THE ROLE OF BEHAVIOR FRAMING FACTORS IN INDUSTRIAL DESIGN EDUCATION TO INSPIRE THE RESPONSIBLE ATTITUDE

Zoha KHANIKI[1] **and Maryam KHALILI**[2]
[1]Master of Industrial Design Student, University of Tehran
[2]Assistant Professor, University of Tehran

ABSTRACT
Moving towards the goal of tackling global challenges and building a sustainable future requires active participation and responsibility of all professions including industrial designers. Design education plays a key role in this regard. Several papers have discussed the needed adjustments of design curricula to encourage more students to participate in sustainability matters, but the real change is determined by a wide range of factors at the same time, seldom regarded in existing debates. This study pursues the issue from a new perspective which enables one to consider more aspects simultaneously. It proposes that designers' activism and responsibility (which are defined in the paper as two dimensions of ethical design) could be regarded as two target behaviours which are guided by behaviour framing factors. Accordingly, behaviour models are reviewed and afterwards, change criteria are investigated more precisely through focus groups and a follow-up questionnaire with contribution of BA and MA industrial design students of three prime universities of Iran, all located in the capital, Tehran. The paper suggests a range of influencing factors which are better to be acknowledged in planning industrial design education in order to inspire more responsible attitude.

Keywords: Design activism, responsibility, behaviour change, design education, industrial design.

1 INTRODUCTION

The Earth is not in a good state obviously. If the current social and environmental crisis remains unsolved, a sustainable future would be unattainable. Industrial designers are known to be determining in this regard, as design may build up desirable changes or create undesirable -even unintentional-effects [1]. Therefore two roles can be defined for designers when considering sustainable future: first, they may try to solve the global challenges creatively, which requires them to be "activists"; second, they may stop inflating consumerism and also reduce the negative impacts of the products they design, which needs more awareness and "responsibility". These are two dimensions of ethical design. Both can be developed by education. Education plays a key role in training future problem solvers. As so, reconsidering the learning system would transform a chaotic future to a sustainable one [2].

Several studies have attempted to assess design education or to propose educational frameworks to assure developing designers for good causes. Concentrating on sustainability, related courses have been reviewed and rearranged to inspire more responsible students. For instance, Ramirez challenged the usual product-oriented syllabus of a third year studio course and defined a new content with the focus on users' sustainable behaviours. Results revealed that students enjoy working on real sustainability issues and interacting with clients [2]. Lilley & Lofthouse developed a web-based resource to support the teaching of Design for Behavioural Change following the sustainable design research, as they had concluded that design professionals need an assist in problem definition and being inspired to solve problems [3]. Clune assessed industrial design education in order to develop sustainable literacy and discussed that students of industrial design are unable to design in a way that can contribute to a sustainable society, economy and ecology in real terms. His findings revealed that a targeted definition of unsustainability is required; students' understanding of unsustainability must be transformed into design for sustainability and future vocational opportunities should be provided

for them [4]. Other attempts include describing designers' perceptions of responsibilities [5] which help developing ethical considerations in design education by further research.

Although many studies have concentrated on these kinds of topics, a broader literature review reveals that very few have determined an extensive solution, while encouraging designers to engage in sustainability matters requires to provide a wide range of effective elements simultaneously.

As a result, this study pursues the issue from a new perspective. It proposes that designers' activism and responsibility could be regarded as behaviours and thus are able to be guided through behaviour framing factors. Similar viewpoint was accustomed by Stevenson [6] in studying responsible design within the commercial remit. Yet the current research remains novel as it focuses on behaviour change inside education, considers two dimensions of ethical design, one completely different from what is defined in Stevenson's debate and utilizes different approaches of study.

This paper regards education as a product and designers as its users. It therefore attempts to employ common developed behaviour change models in design, this time to affect designers themselves rather than users. This has resulted in a demonstration of wide range of factors which may lead to more design activism and responsibility, if acknowledged in design education.

