Behavioural Change and Innovation in Water Consumption

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Abstract: Design Student perception and ability to change the world in which they live often falls short of any significant advances. Design is often most effective in exploiting small incremental changes that highlight big issues, rather than singular engineered solutions.
This paper explores the methods and techniques employed by undergraduate Industrial Design students investigating sustainability and innovation in water consumption and sanitation. Students set out to understand and subsequently influence routine and conditioned behaviour. Industrial Designers, in particular 'T' shaped Industrial Designers, often make headway in understanding and problem solving. The 360 degree understanding of good Industrial design thinking operates in matters of interconnections including ethnological and social needs coupled with insight and application. Good design solutions try to challenge explorative economies, better understand resource in consumerism and fundamentals of the exchange of value needs.

Keywords: Behaviour, Empathy, Innovation, Design

1. Introduction

Our education system is fundamentally set up to supply the needs of industrialism. It delivers on the demands of developed nations and to facilitate a world of work focused on productivity and standardized processes. Our education focuses on academic ability and less on creativity. Yet creativity and innovation is sited as critical to solving complex issues of the future. The world faces a range of complex problems not least around population growth and use of finite resources. For generations superfluous product has consumed resource to pander to the needs of the richest 10% of the worlds' population. Designers and the education supporting the discipline could be accused of contributing to

the problem. World population will reach nearly 10 billion by 2050 despite falling fertility rates (UN data). (Laurence c Smith- 2014) Total population numbers is a concern but what is more significant is the choice of life style and an unceasing drive to improve living conditions. The real challenge reconciling our contradictory desires to bring modernity and prosperity to all while stabilizing the innumerable natural resource demands that they foreshadow for the planet. It is important that students at an advanced stage of their undergraduate training have the chance to tackle a number of significant design challenges. It is during these challenges they have the chance to exercise a number of techniques learnt and rehearsed helping to asses, assimilate and iterate ideas.

No longer a specified module of study, sustainability, should be inherent in all aspects of design education (Chapman 2005) identifies the limitation of a singular sustainable approach – 'failing to understand the actual drivers underpinning the human consumption and waste of goods, sustainable design resigns itself to a peripheral activity, rather than the central pioneer of positive social change that it potentially could be. (Walker S 2006) The discipline of design is also about exploring new ground and charting new territory, and if we are to do this effectively and sustainably, we must be fully aware of the new context in which we find ourselves and learn to respond to it in an appropriate manner. We must also consider the baggage, in the form of preconceptions that we bring along with us.

A student design competition can facilitate the challenging of these preconceptions. Responsible design activity need therefore focus on a number of issues particularly the balance of materialism and intrinsic values. Design students can find themselves lost in myriad of values and fundamental concerns as they embark on their design activity. Promoting an empathic design approach can add a more rounded and rewarding understanding of user-centered values. (Kouprie, merlijn 2009) identify a shared definition of empathic design – It is related to a *deep understanding* of the user's circumstances and experiences, which involves *relating to*, more than just *knowing about* the user. They go on to describe a Framework applied to the design process (1) Discovery, (Entering the user's world Achieve willingness) (2) Immersion, Wandering around in the user's world taking user's point of reference (3) Connection (Resonating with the user, achieve emotional resonance and find meaning and (4) Detachment. Leaving the user's world design with user perspective. Applying this framework in design project activity enables a broader understanding and interconnections of influence particularly in areas of water consumption. Students engage in the prestigious annual Royal Society of Arts competition, often sponsored by multi-nationals that aim to promote and innovate in design thinking.

The following case studies are good examples of how students apply an empathetic approach to achieve a better connection with their problem space. Projects last for 7 weeks punctuated by a number of interim sessions and sponsor workshop sessions.

2.1 Case study 1 - Sustainable Bathing and Irrigation

The "Save" bathing station is part of a greywater irrigation system that has been frugally designed to help the people of Sub Saharan Africa reap the benefits of the missed opportunity that is, greywater irrigation. This concept addresses a number of issues that were uncovered through primary research. This was developed in part as a result of focus group sessions, particularly in discussions with men and women originally from Zimbabwe and Ethiopia. Wastewater - greywater - produced as a result of bathing is often discarded, as it is believed to be harmful to plants. Greywater from bathing can actually be more beneficial than regular water for irrigation as it often contains nutrients such as phosphorus and nitrogen. These ingredients are also found in fertilizer. The concept addresses the needs of users. It addresses some fundamental matters around privacy when bathing, plant irrigation and subsistence living whilst facilitating the promotion of a soap brand. "Plant+" is a slightly adjusted formula containing boosted amounts of plant nourishing ingredients. This brand will be marketed especially for use with greywater irrigation and increase the positive brand association with Unilever through encouraging small behaviour change that brings benefits for the user and community.

