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Designing city installations for socially and environmentally responsible behavior

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Abstract

As a result of global climate change, financial crisis, and the public perception of massive overconsumption, designers are increasingly motivated “to do good for society”. In this paper, city installations are considered as good opportunities to connect with public and raise their awareness to sustainability. This is while responsible design and sustainability rarely are the focal points of designing street furniture. The conventional goal of sustainable design initially was to design products that require the least energy to be produced and used and that could be recycled. Currently, the idea of sustainable design is growing to have some type of a higher calling, which may be social responsibility and a public design. This becomes more important in developing countries like Iran, which sustainable issues are still not a public concern.
This paper presents a design case study at Art university of Isfahan, Iran, which explores how designers and design educators can set their own holistic approach to sustainability in new product development, place social awareness, responsibility and behavior in perspective. The experiment consists of practices for designing city installations which are not neutral but a deliberate means to promote different levels of sustainability. The proposed design interventions through the conducted experiment are presented and analyzed with their level of success for implementing different levels of sustainable design from eco-design, to raise public awareness of sustainability, sensate or educate people, and cause sustainable behavior through one of the design strategies of coercive, decisive, persuasive, or seductive.

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1. Introduction

Street furniture are installed in different locations of a city, are daily used by a large public, and have the closest contact and most dynamic interaction with people and the environment. Therefore, they have a great responsibility to benefit the urban and society development. According to Rehan, "sustainability in street furniture is one of the most important strategies for sustainable urban design" [1]. Although comparatively small in scale, street furniture is an element that can play an essential role in developing the quality of urban spaces with added value of representing city identity [2]. Gehl [3] asserts that street furniture also can offer positive social influences on users (Wai, Siu, Sing, & Wong, 2015). Despite with all the possible benefits given, early observation has found that there is still a lack of understanding towards sustainable design of street furniture. As revealed by Tazilan et al. [4] over the past decades, sustainable criteria have been lacking or have not been applied to most of the current street furniture designs. This encourage us to focus on street furniture and city installations for adopting the concept of sustainability through the local cities.

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2. Design for sustainability in city installations

The traditional approach to environmental management has evolved from pollution control, the end-of-pipe approach, to preventive or cleaner production strategies. The fundamental eco-design strategies are:

- Design for Manufacturability
- Design for Energy Efficiency
- Design for Dematerialization
- Design for Modularity
- Design for Longevity
- Design for Disassembly
- Design for Packaging
- Design for Logistics
- Design for Multi-functionality
- Design for Serviceability
- Design for use of recycled materials
- Design for Recycling
- Design for healthy materials

Recently, it has become clear that such interventions must be more radical and go beyond the redesigning of existing products in order to catalyze a transition towards a sustainable society. Design for Sustainability (DfS) goes beyond these eco-design strategies. DfS integrates social, economic, environmental and institutional aspects and offers opportunities to get involved one's own identity beyond consuming standardized mass products[5]. DfS suggests that a typical win-win situation is not only the eco-efficiency of production, but also the eco-efficiency of consumption and sustainable consumption[5]. A product is efficient if the abovementioned eco-design strategies are applied in its design process, and if the use efficiency of this product can also be extremely low (most of the time the product is not used). Hence, detecting possibilities for improvement of socio-cultural rather than technical, like improving the use intensity can lead to better results in eco-design and is a step forward to design for sustainability. Choosing bicycle instead of car in the Netherland is one the best successful examples of sustainable consumption instead of focusing on making that product eco efficient. The need for sustainable behavior introduces a relatively new issue into the global debate on sustainable development. Sustainable behavior questions, not only products and services but also the way that needs and wants are defined and fulfilled [6].This means that designers need to be made aware of their new responsibilities and to become competent to make specific contributions in the transition towards a sustainable society.

