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Promoting Sustainability through Industrial Design Studio Projects

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ABSTRACT

Inculcating social and ecological sustainability amongst industrial designers is a bit of a challenge. In their early years of design education students are encouraged to explore novel forms to replace or refresh those of years past, to create more fancy objects which would make contemporary living more convenient and pleasurable, and so on. In the current climate of global warming, high levels of pollution, and other ecological problems brought about by unbridled consumption and throwaway cultures, it is appropriate to question why we continue to educate students into fashioning more material objects or battery-powered gizmos with little regard for their environmental or societal impacts.

This paper presents examples of projects in a third-year Industrial Design studio course which expose students to a deeper understanding of sustainable design principles, by considering products and systems that promote community cohesiveness, enable user participation, help overcome barriers to sustainable behaviors, reduce lifecycle impacts, and so on. These studio activities foster, among others, a respect for ethical practice and social responsibility, a graduate attribute that most Australian universities aim to desirably develop through students' learning encounters.

The experiences gained from these sorts of projects show that students appreciate the challenging nature of briefs with aspects of sustainability, and their reflections point toward a growing desire to be more responsible future practitioners in the industrial design community.

INTRODUCTION

Ecological sustainability is one of the most talked about topics in the world news these days. There is now overwhelming scientific evidence that climate change and global warming have begun to negatively transform life on Earth. A wake up call was raised last year by a review on the Economics of Climate Change, which concluded that "there is still time to avoid the worst impacts of climate change, if we take strong action now" (Stern, 2007). Similarly, the Intergovernmental Panel on Climate Change, which scientifically assesses the risk and potential impacts of human-induced climate change, reported that the warming of the climate system is unequivocal, and that most of the warming is very likely caused by human emissions of greenhouse gases (IPCC, 2007). Thus if left unaddressed climate change can potentially lead us into a global catastrophe.

The United Nations emphasizes that education is an indispensable element for helping solve our current environmental crisis and achieving sustainable development (UN, 2002). Transformative learning can potentially spell the difference between a sustainable and a chaotic future (Sterling, 2001), and yet we seem to "continue to educate the young for the most part as if there were no planetary emergency" (Orr, 2004).

Since 2005 we have entered the United Nations Decade of Education for Sustainable Development, which challenges educators into rethinking and reforming education to become a vehicle of knowledge, thought patterns and values for building a sustainable world (UN, 2002). In the Talloires Declaration, 342 university leaders from 49 countries committed to "ensure that all university graduates have the awareness and understanding to be ecologically responsible citizens" (www.ulsf.org).

SUSTAINABILITY IN THE UNIVERSITY

Acknowledging that graduate attributes prepare students to become "agents of social good in an unknown future" (Bowden et al, 2000), Australian universities often aim to provide in their students' learning experiences some concern for inculcating environmental ethics, acknowledgment of social justice and equity, respect for the interdependence of global life, aspirations for global citizenship, and appreciation of the importance of sustainable development. As an example, the University of New South Wales (UNSW) pledges to provide an environment that fosters in students "a respect for ethical practice and social responsibility" (UNSW, 2003).

Strategic plans in a university can reflect its commitment to seek the optimum sustainability-related graduate outcomes. In 2005, UNSW drew its Strategic Plan, its Environmental Management Plan, and its Learning and Teaching Plan, all of which affirm a university-wide concern for sustainability aspects. In laying out its vision and priorities, UNSW avowed its belief "that the principles of environmental sustainability should underpin and genuinely apply to all activities in which we are involved" (UNSW, 2005c). Complementing this recognition of its sustainability obligations is the university's undertaking to "develop and promote a culture of environmental leadership, responsibility and continual improvement across the UNSW community" (UNSW, 2005a), manifested by such performance indicators as

reduction of ecological footprint and dollar savings from environmental initiatives. Finally, it recognizes that "sustainability, equity, and diversity are key elements in the learning and teaching planning process" (UNSW, 2005b).

SUSTAINABILITY IN DESIGN EDUCATION

The profession of industrial design (ID) is greatly implicated in the current environmental crisis. Thirty six years ago, design educator Victor Papanek exposed the latency of industrial designers to contribute to ecological damage. Censuring ID as being one of the "most harmful" of professions (Papanek, 1971), he challenged ID practitioners to redirect their activities from those which foster unwarranted resource consumption and premature product obsolescence to those that advocate social ethics and environmental responsibility. A quarter century later Papanek continues to attack the involvement of designers in creating superfluous and wasteful consumer paraphernalia and their enslavement to the whims of advertisers and marketers, resulting in a design profession that "conforms, performs, deforms and misinforms" rather than one that "informs, reforms and gives form" (Papanek, 1995).

