

# **Sustainability: towards systematic approach for its conceptualisation in technology education**

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## **Abstract:**

The aim of this paper is to examine how the concept of sustainability can be presented within technology education programs. A systematic approach for interpreting sustainability in technology education is proposed. Because of the importance of the aesthetic in today's society, it is argued that this aspect of sustainability needs more attention. It is argued that governments and industry exploit consumers' manufactured desire for pure economic reasons. This can be opposed by exploiting contemporary demand for the aesthetics in pursuit of sustainability. A need for further studies that consider effective ways of teaching and assessing aesthetic component of sustainability as a separate aspect and as an interrelated part of the complex phenomena is identified.

## **Introduction**

When the concept of sustainability is discussed within technology education it is focused mainly on the sustainable design of products, with a major emphasis on the environmental impacts of these products (Elshof, 2003; Martin, 2003). These impacts can be assessed using such methodologies as Life Cycle Analysis (LCA) ([http://www.pre.nl/life\\_cycle\\_assessment/default.htm](http://www.pre.nl/life_cycle_assessment/default.htm)) and Design for Environment (DfE) (<http://www.pre.nl/ecodesign/default.htm>). The emphasis in these programs is placed on the ethical aspects of the decisions that students make during design processes, so sustainability is perceived from the producer's point of view. The major problem with such approaches is that such methodologies have not been adapted to the classroom environment. Furthermore, there is very limited discussion on the other important dimensions of sustainability such as the social and economic (eg. Martin, 2003), and as a result there is no consistent approach proposed for teaching these aspects. In some cases there is also a very restricted view adopted (for example the social aspect is interpreted very narrowly in terms of justice and equity only), in other cases, only a one-sided view is presented (for example, the economic aspect is viewed only in negative terms: implications of short-term economic thinking, the growing wealth gap, consumption and consumerism, unintended 'revenge' cost of technology, and 'perverse' economic subsidies (Elshof, 2003)).

Thus, currently, there is a twofold problem in the representation of sustainability in technology education discourse. On the one hand not all three aspects of sustainability (environmental, social and economic) have been conceptualised within technology education; on the other hand, two important issues such as aesthetic aspect of sustainability and consideration of sustainability from the consumer point of view are completely missing from discussion. As a result, guidance for technology education teachers concerning what to teach, how to teach and how to assess student learning is not coherent and comprehensive. Due to space constraints this paper's focus will be directed to issues that are currently missing from the discussion.

## **Sustainability**

The most common definition of sustainability refers to 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (Bruntland, 1987). However, because sustainability is considered as an ethical matter; there is no single model of a sustainable society (Robinson, 1996, cited in Elshof, 2003, p.45). There are several tensions in current interpretations of sustainable development and they are present at different levels: international, national and local. The most significant one is the tension between international and national interests at the *international level* in both interpretation and action

concerned with sustainable development. Understanding of sustainable development at the international level is related to two broad areas. The first one is focused on efforts to limit major disasters such as ‘greenhouse gases’ and the threat of global warming and rising ocean levels, the destruction of the world’s forests and expansion of the deserts, outbreaks of war, mass migration, etc. These are examples of economic and environmental tensions. The second one relates to the promotion of national interests. The tensions here is between justice and equity and economic prosperity.

The tensions present at the *national level* relate to the following aspects of sustainable development: economic, social, cultural and environmental. The tensions between economic and environmental components and between social and cultural components are largely unnoticed. The balance between them is different in different countries. More specifically, the balance could be described in terms of the relative emphasis in individual countries in terms on priorities for developments that maintain and improve the quality of life for both the present and future generations. Several examples can illustrate the analysis. Sustainable development in Russia, for example, is interpreted largely in terms of environmental issues, and therefore ‘education for sustainable development’ is simply a new twist to the notion of ‘environmental education’ (UNESCO, 2001). In the UK the notion of sustainability is much broader and includes issues that are related to culture, society and politics as well as the environment and economy.