2   INDUSTRIAL DESIGN EDUCATION IN IRAN

This study has been conducted in Iran and concentrates mostly on industrial design educational program of three universities located in Tehran. To discuss the findings of the study, some preceding information should be considered: In Iran, curricula of all majors are decided by the Ministry of Science, Research and Technology and are reviewed every five years. The bachelor's program is planned in 8 semesters. None of the bachelor's modules is dedicated to sustainable design nor any aligned trend with it, like green or social design. The only module which associates with sustainability indirectly is "Environment Design Project". The main objective of this module is to "Introduce psychological topics and their application considering industrial products in environment". The program is therefore outlined to cover discussions around the relations between products and environment, products and users' behaviours, as well as visual environment effects on industrial products. However, what is actually taught during this project currently is designing of urban/outdoor furniture regardless of psychological factors.

The master's program is planned in 4 semesters. At the second semester, "Sustainable Design" module is taught with the objectives of "Introducing sustainable design, designers' role in attaining sustainability and the influence of sustainable design on human life". Its program is decided to cover topics around picturing the current ecological crisis as well as discussing recycle- reuse- repair- remanufacture- biodegradable materials- renewable energies- littering- packaging- fast fashion. It will also review culture and societal structure in one hand and organizations and legislations in the other.

3   METHODOLOGY

The main objective of this study was to investigate behaviour framing factors which may lead to educating more design activists and responsible designers. To achieve this, the research activities were planned in three levels.

An examination of six common behaviour change models and toolkits preceded the field research to help in building a basis for the study. This led to a framework of potential determinants of inspiring responsible behaviour, which was in mind during further research.

To investigate the factors more precisely, three focus groups were conducted in University of Tehran classrooms with contribution of 30 students in total, of whom 18 were female and 12 were male (average age: 26.96 -SD: 4.00). It was considered that the participants have passed at least one process-based project, thus bachelor students who were studying lower semesters than 4th were excluded from all studies. The focus groups were audio recorded for post-reviewing and the conversations were transcribed both during and after the sessions. This level of research provided data on students' perception of: sustainability, their ability in influencing the crisis, current burdens they picture in the way of being more responsible and active, as well as the best educating approaches to inspire responsible attitudes.

At the next level, a questionnaire was designed based on the studied factors and burdens in focus groups to re-examine the results with larger number of responders. It consisted of 20 questions and was distributed among a random sample of students in "University of Tehran", "Tehran University of Art" and "Iran University of Science and Technology". Currently 300 students study industrial design

at these universities. The sample size was decided to be 50, therefore 65 paper questionnaires were handed out. 26 of final responders were female and 24 were male (average age: 24.04 -SD: 4.74). None of the responders of questionnaire had participated in focus group sessions.

Main findings of questionnaire and focus group were classified among some extracted determinants from theoretical studies. The results helped in interpreting the behaviour framing factors specifically in regard to educating more design activists and responsible designers.

4   BEHAVIOUR FRAMING FACTORS

Different models are developed in design studies to guide one through investigating, changing or framing behaviours of a target group. These models have utilized the insights of psychological and behavioural theories in a sense that is applicable to product-user relation. In addition, some toolkits are also generated, which guide designers in a more practical manner by providing a very detailed process path, supported with examples. This study adopts models and toolkits which are framed in design theories instead of the ones developed in behavioural sciences. The reason is that education is considered as a product here and guiding the users of this product requires practical solutions.

Six behaviour change models, from both cognitive-based and context-based ones, were selected as to enable the study to cover as many as possible behaviour factors. Four of these change models and tools found to be more applicable to the study of design education and inspiring responsible behaviours: Fogg Behaviour Model (of persuasive technologies) [7], Loughborough Model (of sustainable behaviours) [3], Product-Impact Tool (with concentration on technology) [8] and Design with Intent Toolkit (developed for a wide range of applications) [9]. Although each of these focuses on a different field and explains behaviour in its own word, similarities exist between their proposed factors or solutions and they may even overlap. Table 1 demonstrates the main factors discussed in each. Factors which aim at similar contents are categorized in same rows. Because Design with Intent consists of 101 detailed patterns only some sample titles are brought in.