Caution should be taken, however, in viewing designers unconditionally as a root of our current "unsustainability" problems; rather they should be regarded as a very rich source of creative solutions (Yang & Giard, 2001). Designers have an enormous potential to propose solutions that would mitigate the global ecological crisis, and to use the power of design to inspire people to act for the benefit of our natural environment and for improving the quality of human lives (IDSA, 2001).

In 2001 industrial designers from around the world declared that "industrial design will no longer regard the environment as a separate entity" and that "we, as global designers shall pursue the path of sustainable development by coordinating the different aspects influencing its attainment, such as politics, economy, culture, technology and environment" (ICSID, 2001). The model code of professional conduct of the International Council of Societies of Industrial Design also recognizes that a designer should "accept professional responsibility to act in the best interest of the ecology and of the natural environment" (IDA, 1983).

The Industrial Designers Society of America (IDSA), possibly the world's largest association of ID professionals with 3,300 members, supported the development of an introductory curriculum on ecological design, whose modules were designed to be easy to incorporate into existing product design classes in universities in the United States (White, Belletire, & St Pierre, 2004). A similar curriculum resource kit was produced in Australia for ID teachers to improve understanding of design for environment principles and strategies (CfD, 2005).

SUSTAINABLE DESIGN IN STUDIO PROJECTS

Sustainable design is gradually being covered in the ID curricula in universities around the world. Among American ID educators, 12% reported ecodesign to be integrated in some fashion in their curricula (IDSA, 2001), while in Australia an average of 12 out of every 100 credit points earned for an ID degree were found to have environmental sustainability content (Ramirez, 2006).

At the University of New South Wales, the learning of sustainable product design is dealt with in a mainstream third year course, IDES3221 Industrial Design Studio 3A. Historically this course has had a focus on technical resolution, documentation to a professional standard, and working on projects with "real-world" constraints, but in 2003 the course has had an added emphasis on sustainable innovations.

Seven studio briefs carried out in the last four years of the course touched on both ecological and social-cultural aspects of design for sustainability. The projects are detailed below.

ECOLOGICAL SUSTAINABILITY

A. Immaterialism, 2003-2005

This brief focused on significantly reducing the intensity of material and energy inputs throughout a product's lifecycle.

Students were initially given lectures on sustainable product innovations and on the lifecycle design strategies wheel originated by Delft University of Technology (Brezet & van Hemel, 1997). Groups looked at various human activities and then assessed the positive and negative impacts, which they documented using mind maps and a MET (materials-energy-toxics) matrix. A day was devoted to a hands-on exercise on product disassembly and on LCA (life cycle analysis), in order to gain an understanding of the material and energy contributions to the total ecological impact of a product.

The Immaterialism project, which ran for three years, produced many highly innovative proposals, with creative scenarios and technological forecasting used to demonstrate the apparent sustainability benefits. They encompassed a wide range of sustainability approaches and addressed resource reduction in various stages of the lifecycle of their reference products. Some of the creative solutions from students:

- piezoelectric shoes that convert kinetic energy from walking into electrical power, by Zhi Pei Siew (Fig 1)
- newsstand that allows consumers to buy only the newspaper sections they will read, by Fiona Chapman
- book scanning system in libraries as an alternative to photocopying, by Scott Brackenreg

Fig. 1. Immaterialism 2005 project by Zhi Pei Siew.

B. *Young Designer of the Year Awards, 2005*

The Sydney Morning Herald Young Designer of the Year Awards have been running alongside Sydney Design Week since 1995, it was only since 2004 when the briefs started to engender a sustainability focus. In 2005 the theme was "New Decoration", aimed at reworking or reinterpreting commonplace products into objects of beauty and practicality for the home.

Isobel Scanlon won the award with her "Watering Bottle" (Fig. 2), which cleverly transformed a PET water bottle into a spouted watering jug, by cutting tabs and slots that click together without glues.

Fig. 2. SMH-YDY 2005 project by Isobel Scanlon.

C. *Enabling Sustainable Living, 2006*

An offshoot of Immaterialism, this project was inspired by the "enabling sustainable solutions" approach proposed by Politecnico di Milano industrial design professor Ezio Manzini (2006). An integrated system of products, services and infrastructures is used to empower individuals and communities to sustainably solve problems using their own skills and abilities. This system tends to have a low material and energy intensity in production and consumption, and restores and regenerates people's contexts of life. The project acknowledges that the transition towards a sustainable society requires a massive social learning process or radical lifestyle changes.