At the local level, the concept of sustainable design within the design professions is approached in terms of sustainability being a key objective. Several principles have been developed by professional designers to ensure that the final product is sustainable. One example is the Design for the Environment Multi-media Implementation ( DEMI) principles of design for sustainability (DEMI, 2003). The DEMI approach includes consideration of:

- efficiency - doing more with less
- scale -the right size for the right place involving the right people
- systems - connections within and between society and nature
- appropriateness - choosing the right thing
- sufficiency - how much is enough? do I really need this?
- equity - fairness within and across all systems ... not just human

For professional designers the key aspect of ‘Sustainable product design’ (SPD) is the “addition and balancing of social and ethical issues, alongside environmental and economic issues, into the product design process – to achieve ‘the quadruple bottom-line’” (Charter and Chick, 1997, p.5). Many of these issues have been discussed since the 70s in relation to corporate social responsibility and gradually have been translating into an agenda for the design profession. However, the aesthetic aspect of sustainability is missing from this formula; it is very rarely mentioned in discussion on sustainable development. Manzini (1994) considers the aesthetic dimension as a social stimulator, giving direction to the choices of a great number of individuals. Because of that it can contribute towards a shift in attitudes towards product consumption Thus, this aspect of sustainability provides the opportunity to consider products from a consumer point of view. In technology education, a key way of addressing sustainability is via sustainable product design that should incorporate considerations of all the above tensions and principles.

### **Aesthetics**

In this section of the paper, the idea of aesthetics is discussed. This is then related to the idea of sustainability. Describing the nature of the current era, a number of authors argue that aesthetics is prevailing above the cognitive and moral dimensions within society (Habermas, 1981; Bauman, 1995; Lash, 2001). The appearance of formalised design at the particular time in the history of mankind reflected deep changes in the nature of society and the meaning of Being.

Historically, as argued by Habermas (1981) theoretical, practical, and aesthetic spheres of cultural modernity attained autonomy from one another from the end of the eighteenth century. Around the middle of the 19<sup>th</sup> century the autonomy of the aesthetic sphere became a deliberate project: *The talented artist could lend authentic expression to those experiences he [sic] had in encountering his [sic] own de-centered subjectivity, detached from the constraints of routinized cognition and everyday action* (Habermas, 1981, p.9). The extravagant art programs of the 20<sup>th</sup> century had attempted:

*to level art and life, fiction and praxis, appearance and reality to one plane; ... to remove the distinction between artifact and object of use, between conscious staging and spontaneous excitement; ...to declare everything to be art and everyone to be artist, to retract all criteria and to equate aesthetic judgement with the expression of subjective experiences.*

(Habermas, 1981, 10)

The gradual autonomization of the aesthetic dimension in the life of society leads to the domination of this area over the other spheres. That causes tensions among the cognitive, moral and aesthetic spheres that are reflected in different areas of human activities. Habermas's concern is shared by a number of thinkers (Bauman, 1995, Lash, 2001, Lyotard, 1979/1984) who consider that the cognitive and moral spheres of human life have been colonised by the aesthetic sphere. Bauman (1995), for example, argues that in the current era, features that belong to the aesthetic space tend to submerge and colonise the social space, and become the principal tools of social spacing. Bauman makes a clear distinction between a cognitively spaced world and an aesthetically spaced world. All images inside the aesthetically spaced world are structured by *the relevances of attractiveness, pleasure-potential, interest-arousal* (Bauman, 1995, p.150). In this world images are more real than reality: *where everything is a representation and thus the difference between representation and what is represented can no more be made* (Bauman, 1995, p.150). Advertising objects or commodities are frequently equated with ideas or values:

*...a brand of cigarettes with virility, beer with manhood and athletic prowess, a soft drink with being young and vigorous. Equal time and equal weight can be given and are given to the trivial and the profound. In this way, too, many of the increasing services and products of the consumer-oriented society fulfil artificially created rather than genuine need.*

(Shore, 1985, 38)

Another important feature of the aesthetically spaced world is the increasing role of form as compared to function, process as compared to content, as argued by Lyotard (1979/1984):