Table1. Behaviour Framing Factors Based on Models and Toolkits

Model/ Tool	Fogg Behaviour Model	Loughborough Model	Product-Impact Tool	Design with Intent Toolkit
Factors	-Ability *Sources of: Time, Physical Effort, Money, Brain Cycles, Social Deviance, Routine*	- Eco-information - Eco-choice	- Background Conditions - Guidance	- Simplicity - Choice Editing - Defaults - Progress Bar
	-Motivation *Pleasure/Pain Hope/Fear Social Acceptance/Rejection*	- Eco-technical - Eco-spur - Eco-Feedback	- Subliminal Affect - Persuasion - Image	- Levels - Rewards - Assuaging Guilt - Peer Feedback - Summary Feedback
	-Trigger *Spark, Facilitator, Signal*	-Eco-information (repeated) -Eco-feedback (repeated)	- Persuasion (repeated)	- Kairos - Conditional Warnings
	(NONE)	-Eco-steer -Clever Design	- Coercion - Mediated Gestures	- Portions - Feature Deletion - Colour Associations

Though even utilizing one model may assist in studying behaviour factors, this paper regarded four to be inspired in considering different aspects of each factor. Some outlined framing factors reported in this study may be subsets of others, but they are divided to be analyzed separately. Also, some other determinants were studied through field research and added to the final selection of factors.

5   RESULTS

Collected behaviour framing factors from theories were investigated more precisely by the support of field research, in order to examine the role of each in developing ethical design students and to define

a range of behaviour determinants in the case of education. These determinants are argued in this section under representative topics which refer to mentioned groups of factors in Table 1. There are no priorities in providing these factors, as they should be considered simultaneously to actually make the target behaviour happen.

5.1 Awareness and Perception

The mentioned models have acknowledged "awareness" in their own words. At the top layer of awareness lies the knowledge about sustainability itself. Some participators didn't know the meaning of "sustainable design", many confused "sustainable" and "green design" totally and few knew that there are differences between these two, but even they were incapable of telling the differences. Seldom social and economic benefits were mentioned. Answering the question "Which design approaches are aligned with sustainable design objectives in your opinion?", only 22% of responders mentioned socially respective approaches beside "green design". When regarding ecological dimension of sustainable design, most of the students thought of material, use of resources during manufacture and recycling. Just 12% of responders acknowledged emotional longevity, behaviours through the use phase, real and bogus needs as considerations to make in an eco-friendly product.

This level of awareness affects designers' perception of target and the path to achieve the objectives of sustainable design, hence influences taking responsibilities in this regard. At deeper layers of awareness, lack of information about current negative impacts of design, available approaches to consider sustainability and existence of successful products in meeting social and ecological needs have resulted in not believing the influence of design. Responders mentioned that the designer role in achieving sustainability is highly related to the field of design. Fashion designers were considered to be less effective while service designers were regarded most effective. They acknowledged the role of concept designers in building cultural layers of a society, but put the blame on clients when it came to industrial production. These kinds of conclusions are products of incomplete awareness. What is neglected by designers is that moving toward a sustainable future does not necessarily need to change the idea from the basis. They are not aware of great impacts of some little justifications on environment, society or economy. Design for Behaviour Change (DfBC) makes it possible to think of little steps more. As a result, introducing DfBC and aligned approaches plays a key role in increasing awareness of students in the case of sustainability, therefore inspiring more responsible design.

According to questionnaire results, Design against Crime and DfBC were less known approaches among responders. Providing visual resources of these approaches should be considered, as the study also revealed that industrial design students are mostly in touch with visual references.

5.2 Ability and Simplicity

The simpler a target behaviour, the more able the user would be to act [7]. User's ability could be measured by behaviour's "simplicity". Elements of simplicity can guide the content of design education in a way to inspire more responsible behaviours. To name few, emphasizing on teaching DfBC or defining available standards for sustainable design are two helpful strategies in this regard. DfBC increases the chance of acting ethically as it makes responsible design much simpler. Standards lower the need of brain cycles by omitting some variants of decision making, therefore they make the process of ethical design simpler and responsible behaviour becomes more probable this way.

