basis. There are thus two competing modes

of operation one is the academic desire for a thorough scientific understanding of the other commercial benefit that coincide when the academic requires funding to perform the science and in some instances might permit the market to dominate the science. These principles are particularly prevalent in the funding available for innovation research projects as it is the case in the research related to bio and energy technologies where the potential commercial benefit may override the basic research when decisions are made with regard to funding.

This new paradigm requires changes to the University system so that these institutions are capable of tackling in a coherent manner teaching and performing research that also solves real-world problems of value to society. Many US Universities have operated these principles for several decades and done so successfully. For most other Universities, this will certainly, as Nielsen (2012) describes, require severe changes to the practices previously adopted by university. Some of changes are as follows: (i) more interdisciplinary research; (ii) more open and transparent science; (iii) close collaboration with different stakeholders; and (iv) larger scale of problems worthy of solution.

Within this paradigm, changes to the operational mode of Universities are required to incorporate the concept of sustainability into the University system. In this case, McDonald (2011) reports Universities across the world are incorporating sustainability into their curricula and engaging in activities to promote sustainability. Indeed, a strong curriculum in the sustainability paradigm both attracts students and recruiters alike. Indeed, many corporations require students with degrees in business have a background that includes sustainability and thus a far greater number of students are seeking business degrees that emphasis sustainability (Bunch 2009).

In the educational context, it must be noted that sustainability must be treated as a cyclical process of implementation, evaluation, and readjustment. Courses that include sustainability can now be found within many different academic disciplines and they all require these three elements. Of equally importance in education is the removal of interdisciplinary boundaries following the so-called trans and interdisciplinary approaches. This has an additional benefit in that the students are more likely to succeed in multiple future career paths. We expect, within the next few decades that higher education institutions worldwide will have to prepare their students with the mental flexibility that permits a smooth transition between disciplines. The goal of higher education and necessarily the structure of the academic disciplines must necessarily evolve continuously. In view of the challenges of the twenty-first century, it is therefore necessary that Universities adopt both interdisciplinary research and the metadisciplinary approaches of education.

In view of these changes, it is inevitable and indeed a requirement that Universities contribute to the process, rather than sit on the sidelines, because it is that clear higher education is intertwined in the complex system. As an example, we consider the comments of Jackson (2011) concerning the economic transformation that is crucial to sustainable development. In this regard, Jackson states "to rely on heroic beliefs about technological or behavioral change without exploring these questions is to default to a kind of magical thinking about the future." Brand

(2012) has stated that strategies to sustainable development have been failing owing to the absence of relevant socio-economic proponents that are interested in pushing this agenda and formulating appropriate strategies. This debate highlights the necessity of engaging professors and students to resolve the disputes. In the beginning of this chapter, we stated that the terms "sustainability" and "sustainable development" are ill defined and in some regard unstable and it is the purpose of this article to prompt further discussion.

In the definition of these terms, there are at present conflicting interests and it is our view that Universities have an emancipatory and privileged position that permits the definition of these terms (Wals and Jickling 2002). Indeed, Lozano et al. (2013) has stated with immense clarity that Universities must become the leaders in sustainability and change the paradigm within the context of education, research, campus operation, community outreach, assessment, and reporting. In this regard, Schratz and Walker (1995) were the first to suggest that the concept should be "research as social change" that is research that is undertaken 'with people' rather than 'on people'.

Final Remarks

History has clearly shown that education is the most appropriate way to promote critical thinking that ultimately empowers people to address matters of both local and global concern ultimately developing solutions for sustainable development. Higher education empowers people for their role in society and therefore of vital importance to promote the concepts of sustainable development within education so that it benefits the global community. History also shows, albeit with regard to other matters, that education shapes future generations and provides the means by which they are able to address the complexities of globalization. Universities are thus required to teach the skills students require to enter and advance in the labor market, as well as to cultivate in their students, faculty, and staff a positive attitude toward cultural diversity and to help them to understand how people can contribute to a better life in a safer sustainable world.

In Europe, the so-called Bologna Process requires Universities to rethink their strategy and to meet the challenges of a sustainable society: Which innovative approaches in teaching and learning are needed? The Bologna Declaration stated that a 'Europe of Knowledge' is an important factor for social and human growth. Universities have been important partners in the building of transnational understanding and cooperation, thus also in contributing to the European dimension of higher education.

All these challenges and opportunities require universities to rethink their position in society in order to meet expectations as well as to take full advantage of emerging opportunities.

References

Brand, U. (2012). Green economy—the next oxymoron? no lessons learned from failures of implementing sustainable development. *Gaia, 21*(1), 28–32.

Bunch, R. (2009). Editorial: Sustainability vs. the downturn. *Sustainability: The Journal of Record 2*(1), 1–2.

Cohen, S., Demeritt, D., Robinson, J., & Rothman, D. (1998). Climate change and sustainable development: Towards dialogue. *Global Environmental Change, 8*(4), 341–371.

Deller, S., Marcouiller, D., & Shaffer, R. (2006). Rethinking community economic development. *Economic Development Quarterly, 20*(1), 59–74. Retrieved from SSRN http://ssrn.com/abstract=1503252

Dietz, S., & Neumayer, E. (2007). Weak and strong sustainability in the SEEA: Concepts and measurement. *Ecological Economics, 61*(4), 617–626. doi:10.1016/j.ecolecon.2006.09.007.

Edwards, A. (2005). The sustainability revolution: Portrait of a paradim shift. Gabriola Island: New Society Publishers.