Accordingly, this paper aims to explore the possibilities of promoting sustainable behaviors through the current societies by developing new ideas for city installations. The research discusses the sustainability issue of city installations design and seeks to implement street furniture which drives the community towards a deep sustainability. While the common examples of street furniture are functionally designed ignoring the important roles that they can play in the communal living, some emerging trends are applied in the literature in order to increase the benefits of street furniture for the society, the city and the environment; the examples are as follows:

- Multifunctional ICT devices like a bus station, which acts as a cloud device and includes screens that display real-time information about bus movements and touch-screens that provide access to interactive maps, local news, tourist information as well as a USB charging port for mobile devices and advertising.
- Responsive Street Furniture, which adapts to the needs of individuals. The adaptions include brighter street lighting, audio information, extra places to use and more time to cross the road.
- Sustainable Technology like Energy Solar LED Street Lamps or roads with renewable energy use.
- Modular Street Furniture
- Flexible or Pop-Up (Hydraulic Power Units) Furniture.[7]

This paper explores the possibilities in which street furniture can influence on society and raise public awareness of sustainability or even lead to some behavioral changes and promote sustainable behavior.

2.1. Design for raising public awareness of sustainability

Since street furniture has the closest contact and most dynamic interaction with people and the urban environment [8], it can be applied for giving messages to the public. There are scattered examples of city installations in the literature that aim to catch public attention to the environmental issues. The floating Plastic island installation[9]in Portugal is

one the examples which is made of 5000 recycled plastic bottles. It replicates, at a smaller scale, the so-called “eighth continent” made of plastic and garbage which is alarmingly taking over great areas of the Pacific. Rain Interactive installation[9]in London is another example which highlights the vital need of water and how abhorrent it is to privatize it and trade it for the profit of just a few. The labyrinth of plastic waste[9]in Poland, the Rising Moon installation[10] at Victoria Park in Hong Kong and the glowing labyrinth of plastic waste[9]which placed around the plaza’s statue of King Philip III in Madrid are other examples that demonstrate, in a poetic manner, the amount of plastic waste that is consumed daily, in addition to focusing attention on the big business of bottling water. The Tetris-shaped street furniture[11] located within a city park in Córdoba, Argentina, is another remarkable example that is designed to teach passerby about sustainability issues. These unique seats and tables showcase recyclable materials like plastic bottles, cans, and paper, and feature easy-to-understand eco-facts written on the surface of each piece. Park(ing) Day [12] is one the successful events to call attention to a lack of public green spaces and high car usage. It was started by Rebar, a San Francisco art and design studio and has become a global movement that takes place on the third Friday of each September. In a Park(ing) Day, metered parking places are changed to a public park and recreational space.
While, such types of design interventions can sensate the public to the sustainability, acquiring a deep influence and a certain changing behavior are not expected. However, they are considered as an initial step toward shaping a sustainable society.