5.3 Motivation

Motivation is an obvious determinant of behaviour. Different elements motivate people to perform a behaviour. The more common answers to the question "In your opinion, which approaches would be effective for teaching ethics in design?" were all related to providing motivators. Those consisted of "Displaying practical and successful examples" -which develops "hope" align with covering other factors, "Picturing the crisis and real issues" -which is in accordance with element "fear", "Conducting Ethical Design Awards" -which provides both elements of "hope" and "social acceptance" and "Making it a viral trend" -which is again in align with "social acceptance". These are some considerations which would affect responsible behaviour of design students.

5.4 Trigger

Even having the ability and being motivated, one won't perform a behaviour without a right trigger [7]. According to the research, all three kinds of triggers are applicable in this study's interest:

"Picturing the crisis" which was repeatedly mentioned may work as a "spark": motivates students who already have the ability; toolkits, case studies and "evident examples" which participators insisted on are kinds of "Facilitators": remind of the simple steps of a sustainable design. But beside these triggers, "signals are required especially after training simpler approaches of considering sustainability to students and making them aware, thus motivated to take more responsibility. Signals are simply reminders, telling users to "do". These could be provided by a reminder question of a professor or a reminder alert of an assistant software. It should be acknowledged that triggers work only after raising ability and motivation, so timing is important in planning triggers into design education.

5.5 Experience of Process

Participants of focus groups referred to "dullness" of sustainable design process. Align with providing other determined factors, this dullness can be reduced by proven-to-be-effective playful game elements. These elements are defined in both theories of "Gamification" and "Ludic Design". Lockton et al. also regarded these in behaviour change [9]. Playfulness, dividing the behaviour to levels, makes it multiplayer and provides real-time feedback would change the experience of sustainable design.

5.6 Behaviour Change without Attitude Change

It is possible to inspire a behaviour without changing one's attitude [8]. The most common example is when constraints guide a user in a special way. Beside constraints, products may structure routine gestures without engaging user's thinking process. Although this is also a kind of constraint, the user's experience would be substantially different. As user can handle these kinds of technologies and products without thought, he begins to think of those as his own bodily members, hence no coerce is felt. Dorrestijn has named this product-behaviour relation "Mediated Gestures" [8]. To apply this concept in education for sustainability, routine and repetitive processes should be included during studying different design projects. Same is observable about considering user functional needs in almost every design process. According to field studies, students regard this element at the very beginning point of design, while not categorizing it as a constraint. Design for the user needs has become as routine and thoughtless as writing for design students.

5.7 Clever Design

While designers' behaviour could be guided with or without attitude change, sometimes the target is achievable even without any changes in behaviour. In the case of sustainability, system or product can automatically act environmentally or socially without raising user's awareness or motivation, regardless of constraints or routines. These kinds are titled as "clever" in Loughborough model [3].

To utilize the concept of clever design in education context, technology-based assistant programs are needed. These could make automatic justifications at some design levels.

According to the questionnaire, almost every students use computers in research and 3D modeling phases. Therefore automatic systems can be integrated in these levels. For instance, a search engine might add keywords to designer's search topic or a software plug-in would refine the final product from material, assembly parts, guiding graphics or similar perspectives.

5.8 Role of Intuition

Not always the choice is made through a reflective, slow and logical system. Sometimes user decides fast and emotionally [6]. Comparing it to responsible design, it should be acknowledged that final design decision is not always a product of logics. Designers are very dependent on inspirations. Results revealed that majority of students regarded their design process to be determined by both intuition and research. Even choosing a final idea is not always rational. In answering to the question "What often determines your final idea among other choices?", though 51% of responders chose "idea alignment with design brief", 28% checked "personal preference and liking". This makes achieving design responsibility more complicated, as designers' liking is a result of many variants.

One determining variant may be idea's extent of "innovation", because it is the most regarded element of good design according to responders. Innovation overcomes many other considerations. This is not surprising due to the defined essence of design major. As a result, when a novel idea comes to designer's mind, it's hard not to stick with it, even if it denies personal values or design brief limits.