Habermas, J., & Blazek, J. R. (1987). The idea of the university—learning process. *New German Critique, 41*, 3–22.

Hediger, W. (2006). Weak and strong sustainability, environmental conservation and economic growth. *Natural Resource Modelling, 19*(3), 359–394.

Hemlin, S., Allwood, C. M., & Martin, B. R. (2008). Creative knowledge environments. *Creativity Research Journal, 20*(2), 196–210.

Jackson, T. (2009). *Prosperity without growth: Economics for a finite planet*. UK : Earthscan.

Jackson, T. (2011). Societal transformations for a sustainable economy. *Natural Resources Forum, 35*, 155–164.

Katechi, L. P. B. (2012). A university culture of sustainability: Principle, practice and economic driver. In L. E. Weber & J. J. Duderstadt (Eds.), *Global sustainability and the responsibilities of universities* (pp. 117–129). Paris: Economica Ltd.

Leal Filho, W. D. S., Padgham, J., & MacDermott, F. D. J. (Eds.). (1996). *Implementing sustainable development at university level*. Geneva: CRE.

Leal Filho, W. (Ed.). (2002). *Teaching sustainability at universities: Towards curriculum greening*. Frankfurt: Peter Lang Scientific Publishers.

Leal Filho, W. (Ed.). (2005). *Handbook of sustainability research*. Frankfurt: Peter Lang Scientific Publishers.

Lotz-Sisitka, H. (2004). Stories of transformation. *International Journal of Sustainability in Higher Education, 5*(1), 8–10.

Lozano, R., Lukman, R., Lozano, F. J., Huisingh, D., & Lambrechts, W. (2013). Declarations for sustainability in higher education: Becoming better leaders, through addressing the university system. *Journal of Cleaner Production, 48*, 10–19.

MacDonald, T. (Ed.), (2011). *Social responsibility and sustainability: multidisciplinary perspectives through service learning*. Sterling: Stylus.

Martin, B. (2012). Are universities and university research under threat? towards an evolutionary model of university speciation. *Cambridge Journal of Economics, 36*(3), 543–565.

Mattoso, J. (1997). A universidade portuguesa e as universidades europeias. In História da Universidade em Portugal, Lisboa, Fundação Calouste Gulbenkian, vol. 1(T.1), 3–31

Mebratu, D. (1998). Sustainability and sustainable development: Historical and conceptual review. *Environmental Impact Assessment Review, 18*, 493–520.

Neave, G. (2002). The stakeholder perspective historically explored. In J. Enders & O. Fulton (Eds.), *Higher education in a globalisation world. International trends and mutual observations* (pp. 17–36). Dordrecht: Kluwer Academic Publishers.

Nielsen, M. (2012). *Reinventing discovery, the new era of networked science*. Princeton: Princeton University Press.

Nussbaum (2010). *Not for profit. Why democracy needs the humanities*. Princeton: Princeton University Press.

Norman, W. & MacDonald, C. (2004). Getting to the bottom of triple bottom line. *Business Ethics Quarterly, 14*(2), 243–262.

Olsen, J. (2005). *The institutional dynamics of the (European) university*. Oslo: Centre for European Studies, University of Oslo.

Pappas, E. (2012). A new systems approach to sustainability: University responsibility for teaching sustainability in contexts. *Journal of Sustainability Education, 3*. http://www.jsedimensions.org/wordpress/content/a-new-systems-approach-to-sustainability-university-responsibility-for-teaching-sustainability-in-contexts_2012_03/

Schratz, M., & Walker, R. (1995). *Research as social change: New possibilities for qualitative research*. London: Routledge.

Scoulos, M. (2010). What makes a university sustainable? *Sustainable Mediterranean Newsletter, 63–64*, 6–8.

Sheffler, D. (2010). Late medieval education: Continuity and change. *History Compass, 8*(9), 1067–1082.

Smith, D. (2001). Collaborative research: Policy and the management of knowledge creation in UK universities. *Higher Education Quarterly, 55*, 131–157.

Thorp, H. H., & Goldstein, B. (2010). *Engines of innovation: The entrepreneurial university in the twenty-first century*. Chapel Hill: Univ of North Carolina Press.

Tilbury, D. (2010). Sustainability in the DNA of university. *Sustainable Mediterranean Newsletter, 63–64*, 9–14.

Wals, A. E. J & Jickling, B. (2002). Sustainability in higher education: From doublethink and newspeak to critical thinking and meaningful learning. *International Journal of Sustainability in Higher Education*, *3*(3), 221–232.

Weber, L. E., & Duderstadt, J. J. (Eds.). (2012). *Global sustainability and the responsibilities of universities*. Paris: Economica Ltd.

Weber, L. (2012). Universities, hard and soft sciences: All key pillars of global sustainability. L. E. Weber & J. J. Duderstadt (Eds.), *Global sustainability and the responsibilities of universities. Paris*: Economica Ltd.

World Commission on Environment and Development. (1987). *Our common future*. Oxford: Oxford University Press.

The National Environmental Policy Act of 1969 (NEPA) (2013). Retrieved February 28, 2013 from http://energy.gov/nepa/downloads/national-environmental-policy-act-1969

IUCN/UNEP/WWF. (1980). *World conservation strategy. Living resource conservation for sustainable development*. Gland: IUCN/UNEP/WWF.

United Nations (1992). *The rio declaration on environment and development.* The United Nations Conference on Environment and Development (UNCED), Rio de Janeiro. Retrieved from http://www.un.org/documents/ga/conf151/aconf15126- 1annex1.htm.