2.2. Design for promoting sustainable behavior

A product is not a neutral intermediary, but a mediator that actively mediates the relation between a user and his or her environment. Tromp.et. al. [13] used the example of the microwave to show that design would influence behavior patterns even implicitly and unintentionally. Utilizing microwave make families join together for fewer dinners than they did before because the microwave oven has made it so easy to quickly heat up an individual meal. This example shows that products can mediate certain behavior even without determining it. Accordingly city installations are sometime deliberately designed to change behavior in order to prevent an undesired behavior or to encourage a desired behavior. Tromp.et. al. introduces four different types of influence on user experiences, namely, coercive, decisive, persuasive, and seductive[13].
Coercive refers to a definite prevention of an undesired behavior. Speed bump, speed limit camera are the examples of a coercive intervention to stop risky driving behavior by making a punishment for the undesired behavior. Making a perceivable barrier for undesired behavior (pain) or making unacceptable user behavior overt (shame) are also considered as the examples of coercive strategy for changing behavior. Decisive strategy is making the desired behavior a necessary activity to perform. Customize receptacles with different openings for trash, recyclable objects (e.g. bottles and papers) is an example of a decisive intervention.
While coercive and decisive are strong types of design interventions and lead to a definite change of behavior, their effects seems to be temporary and not deep on people. Meaning that people would follow their own behavioral patterns in case of removing the barriers and interventions. Fogg introduced the term of persuasive design that aims to alter attitudes or behaviors of users through persuasion and social influence, but not though coercion [14]. Poor little fish basin[15] designed by designer Yan Lu is an example of persuasive design, which is an emotional feedback device for saving water. Social Stairs, the Piano Staircase [16] is another persuasive design which encouraged people to take the stairs in favor of the elevator by triggering new motivations. Their study on the resulted behavioral changes revealed a high level of long-term social engagement. Seductive is another design intervention which can lead to a changed behavior unconsciously by triggering human tendencies for automatic behavioral responses. Woonerfs the “living streets” are the best examples of this design intervention. The concept of the woonerf was developed in the late 1960s in the city of Delft, Netherlands[17]. Residents of a neighborhood were upset with cut-through traffic speeding through their neighborhood, making it unsafe. They believe eye contact and human interaction are more effective means to achieve and maintain attractive and safe areas than signs and rules. Hence, they initiated woonref, in which the street is shared among pedestrians, bicyclists, and motor vehicles. But pedestrians have priority over cars. The street is designed without a clear division between pedestrian and auto space (i.e., no continuous curb), so motorists automatically slow down and travel with caution[17].

3. Conducting the experiment

3.1. Designing of city installations for sustainability

Although design has proven to be an influential factor in behavior, only for a few years have design researchers tried to gain adequate knowledge that would allow designers to deliberately and effectively affect behavior. The ability to

conceive and practice a type of design that acts as a catalyst for something beyond the immediate product and holds the responsibility in positively influencing entails a shift in the definition of professional profiles and education. According to Deniz 2016, designers generally assume that their area of responsibility is limited to function and appearance and rarely spread through the effects of their designs on people and environment no miner what their scale is [18]. Hence, design practices increasingly need to go beyond styling trends, consider environmental threats, recognize social and behavioral gaps and design to fill the gaps.

At Art university of Isfahan (AUI), an experiment was conducted in order to explore the promises and challenges of designing for deep sustainability within the context of a developing country like Iran. The experiment explored how designers can set their own holistic approach to sustainability in new product development, place social awareness, responsibility and behavior in perspective and provide an inspirational practices for student designers. Accordingly, the experiment was conducted at Industrial Design Group of AUI under the template of a course named 'Design 5', an exemplary for a regular street furniture and city installation design course. The course has been offered for many years in a broad spectrum of disciplines as aesthetics, ergonomics, manufacturability, market considerations, but not sustainability. Through this experiment, an increased emphasis on environmental issues and sustainability was practiced. The main objective of the experiment was to develop design interventions which affect and guide the society toward sustainability. Specifically students were asked to design a city installation or street furniture which is not neutral but improves the sustainability within their context. Accordingly the developed design interventions need to apply the following strategies:

- Eco-design (e.g. Minimizing the environmental impact, using recycled and recyclable materials, dematerialization, naturalization, modularity, extending product lifecycle)
- Raise public awareness of sustainability
- Educate and sensate public on sustainability
- Promote sustainable behavior with any of the design strategies for changing behavior, namely, coercive, decisive, persuasive, and seductive.

Figure 1 presents the spectrum from a not sustainable design to eco-design and a socially responsible design. The design students are encouraged to move toward the end of this spectrum for establishing a deeper level of sustainability in the society.