Fig 1.   Sunlight, Plant+ Brand

2.2 Case study 2 – Sanitation for 'Dollar a Day' Communities

The 4SANITATION concept was in answer to a brief called 'Improve Hygiene, Improve Lives'; which in short was to improve the lives of very low LSM –living standard measure (dollar a day) communities through a frugal hygiene project. It became clear there have been many interventions by governments, NGO's over the years, this lead onto significant insights, reports and opportunities. So much so, through researching water purification an ingredient was uncovered which could potentially kill all bacteria, viruses, fungi, and odor

and leave a protective barrier behind once coming in contact with something. Furthermore the research led to the conclusion that people most in need, not just low LSM communities, require a hygiene product more than anything - so designing a product refugees become the obvious choice. A product that could work for them, could also work for low LSM communities. However, being 1000s of miles away it's incredibly hard to get real insights from people to start designing a product that might actually work and not become another forgotten student project. A Senior UN Sanitation Officer and Professor on Preventative Medicine were interviewed. Reams of problems were uncovered, the main one being sanitation infrastructure and soap. Every aspect of supply-chain, shipping, storing, implementing and using it had its problems, so the product had to answer not only the needs of the refugees, who may or may not be able to read or write and come from a widely different cultures, but also the entire life cycle of the product. Trying to answer all that was challenging. Following ideation, iteration, feedback from experts and trying to solve as many aspects as possible; user needs, supply chain, usability and so on - a solution was created. The 4SANITATION Hygiene Pack has 5 ultra condensed long life soap blocks infused with TIO2 (Nano-Titanium-Dioxde).

Fig 2.   Five block hygiene pack and packaging

This UV activated substance kills all bacteria, virus, fungi, and odor and leave a protective and effective barrier on skin, clothes and surfaces that continues to work for some time. There are 2 blocks for hand washing, 1 for washing clothes, one for personal cleaning and one for surfaces and utensils. The idea is to spread the substance around the camp so tents, medical facilities, cooking areas etc. can become slowly purified, while trying to reinforce cleaning habits by defusing the tasks with different coloured blocks. The instructions are printed as icons on a flannel that the pack comes wrapped in, in aid of trying to cross language barriers so no text is needed. There is also string to tie the soap to locations and a fly strip wrapped around the soap for added benefit. Being a perfect

cube and measuring roughly 100mm X 100mm X 100mm, you can fit 30,000+ into a shipping container.   Not only can it work for refugee camps or even low income LSM communities, the next step in the design process, which is to pounce on opportunities you didn't know existed at the beginning, opened up the chance to sell a singular block of soap in the developed world as a 'premium/extreme' outdoor soap to adventurers, hikers, athletes or even the military to raise awareness and raise funds for the project.
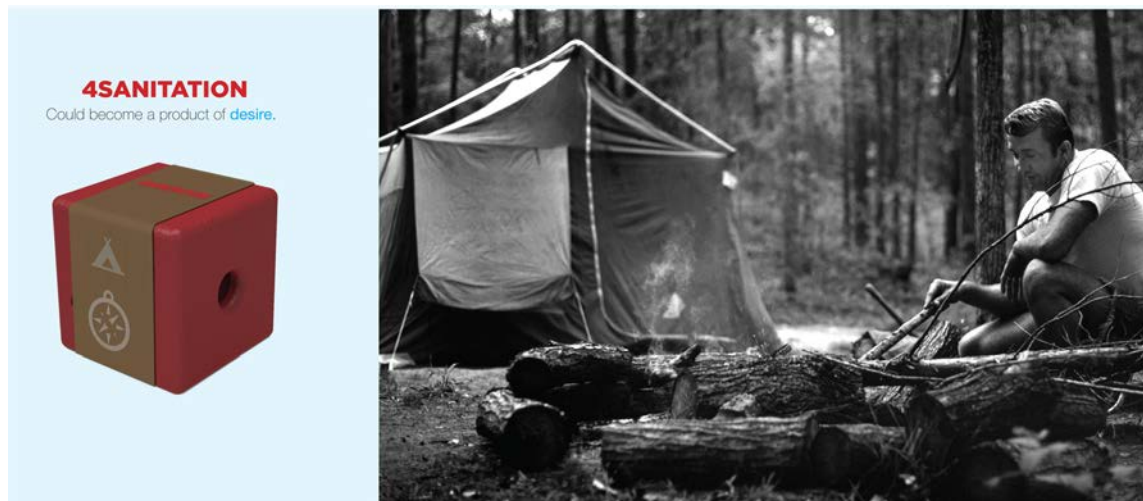

