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Imaginations of creative design on the basis of sustainable design

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Abstract

Sustainability has emerged as the most current and striking concepts of the 2000's. Every field, every subject, and every thought generated its sustainable counter part, and sustainability has come to symbolize the future. In fact, when sustainability researchers study design, they usually consider the sustainability of design.
On the other hand, since it is of the essence of design, as in the essence of creativity, to conceive an original idea, to make new syntheses and to express them as an out of the ordinary image with seeable, tangible, olfactible, audible, and tasteable indicators, it is essential that the basic features of design should include knowledge about the future projections of design in the context of sustainability of design. Accordingly, it becomes a requisite to bring together all the information that is necessary to protect and sustain environments, habitats and nature that support life and evaluate it in shaping the future of product design and teach it as accumulated knowledge.

Keywords: sustainable design, creativity, practices in education.

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1. Introduction

Global warming and related melting of polar icecaps; decreases in fresh water sources; decreases in the number of trees due to senseless deforestation and forest fires in certain areas of the world where trees act as global lungs; inadequacy and unequal distribution of sources of clean energy for global population; mindless increase of global population due to inadequate birth control; inadequacy of livable habitats and similar negativities in working and living systems seem to continue for years.

The history of economy show that environmental problems do not come about independently of human life cycles, but that they develop in line with production and consumption, as we see that "...they grow in proportion with the increase in production and consumption..." (Çevre Üzerine [On environment], 1991). While the mass production methods, which commenced with the Industrial Revolution that started 150-200 years ago in England and followed by other countries, encouraged people's consumption, they, with an unfathomably rapid development, also polluted the world with chimney gas from factories and other toxic waste from chemical industries. But what is sustainability in the context of this widely known, habituated information?

2. The concept of sustainability

The increase in the use of raw materials and energy sources in the 1970s and resulting growth in environmental pollution brought about the notion of sustainability.

World Commission on Environment and Development (WCED) convened for the first time in 1984 and issued Brundtland Report in the spring of 1987. This report defined the term "sustainable development" for the first time and expressed its belief that humanity is able to implement sustainable development (www.mddelcc.gouv.qc.ca/developpement/voie_en.htm). In the United Nations Conference on Environment and Development (UNCED) that convened in Rio de Janeiro in 1992, the strategies that were expressed in Brundtland Report were further improved by representatives from 179 countries and focused on topics such as protection of natural sources, sustainability of all forest varieties, and climate changes. The conference held that the ever-increasing deterioration in the natural environment was due to unsustainable production and consumption models that are in practice in developed countries. The "White Paper" entitled "Growth, competitiveness, employment: new formations and methods to follow on the eve of 21st century" issued by the European Commission in 1994 formed a political infrastructure for sustainable production.

In the light of the facts above, it is essential that raw materials should be used as efficiently as possible. For instance, GE (General Electric) Plastics turns automobile buffers into internal parts for automobiles, plastic desks, building materials, and fuel for incinerators (machines that burn unwanted waste) (Inman 1999).

2.1. Sustainable Production System

Lowell Center for Sustainable Production (LCSP) at Lowell University in Massachusetts, which continue its studies according to its objective, establishes sustainable production principles and information and these make better recognition of the concept and contribute to its practice. The subject gets more research interest and consciousness in this matter increases. In studies by Birdoğan

(2002), O'Brien (1999), and Veleva et al. (2001) the characteristics of sustainable design are listed as below:

1. Environmental awareness should become prevalent in the culture of all organizations.
2. Sustainability should be attached importance in product and process planning of the enterprise.
3. Wastes and ecologic impurities should be kept to a minimum.
4. At planning stage, radical changes are required in the production processes for the recycling of materials constituting the product.
5. Products should be supported with economic, social, cultural, and physical data.
6. Goods and services should be produced with minimum input of sources.
7. Zero stocks and zero pollution could be attained by making continuous amelioration according to total quality management.

2.2. Pioneering and Contemporary Thoughts and Practices in Sustainable Design

From 1850's to 1900's, industrial design historically put on the foreground prototyping technology instead of productive human skills, which led to talented craftsmen lose their prestige. English author and researcher John Ruskin protested against this and defended masters who worked with hand labor and manufactured quality products. He was backed by William Morris and his works. Ruskin, who attached special importance to past and future, passionately defended craftsmen with notions that depict craftsmen's superiority over industrial production such as "self-sacrifice, truthfulness, power, beauty, life, memory, and obedience" (Sennett, 2009).