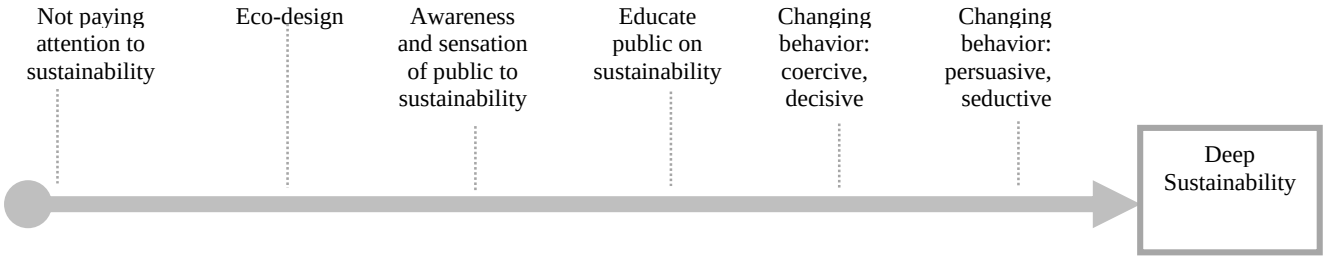


Fig. 1. Different levels of Design for Sustainability

3.2. The developed design interventions

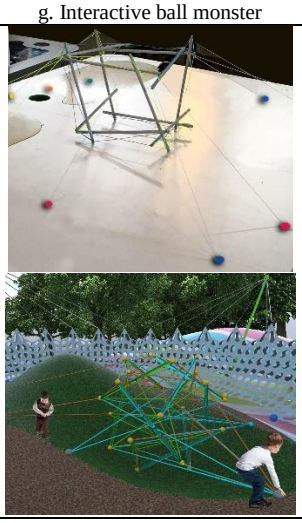
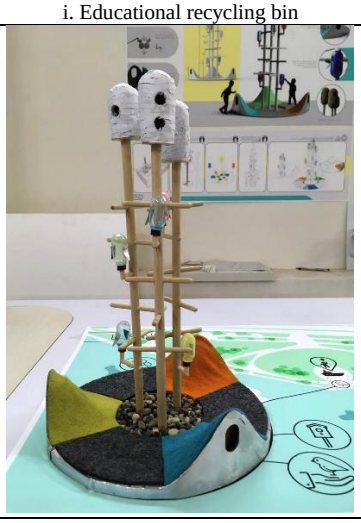
There was not one or more predefined subject in this experiment. Students needed to research on the existing environmental and social problem through the specified context of the city and defined their own design intervention to address that problem. Hence, recognition and treatment of pain using the power of design was the leading directions of the projects. In the following, the developed design interventions by the students are discussed.

Flexible bus stop[1]

Paying attention to the flexibility in designing of street furniture like bus stops is the starting point of this project. Accordingly the bus stops can be more durable and better adapt to different needs of people in different times, different functions and different locations. The project follows eco-friendly strategies in defining the materials, joints, modularity and etc. However it does not go deeper for promoting sustainability within the society (see Table 1, a).

[1] Designed by: AUI industrial design student,Zhara Mehralaian

Table1 The developed design interventions for sustainability during the experiment

a. Flexible bus stop	b. Parklet	c. Recycling Café
		
d. Eco-aware drinking fountain	e. Droplet urban drinking fountain	f. Natural Urban drinking fountain
		
g. Interactive ball monster	h. Ecological pedestrian rout	i. Educational recycling bin
		

Parklet[2]

Chaos in pedestrian routs, mixing the behavioral territories, lack of seating and common areas in the crowded parts of the city and lack of social interactions bring out the idea of Parklets (public spaces that replace street parking). Parklets are pavement-reuse initiative and enhance green spaces of the cities. With temporary and lightweight structures, Parklets can be constructed to improve the quality of environment through the cities. In some examples, the Parklets are set up in the parking areas giving a strong message to the public for less usage of personal cars (see Table 1, b).

Recycling Café[3]

With regard to the little efforts made for public awareness on environmental issues in developing countries like Iran, the project proposes the idea of a recycling café which is composed of recycled materials such as plastics. According to the Iranian Department of Environment[19], the usage of plastic in Iran is 3 times larger than the universal average usage. The project gives people the opportunity to gain information on their overuse habits, get experiences in recycling processes, make their own chairs out of recycled materials, and spend time in this café (see Table 1, c).