*Modern aesthetics is an aesthetic of the sublime, though a nostalgic one. It allows the unrepresentable to be put forward only as the missing contents; but the form, because of its recognisable consistency, continues to offer to the reader or viewer matter for solace and pleasure.*

(Lyotard, 1979/1984, 81)

The analysis of contemporary society presented above represents deep changes in the meaning of Being for the people within it. The increasing role of design in our lives is closely connected to the appearance of the aesthetically spaced world. The role of design in the current era is to create this aesthetically spaced world that has the following distinctive characteristics:

- Colonisation of cognitive and moral spheres of human life by the aesthetic realm;
- Increasing role of experiences in the life of the sensation-gatherer;
- Using designed objects as the means for obtaining existential meaning;

- Manipulating people through cultivation of their desires;
- Dominating the role of form as compared to function (Pavlova, 2003)

Thus, if the aesthetic plays such an important role in the life of modern society, it can be seen as a very significant factor in promoting sustainable products. It can become a 'social attractor', in a sense that it orients the choices of a multiplicity of individuals. Manzini (1994) argues that today 'the perspective of a sustainable society has not yet 'taken form' and the aesthetic of sustainability has yet to be born (p.42). Moreover, in a phase of the transition towards sustainable development there is a real need for an aesthetic of sustainability. Aesthetics represents the way in which values of a particular historical period 'take form'. Aesthetics is connected to ethics in a sense "that no true, profound aesthetic renewal can occur without being based on a value system" (Manzini, 1994).

### **Sustainable consumption**

"Many of the solutions to consumption problems lie in collective choices" (Robins, 1999, p.7)  
 "The switch from 'production to pleasure' has meant, for example, that the growth in mobility and household comfort since 1973 has raised energy use almost as much as improved design has bought efficiency gains" (Schipper, 1994, cited in Robins, 1999, p.8). Sustainable consumption has grown far beyond the 'green consumer' movement of the late 1980s and early 1990s. At that time the emphasis was on providing eco-products using eco-labelling as a marketing tool (Robins, 1999). After a decade of dialogue and dispute, sustainable consumption has now arrived as a global policy priority. The United Nations Development Programme has outlined a seven point agenda for action (UNDP, 1998) that are all related to ethical issues that develop a wider sense of corporate responsibility. UNESCO (1997) relates sustainable consumption to different consumption patterns (public transport, food produced locally, products with a long life span, etc.) and to responsible consumer choices and behaviour. However, the role of aesthetics in sustainable consumption has not been widely discussed in the literature.

Within the culture of consumption the creation of people's needs and wants is one of the important business areas to develop. Design is playing a key role in this area:

*Early on, business leaders realized that in order to make people "want" things they had never previously desired, they had to create "the dissatisfied consumer" ... The economist John Kenneth Galbraith ... [emphasized] that the new mission of business was to "create the wants it seeks to satisfy.*

(Rifkin, 1995, 19)

Current consumerism has no connection to sustainable design. Rather, it is focusing on economic and productivity goals. The culture of consumption (which provides the basis of modern economic models) is closely related to the cultivation of desire that is used as a way of manipulating people. This process of cultivation of the dissatisfied consumer can be found as the rationale for the process of designing new products and services. In the aesthetically spaced world the value of truth and justice is determined by judgments of taste and the: *terror of the beautiful are capable of resisting capture by the deceiving world of science and morality* (Habermas, 1982, 25).

Thus, the elevation of aesthetic reason as well as the cultivation of the particular desires associated with sustainable development has a huge potential in terms of sustainable consumerism that has not been considered within technology education.

## Technology education curriculum

Since Rio, there has been increasing recognition of the critical role of education in promoting sustainable consumption and production patterns in order to change attitudes and behaviour of people as individuals, including as producers and consumers, and as citizens carrying out their collective activities with the advertising industry... in the development of teacher education materials (UNESCO, 2001, p.3)

Thus technology education as a part of general education can play an important role in promoting sustainable production and consumption. Via product design students will be able to consider different aspects of sustainability and apply them in their design.