In fact, in the historical development of product design, the "Art and Craft" (1850-1914) movement that started as a protest against the spiritless growth of industry, and similar design movements in different European countries could be deemed as the beginning of "Ecodesign". In the aftermath, Bauhaus's slogan "Form Follow Function" may be deemed as the forerunner of sustainable design because it advised simple and economical designs. The most typical examples are Marcel Breuer's chairs made of metal pipes. According to Fuad-Luke (2002), polywood furniture by Alvar Aalto, and "Biomorphic Polywood Furniture" by Charles Eames and Eero Saarinen as displayed in "Organic Design for Home Furnishing" organized by New York Museum of Modern Art in 1942 were sustainable as they had entirely fulfilled users' physiological and psychological needs. These designs are both creative and they meet the requirement of highest level of efficiency, a sustainable design criterion.

Figure 1: Sandbag and textile shelter realized by Gernot Minke in Guatemala (www.gernotminke.de/)
Figure 2: Reifensofa von Des-in, Jochen Gros (www.designwissen.net/), [pioneering practices in sustainable design].

Oil crises in late 1960s and in the 1970s invoked in some avant-garde designers the idea to recycle industrial waste. For instance, architect Gernot Minke made his students at Gessammhochshule Kassel

design shelters made of sandbags and waste bottles. He developed a sun-dried brick machine that uses waste from forests. Again in the 1970s, product designer and theoretician Jochen Gros, lecturer at Hochschule für Bildende Künste Braunschweig, designed a sofa from waste automobile tires. Perhaps this design was a provocative one, indicating automobile tires would produce giant heaps of waste or a quest for alternative futuristic use. Nevertheless, it was an avant-garde idea for its time.

Papanek (2003) who is among the first to realize that the main support of life is ecology and environmental balance, listed the Environmental issues in Life Cycle Assessment):

- "The exhaustion of scarce or finite resources,
- The production of greenhouse gases,
- The production of chlorofluorocarbons leading to ozone depletion,
- The production of acid rain,
- Habitat destruction and species extinction,
- Materials or processes that harm plants, animals and humans,
- Air, soil and water pollution,
- Noise pollution with its deleterious effect on the human psyche,
- Visual pollution".

Birkeland (2007), drawing on Ecological Design by Sim van der Ryn and Stuart Cowan (1996- Island Press, Washington D.C.), claims that everybody is a participant/designer, and sums up in design principles that the best solutions could be attained with user-designers. These summed up principles include:

- "Solutions grow from place:"
- "Ecological accounting informs design"
- "Design with nature"
- "Everyone is a designer"
- "Make nature visible"

Walker (2007) emphasizes that improvisation in design means making do with the limited means, that applicable deductive solutions are scarce, and that a more sensitive design and creativity should be encouraged. Such an approach could only originate from regional and local design because there is complete harmony among material values, beliefs, and lifestyles of traditional cultures. The objects of these cultures generally own values with deep and symbolic meanings besides their functional value: What's more, while comparing traditional design with sustainable design, Walker (2007) puts on the foreground the design of functional objects which, in fact, already exists in the content of industrial design. In this context, Walker proposes "Design of Functional Objects" and "Creation of Material Culture" instead of "Industrial Design" and "Product Design", which are the weighted areas of conventional design.

2. Some Notions of Creativity Taught in Industrial Product Design Department (IPDD) at Istanbul Technical University (ITU), and Their Relation to Sustainability

In the light of these facts, students are advised to feed their thoughts with knowledge from different fields. When it comes to individuals' accumulation of knowledge and thought processes, Üstündağ (2011) mentions habits: "…habits are repetitions of cognitive activities. The mind determines what to choose and how to choose from among these habits… Mental habits include chosen ways which include believing, feeling, thinking, seeing, hearing, tasting, smelling, wanting, etc." In spite of the fact that individuals' habits process different information, information in certain matters is learned; and although it is different people who actually think, it is assumed that ideas will emerge related to processed information. Even if each individual establishes different relations of thought, according to Rawlinson (1995) "Creative thought involves establishing relations between objects and ideas that have not been established before. The important point here is that creative thought starts from already existing objects and ideas."