Student pairs identified and analyzed aspects of their day-to-day lifestyles which intensively consume materials and energy. Informed by this analysis, students proposed a product or service system that would help people change their current unsustainable attitudes into ones which are more positive. An added criterion in the project brief is that the design should not do the sustainable behavior automatically for the users, but should empower people to do things themselves, which Manzini calls as "super-kits" or "sets of tools for new capabilities".

Many exciting student proposals resulted from this project, enabling consumers to learn to live better while leaving a lighter ecological footprint:

- do-it-yourself "drip kit" for fixing leaking faucets and showerheads and clearing sink blockages, with an illustrated instruction manual, by Ainslie Asher and Shane Calnan (Fig. 3)
- family shower timer that encourages family members to compete for the shortest shower, by Mitchell Brown and Renee Mathers

Fig. 3. Enabling Sustainable Solutions project by Ainslie Asher and Shane Calnan

SOCIAL SUSTAINABILITY

D. *Design vs. Crime, 2004*

Inspired by the British initiative Design Against Crime (www.designagainstcrime.org), this UNSW project offered student designers an opportunity to help pre-empt criminal behavior using industrial design as an anti-crime tool.

Students were tasked to come up with creative yet practical design solutions in five crime areas: assault, robbery, unlawful entry with intent, vehicle theft, and vandalism. During the first week, experts were invited to the studio to provide the students with information and inspiration. These included Chief Inspector Phil McCamley, the Safer by Design group manager of the New South Wales Police; and Ms Jackie Fitzgerald, statistical services manager of the New South Wales Bureau of Crime Statistics and Research. Students then interviewed victims to find out how crimes occur; gathered news clippings of relevant crime cases; and collected brochures on current or emergent crime-prevention solutions.

Ingenuous ideas which came out of the project include:

- light-up park bench with seat boundaries to prevent vagrancy, by Morgan Green (Fig. 4)
- textured sheet to discourage illegal street posting, by Phoebe Hill
- reconfiguring ATMs so customers face the public while withdrawing cash, by Sheng Yang Tan
- photochromic tag on pub patrons to detect how many times they went to the bar for a drink, by Scott Norrie
- protective patches for females in the defense force to identify and deter gender harassment, by Greta Sharpe

Fig. 4. Design vs. Crime project by Morgan Green.

E. Designed for Disasters, 2005

The class was engaged to throw in creative solutions for improving the human living situation in areas stricken by either natural or human-caused disasters. Because this project was introduced within two months of the deadly Indian Ocean tsunami of 2004, students' minds were still fresh with images of the ecological devastation and of the shattered lives of the families of the 230,000 victims. To help students connect with the physical and psychological consequences of calamities, presentations were given by representatives of Oxfam Community Aid Abroad.

Students worked in small research groups to identify an actual site of a large-scale natural disaster and to gather survivors' personal accounts and scientific analysis of the destruction. They also interviewed disaster combat agents to understand efforts in responding, rebuilding, and restoring normalcy to people's lives.

Students then designed solutions for one of the emergency management phases: prevention or mitigation; preparedness; response and rescue; and recovery, relief, or reconstruction. Many exciting proposals came out of this project, including:

- kits for assembling net structures where helicopters could aerially drop disaster relief supplies in remote areas, by Beng Seng Liew (Fig. 5)
- tripods for holding firefighters' hoses, allowing them to perform other tasks such as entering a burning house, by Wei Sheng Du
- waterproof "vault" bag for keeping valuables safe and dry during an emergency, by Zhi Pei Siew
- "wheel n tow" barrow for uncovering injured or trapped people, moving rubble, and transporting goods and valuables to safer grounds, by Martin Hala

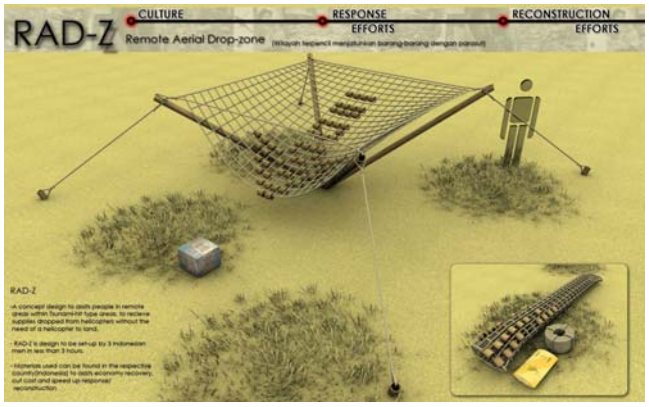

Fig. 5. Designed for Disasters project by Beng Seng Liew.