Literature analysed above suggests that there can be different ways of looking at sustainability. In *one dimension* cognitive (knowledge and understanding, eg. principles of design for sustainability), moral (attitudes towards designing products and consuming products and services) and aesthetical (current style, appearance of the product that will lead for more economic benefits as well as a sense of pleasure and satisfaction) aspects constitutes the concept of sustainability. In *the other dimension* categories from the 'triple bottom line' concept (a predecessor of 'the quadruple bottom-line') are included (economic, environmental, social). Although these categorisations are very schematic (for example, the cognitive aspect is a part of economic, environmental, social, moral and aesthetic aspects, etc.) it still can be a useful framework for technology education teachers, as it suggests the areas that can be a focus of a particular activity that relates to teaching about sustainability:

**Table 1. Systematic approach for sustainability in technology education classroom**

	Economic	Environmental	Social
Cognitive	LCA*	LCA**	
Moral	LCA*	LCA**	
Aesthetic			

Using this table, technology education teachers can think about different learning activities that can be focused on one or more aspects of sustainability and can also think about possible ways to assess student learning. For example, if the teacher uses a LCA of the particular product, the learning activity will be focused on cognitive and moral aspects that relate mainly to protection of the environment. However, economic issues can be also partly covered. It would be easy for teachers to assess the application of LCA by the students, as the results would be presented in a way required by a particular software or methodology. However, the question remains if we are talking about the aesthetic aspects of sustainability, how can they be addressed and assessed in the program? One of the requirements specified by UNESCO as the way for reorienting curriculum towards sustainable development is "the development of new ways to assess the processes and outcomes of learning" (UNESCO, 2001, p. 2)

Answers to the question of how the aesthetic aspect of sustainability might be addressed in technology programs, requires shifts of perception that are characteristic of systematic thinking of sustainability - from mainly ecological aspects to consideration of the whole, from aspects to relationships, from specified content to patterns. Patterns mean that the relationships between the aspects are non-linear and complex. Such a structure should be flexible and have the capacity to

adapt to changing conditions. Students should think about the strategies for conflict resolutions. Product design should include stability and change, order and freedom, tradition and innovation. There is a need to understand the interdependence of ethical and aesthetical components of sustainability in terms of their relationships, as well as the relationships with social and economic aspects of the product design. Aesthetics today, conceived in a broad terms:

Tends not to concentrate exclusively on the concept of beauty, aesthetics is the attempt to understand our experiences of and the concepts we use to talk about objects that we find perceptually interesting and attractive (Smith, Simpson, Ralph 1991, p.18)

We should provide students with the opportunity to experience colour, texture, shapes and images that can be associated with sustainable development. Although aesthetics relates to personal experiences, it is also related to the collective perception of what is interesting and appealing. Thus, one of the effective ways of assessing aesthetic appearance of economically effective and environmentally sustainable products is end-user evaluation.

The area of aesthetics for sustainability needs to be evaluated with the aim to develop particular teaching strategies that address the role of aesthetics in a systematic approach for teaching sustainability.

### **Conclusion**

“Education not only provides the scientific and technical skills required, it also provides the motivation, justification, and social support for pursuing and applying them. Education increases the capacities of people to transform their visions of society into operational realities” (UNESCO, 2001a, p.1)

In this paper it is argued that since the introduction of formalised design, the moral and cognitive aspects of society have been dominated by the aesthetic aspect. This has made consideration of ideas such as sustainability difficult to promote, given that the emphasis is made mainly on the ethical aspects. It is argued that if aesthetics has such a strong position in society it should be possible to use this position to assist the transition to a more sustainable society. One way in which this might be accomplished is by making sustainable products that are more aesthetically appealing. In this way people will willingly make appropriate choices. This approach can then be examined to see if it provides an answer to the question of how the aesthetic aspects of sustainability might be introduced and assessed in technology education. There is a real need for the further studies on that issue.

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