While Buzan (2015) criticizes available creativity tests on grounds that creativity is quantitative, he mentions three academically correct statements: The first of these is that the number of schemes that could be formed in a brain is 1 followed by 10,000,000 kilometers of zeroes; secondly, human brain could associate any object with another using simple techniques that strengthen the memory; and thirdly, when under pressure, this magnificent structure could, in a minute, contrive at least six ways of use for a simple paper clip! According to Buzan (2015), the qualitative aspect of creative thought includes a general sense related to giving order and shape, integrity and harmony to the ideas generated in large numbers.

A review of studies by Walker (2007), Üstündağ (2011), Rawlinson (1995), Buzan (1999), and Ramirez (2004) on sustainable-creative design brings about the following statements:

- As processes that take place in thought, design and creativity should be considered in the scope of sustainability with a concern on the future. Walker (2007) emphasizes that creativity, in particular, should be encouraged.
- The mind, which could generate millions of ideas, feeds on its own accumulation quantitatively. This accumulation should be qualitatively developed so as to protect the environment and life forms.
- Thanks to simple techniques that strengthen the memory, human brain is able to associate one piece of information with another. In using these techniques, notions that teach "protection of nature", "using local sources", and "making do with less" should be used.
- In order for the designers to come up with the accurate idea, it is essential that they have learnt the requirements of ecodesign and sustainable design. Analytic thought supports creative thought to prevent waste of time, effort, and material.

In the light of the information taught and adopted as above, students were assigned with many projects that involved concept generating and practice.

2.1. Concepts and Projects Realized at ITU-IPDD

Projects based on sustainable design could be divided into three groups:

First group:
In the scope of "Eco-holiday" project assigned to students as the third project in 2009, many useful concepts were generated in terms of sustainable design. Three remarkable projects are given below:

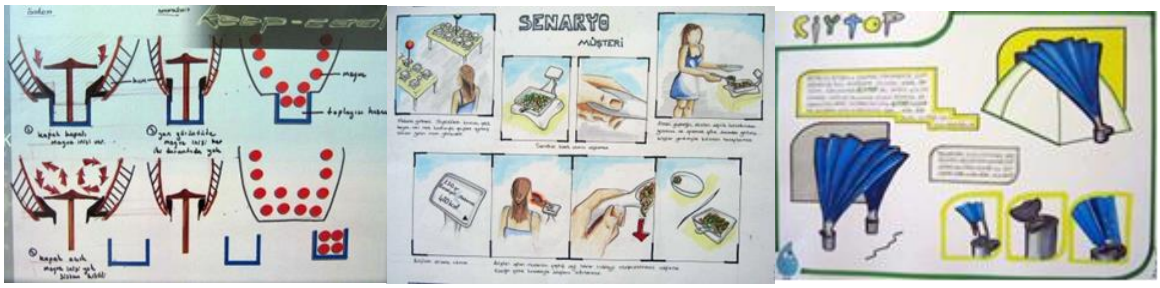

Figure 3: Mert Sezer designed an earthenware cooling system that cools fruit and vegetablewith a natural method in rural or camping areas.

Figure 4: Huriser Ezgi Ece contrived a system that kept food waste at a minimum in holiday resorts and restaurants. In this system holidaymakers could receive food according to calories they require during the day, which leads to a healthy diet and prevention of waste.

Figure 5: Pelin Kenez designed a tent system which collects dew and turns it into usable water for holidaymakers who spend their holiday camping in cold areas.

Second group:

They belong to the "Introduction to notions of creativity" and "Methods of seeking form" classes. In this context, students are given a topic and following their accumulation of knowledge, they practice to explore their creative identity. The topic is given in the exercises. When "ecodesign" was assigned as a contemporary topic:

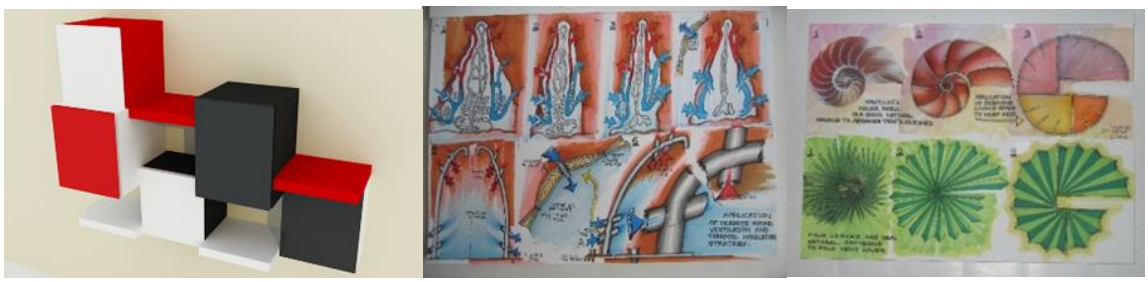

Figure 6: Sertaç Toros married his environment and graded urban structure with modularity, which is a significant rule of sustainability and designed a modular bookcase.

Figure 7: Hanife Yıldız transferred the anthill structure into a shelter's piping and ventilation system. An important system of nature was employed.

Figure 8: Hanife Yıldız and Secil Satir; a snail shell shape was the main premise of a shelter and a palm leaf formed the roof. Systems of nature are imitated in sustainable design.

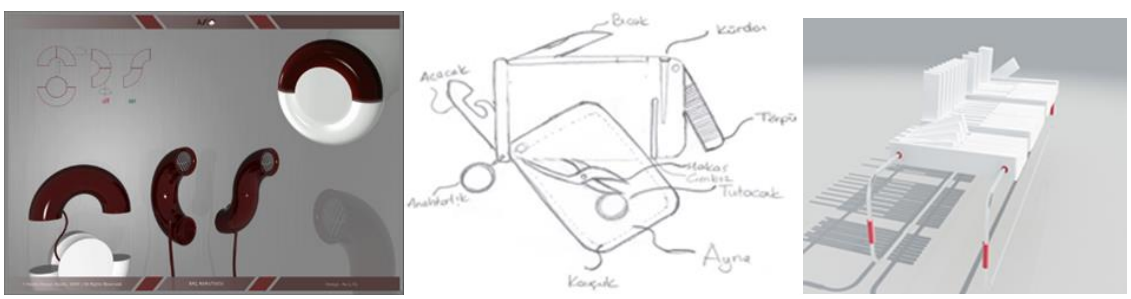

Figure 9: Burc Öç (first project as a master's student) used infrared rays in a hairdryer instead of metal wired heating element. This saved energy and also a security measure was contrived to prevent burning of hair.

Figure 10: Handan Duyar emphasized the rules of productive use and multi-sidedness. She developed multipurpose pocket-knife, originally a men's accessory, for women and added an object of daily use: a mirror.

Figure 11: Sabiha Yıldız conceived an easily mountable and demountable book exhibition unit using waste from furniture production. Wastage gained value, modularity was used, carrying made easier.

Concepts and projects realized in two different groups all support the notion of sustainable design and cover its different viewpoints and dimensions. Perhaps, even without mentioning "sustainable design", some of these designs could have been conceived. However, when made on purpose and students were made aware; at first their ideas did not come freely and like deduction. They had to think a lot. They had to remember the requirements of sustainability for many times, and almost carved it into their minds. Only then were they ready for creative thought.

3. Findings and Discussion

Depending on the foregoing information, sustainability of design involves perfect ergonomic efficiency; object's multi-purpose use, indispensability of universal designs as well as self-contained and compact designs. This very comprehensive and detailed subject may seem to be hindering the designer's creative identity. However, finding a creative idea requires a voluminous accumulation of knowledge and protection of the inherent contrasts contained in the information while recording it into memory. If thought is recorded with the contrastive information, the solution could be found even for the most complex of problems.

On the other hand, sustainable design involves designs that protect future lives and environment, avoid wasteful conduct in their projects or systems and the designs will continue to exist in proportion with their ecologic and protective content. Both viewpoints could be developed positively on the basis of ideas that are creative and emphatic with ecosystems.

3.1. Conclusion

As the doctrine of the experimental studies, a part of which is given above, sustainability should be taken as basis in design education and starting from freshmen, the requirements of the notion should be taught again and again. In all doctrines of design which identifies with creativity, the infrastructure of thought, which will form ideas and original thoughts such as interest, curiosity, perception, opposite poles of memory, accumulated knowledge etc., should be immersed in the knowledge of ecosystems and their protection. There is a nice saying in Turkish: "You reap what you sow".

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