Fig 3.   First and Third world brand association

2.3 Case study 3 – The Rain Shine Pack

This study was in response to brief that set out to lighten the burden of water collection for women in the developing world. Sub-Saharan Africa alone spends 40 billions hours a year collecting water This solution focused on a more socially neutral application rather than it being specific to the women of Ghana. The Rain or Shine packs are designed to cover any pitched style roof to collect and store rainwater effectively. The packs are made up of 3 parts, a roof cover, a filter frame and an anti-bacterial liner. The roof cover is designed to collect and funnel fallen rainwater into the filter frame. The filter uses locally available woven materials that are already used to filter water such as spare cloth or women's tights. And finally, the liner is a flexible mesh structure that is treated to have anti-bacterial qualities.

This proposition has the possibility to be scaled to a larger community centered application. The cover collecting rainwater with combined thin film Photovoltaic properties enable a rudimentary lighting application. It is envisaged that this system would be able to create enough energy to power small electronic, communication equipment and OLED lighting. Being able to continue school and classes after dark opens up a number of new opportunities particularly important in agricultural communities. The

net result offers some impact on water collection coupled with a lighting power source thereby impacting on communities struggling to break a poverty cycle.

Fig 4.   Rain Shine Pack – domestic setting.

3. Observations and results

Some obvious shortcomings in aspects of 'discovery' and 'immersion' due to lack of first hand access to communities and users. These and other design project results may never come to fruition, however the process and methodology learnt are what hold the key to future career impact.

The aims of this particular module are:

- To improve students research skills,
- Develop students problem solving abilities,
- To understand the relationship between theoretical and practical considerations
- To experiment with communication strategies for complex design scenarios.

The choice of student design competition matters. The RSA strive to 'Challenge emerging designers to tackle pressing social, environmental and economic issues through design thinking.' This coupled with significant sponsors - in this case Unilever and prize money or sponsorship contribute to high profile and impact. (*RSA Design awards 2015)* Design

agendas around sustainability have shifted considerably, from greenwash, to designing just-less-bad products, to a much deeper engagement with sustainability. Of course the very nature of design practice – if it means the production of items for manufacture – is somewhat at odds with the sustainability agenda. This presents something of a dilemma for designers.

Industrial Design has matured as a sector. Planning undergraduate programmes of study need not be exclusively focused on environmental issues however this is quite often where complex design scenarios are found. What is becoming apparent within design education is the importance of honing and crafting particular problem solving skill sets to respond to these problems. Thereby challenging significant economic and social issues of the future across first and third world communities. Most designers up until now have little or no impact on the poorest people living a subsistent life (Polak 2007) 'there is only one truly sustainable engine for driving the process of designing cheap. Because that's where the money *is*.' A good example of how this design thinking can have significant impact can be found with 'Designers Without Borders' A not for profit organisation that apply modern design practices to humanitarian and developing communities.

4. Conclusion

Part of learning within complex design scenarios gives student's exposure to and fostering interconnections between discipline areas. The notion of 'what is good design' can be redefined beyond a beautiful artifact to a project with depth and breadth in user centered understanding. It becomes apparent that design professionals need integrated data from a range of sources to add credibly and substance to design outcomes.

Part of the challenge in education is to facilitate these interconnections between ethnological and social needs coupled with insight and application. Good design solutions try to challenge explorative economies, better understand resource in consumerism and fundamentals of the 'exchange of value needs'. (Welch, Kennedy 2008) At its core, design involves both analysis and synthesis, and is frequently solution-focused, culminating in the creation of design outcomes as prototypes, models or proposals. It is equally concerned with all aspects of material culture across a wide range of interrelated sub-disciplines. There is no single definition or methodological approach to the discipline, and there are no limitations in terms of interdisciplinary relationships.

The Cox of creativity in business identifies the need for good relationships. 'Turning creative ideas into new ways of thinking and into successful products and services requires a fusion of different skills. This is often impeded by the inability of business people and specialists to speak the same language, a failure to understand how a

combination of engineering, technology, creative and business skills can contribute to a business, and a misunderstanding about what 'creativity' is and how to manage it. (Cox review, 2005) There is no doubt that designers within multidisciplinary teams will be a forefront in changing markets and perceptions of the consumer. Arming students of the future with a range of good research skills is an imperative that must be undertaken by design educators.

Acknowledgements

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