Eco-aware urban drinking fountain[4]

The project proposes an urban drinking fountain with three different types of eco-friendly materials (e.g. terracotta, mosaic, bamboo, straw mat and rope) in different contexts, like, historical, natural and childish settings. Wasted water from the fountain irrigates the plants underneath the fountain and the used symbols applied in the fountain sensate the public to the water consumption (e.g. penguins, ducks and other animals who live in water are used as water tab to aware kids on the importance of water for the life of animals). Such kinds of urban drinking fountains can be considered as an eco-friendly design which tries to aware and sensate the public to environmental issues (see Table 1, d).

Droplet urban drinking fountain[5]

With attention to the extreme lack of water in different cities of Iran, the project aims to aware the public to this fact. Hence, the designed urban drinking fountain with a different appearance and a droplet function tries to make people think about this serious environmental problem. The whole structure of the fountain simulates a raining state, but it gives water to the consumers in a dropping manner. Hence, it gives a message to the public on the overuse water consumption and can sensate consumers on this issue (see Table 1, e).

Natural Urban drinking fountain[6]

The project presents an urban drinking fountain which passing the water through a piece of natural stone with a small carving on it to value the water and to promote water conservation. The idea stems from the traditional Persian drinking fountains which proposed a kind of holy water to the consumers. The designed fountains are gathered around a handmade wood stick tree reminding a dry tree which can be Irrigated by the wasted water of the fountain. In comparison with the conventional urban drinking fountains composed of metal or other modern materials, this natural drinking fountain can better communicate with public. It catches the public attention to the purity and importance of water for not being wasted (see Table 1, f).

Interactive playful ball[7]

The project aims to address the growing concern over the increasing isolation and loss of interactions among the new generations who are drowned in digital lifestyles. While most of the playgrounds are limited to individual gaming or just gathering children around, the interactive playful ball promotes children to collaborate and interact with each other in order to reach a shared aim which is moving and changing the shape of the ball. Hence, this design intervention can be considered as seductive design which tries to promote a positive behavior in children unconsciously (see Table 1,g).

Ecological pedestrian rout[8]

Starting from the problem of chaos in the large cities of Iran caused by not following the routs which are designed for pedestrians, bicycles, motorcycles and cars, the project presents a parametric rout out of recycled materials. The rout is designed for the most crowded urban node of the city and tries to influences on people`s movement by guiding them to the correct directions. The designed structure also offers multiple activities such urban gardening, voluntary environmental and social activities. Accordingly, it can be categorized as a persuasive and seductive design intervention (see Table 1, h).

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[2] Original idea refers to Andres Power, 2008 [20], and the project is developed by AUI industrial design student, Javid Namdar

[3] Designed by: AUI industrial design student,Farzaneh Mangelian

[4] Designed by: AUI industrial design student,Melika Etemadi

[5] Designed by: AUI industrial design student,Zahra Soumi

[6] Designed by: AUI industrial design student,Farnoosh Beheshtinia

[7] Designed by: AUI industrial design student, Farshad Saffari

[8] Designed by: AUI industrial design student,Anahita Khodabakhshi, Sheyda Rahmani

Educational recycling bin[9]

The project presents a recycling bin combined with some lighted birds and their nests. By throwing wastes (e.g. paper, plastic, and trash) to the correct bin the related colored bird light up. Accordingly children are motivated to feed the birds with more wastes while learning how to separate the recycling material. Such a kind of design intervention can sensate and educate people on environmental issues and persuade them to do good things for the environment. Children can also interact with the real birds through this urban furniture. Children can feed the toy birds by bread, shake their wings to chop the bread and make the food for the real birds living in the nests on top of the recycling bin (see Table 1, i).