Based on these findings, the paper proposes considerations in design education planning: One, training students to use their creativity and innovation more in problem definition phase rather than depend on

inspirations in ideation phase. Two, training students to pursue a rational design process after defining the problem from a novel perspective. This reduces the generation of unrelated inspirations.

But above all of the discussions, it should be acknowledged that an expert consultancy during or after design process would be helpful in mediating the ideas or making justifications to one's final design. Therefore defining new interdisciplinary majors or job positions would be effective.

5.9 Linguistic and Cultural Considerations

The study revealed some key elements to be regarded specifically in teaching sustainable design in Iran. First, the term "Sustainable design" is much less apprehensible than other trends for Iranian students, as the use of word "sustainability" itself is very rare in Persian language and it reminds of confusing meanings. That might be the reason when asking students about "sustainability", they can't even relate it to their prior knowledge while words like "green" enable people to imagine what they refer to. This requires an attempt to substitute the term with another apprehensible Persian translation.

Second, students are trained to look for knowledge elsewhere than official classrooms. There is a common belief that they must experience and learn by themselves. Responses revealed that students become aware of new approaches in design either by personal studies or attending events or workshops outside the formal framework of university. According to responses, professor assistance is weak currently. This may be due to the developing phase of Iran or cultural foundations. Anyway it leads to a conclusion that web-based or printed sources and events, workshops or seminars are more determining in increasing Iranian students' awareness and inspiring responsible behaviour among them.

6 CONCLUSION

Designers' activism and responsibility could be regarded as two target behaviours which are therefore outputs of certain behaviour framing factors. Considering these factors may lead to the growth of ethical designers, hence moving towards a more sustainable future. Design education provides a proper starting point for inspiring responsible behaviour. Thus, this study proposes to acknowledge behaviour change factors when planning educational programs. The paper discussed some of these applicable framing factors. This study is still in developing phase. The collected factors are now under more investigations and assessments to be used in designing a toolkit with the focus on inspiring designers' responsible behaviour in different contexts.

REFERENCES

[1] Niedderer, K.; MacKrill, J.; Clune, S.; Evans, M.; Lockton, D.; Ludden, G.; Morris, A.; Gutteridge, R.; Gardiner, E.; Cain, R. and Hekkert, P. Joining Forces: Investigating the Influence of Design for Behaviour Change on Sustainable Innovation. *NordDesign 2014*, Espoo, Finland/ Melbourne, Australia, August 27-29 2014, pp. 620-630.

[2] Ramirez, M. Challenging Industrial Design Students to Foster Sustainable Behaviours. *6th WSEAS International Conference on Education and Educational Technology*, Italy, November 21-23 2007, pp. 94-103.

[3] Lilley, D. and Lofthouse, V. Sustainable design education - considering design for behavioural change. *Engineering Education: Journal of the Higher Education Academy Engineering Subject Centre*, 4 (1), 2009, pp. 29 - 41.

[4] Clune, S. *Developing Sustainable Literacy in Industrial Design Education*. thesis for the degree of PhD, The School of Engineering University of Western Sydney, Australia, 2009.

[5] Birkett, S. *The Development of Responsibility in Product Designers*. Thesis for the degree of PhD, Department of Design, Environment and Materials of The Open University, UK, 2010.

[6] Stevenson, N. *A Better World by Design? An Investigation into Industrial Design Consultants Undertaking Responsible Design within Their Commercial Remit*. doctoral thesis for the award of Doctor of Philosophy, Design School of Loughborough University, UK, 2013.

[7] Fogg, B.J. A Behaviour Model for Persuasive Design. *Persuasive'09*, Claremont, California, USA, April 26-29 2009.

[8] Dorrestijn, S. The Design of Our Own Lives, Technical mediation and subjectivation after Foucault. Doctoral thesis for the award of PhD, University of Twente, Netherlands, 2012.

[9] Lockton, D.; Harrison, D. and Stanton, N. Design with Intent. Equifine Windsor, Berkshire, UK, 2010.