3.3. Evaluating the design interventions

Evaluating the design interventions shows that the experiment leads to expand design context in thinking and practicing something beneficial for the society and set new aspirations, change perceptions of students by making use of the diversity of ”value-added’ criteria’s to design process. However, the developed design interventions are not equally contributed with the social community to promote sustainability and enhance socially responsible behavior among the public. Figure 2 represents a categorization of the design interventions for establishing sustainability. Moving from center to the outside of the diagram indicates a more influential and longer-term design intervention.

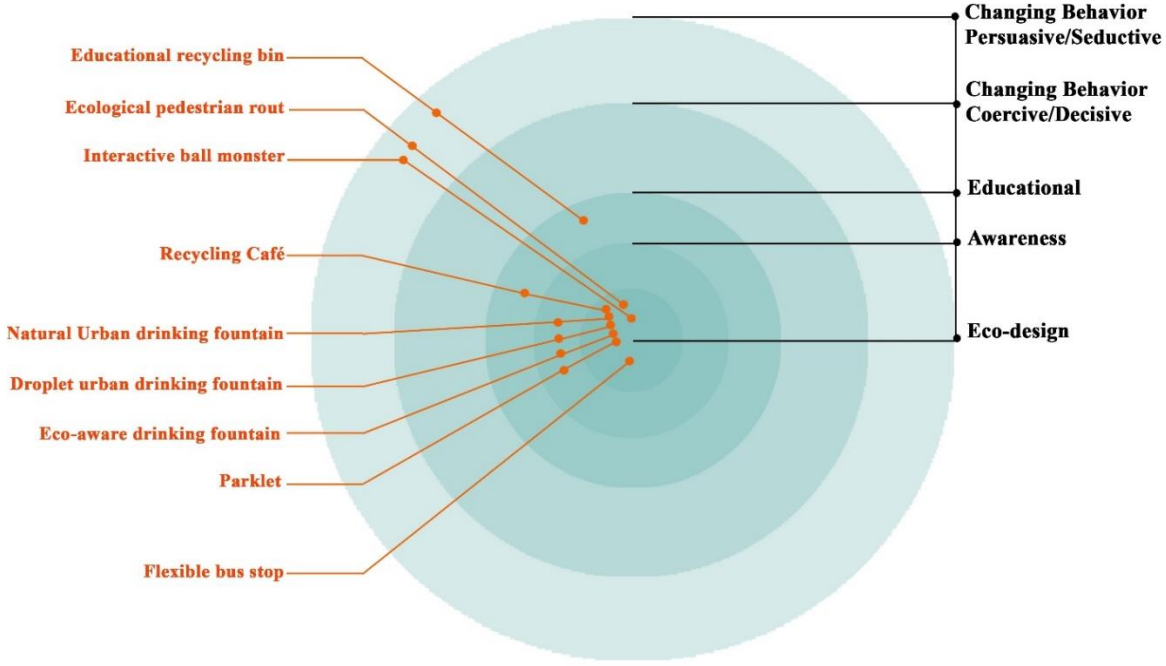

Fig. 2. Categorizing the design interventions for establishing sustainability

4. Conclusion

The paper proposed to deepen the design of city installations from functionally designed and eco-design to a more influential design for sustainability. While the developed design interventions of the conducted experiment tried to have the least environmental effects, their focal point was to have a multi-layered design; meaning that they aimed to address the existing needs of a city life in an expressive manner. For instance, an urban bin should be rubbish removal in a city and correctly contains wastes, but it can also play more role in the city by engaging children in an interesting game, teaching them how to separate trash for recycling and encouraging them to keep the streets and the environment clean. An urban drinking water should satisfy the thirst of people, but it also can create different drinking experiences and simultaneously give strong messages on the value of water and the importance of water conservation. By such a kind of design interventions, street furniture are no longer inactive objects in the cities but be alive and communicative to people. Outcomes of the study reveals that city installations can effectively act as a facilitator to sensate people on

[9] Designed by: AUI industrial design student,Zahra Ghiasi

serious social and environmental problems, make them thinking on these issues, even influence on people behavior by promoting socially responsible behavior and finally establish sustainable cities.

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