F. A Sense of Place, 2006

UNSW collaborated with Street Furniture Australia to offer a student prize for creating an innovative street furniture element that helps give a public space its "sense of place". Students initially received lectures on trends in furnishing the urban environment, and on the emotional and universal design aspects of public space objects. In small research groups they selected an existing public space which has inherent challenges in its transformation into a truly public place. The groups walked about, looked at, listened to, and inquired with the users of the public space to discover their needs and aspirations and to determine how they would behave and interact with the street furniture within the space.

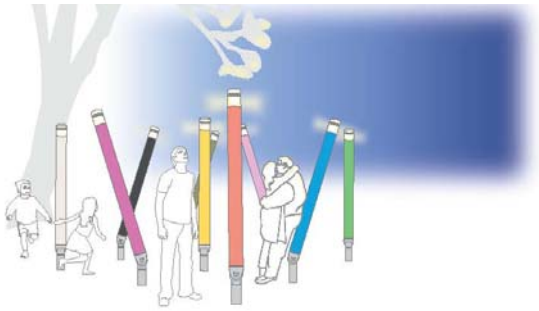

Fig. 6. Sense of Place project by Angeline Meloche.

Angeline Meloche got the prize for her community poles decorated by local artists. This creates a sense of ownership of the installation, possibly preventing graffiti while showcasing neighborhood talent and culture. Each pole has a solar powered light that releases a soft atmospheric illumination at night. Park visitors can either passively enjoy the artwork, or interact with the poles by configuring and rotating them. (Fig. 6)

Honourable mentions went to Shalini Seneviratne's thermochromatic seating which enables users to leave impressions of themselves; and Alicia Mintzes' bollards for disposing hypodermic needles in public parks.

G. Packaging & Society, 2006.

The class entered an Australia-wide tertiary competition, the Southern Cross Package Design Awards, organized by the Packaging Council of Australia. The class worked on the brief "Society, Design & Now", which calls for intelligent and creative responses to the evolution of our constantly changing society, culture and values, and anticipating how the changes will impact on the needs, wants, desires and expectations of consumers.

Fig. 7 Packaging & Society project of Matthew Spruell.

Of the 400 student entries received by the competition, UNSW student Matthew Spruell ended up with the silver award, for his WaterMed Emergency Pack (Fig. 7). This bubble pack of antibiotic capsules for treating infections and malaria in disaster stricken areas comes with its own purified water, minimizing user exposure to unclean water.

Other notable outcomes of this packaging project were:

- condom-and-lubricant pack and a discreet condom pack for teen age girls, both to encourage safe sex, by Alicia Mintzes and Angeline Meloche
- emergency toilet seat cover and toilet paper pack, by Jessica Tanudjaja
- all-in-one "quit smoking" aid pack, by Yisun Teo
- drink-spiking detector label for premixed beverage bottles, by Eleanor Pratt
- self-measuring medicine cup for the vision impaired, by Sittigorn Geratitragarn

DISCUSSION & CONCLUSIONS

Reflections written on the learning journals of the students generally show that they appreciated the challenges of contributing to design solutions that would promote a better society and a more sustainable environment. Through these projects they were able to comprehend the interplay between ecology, consumerism, and sustainable development. Several commented that their interests were heightened by the "real-world" nature of the briefs, and this attitude kept them motivated in searching for practical solutions.

Some students noticed that their tutors had different levels of knowledge, understanding and awareness of ecological design issues. They found it frustrating that some tutors are contented with the way their projects went, and yet during the final presentation to their assessment panel they received comments from other lecturers on noncompliance with environmental regulations, adverse lifecycle impacts of the prescribed materials or processes, or disassembly and recycling difficulties. This situation concurs with a U.S. study that many design professionals are in need of education in sustainable design (IDSA, 2004). It is essential that tutors engaged in this studio express the same commitment, advocacy and adherence to the principles of ecology and ethics in design, if we intend to effectively preach consistent messages of sustainability.

The third-year studio has been an opportune spot within the industrial design curriculum to actively engage and influence young minds about their future responsibilities to the planet and to the people, when they practice as design professionals. The work that these new industrial designers will generate will have an enormous impact on the future, and it is the duty of educators to equip them with an understanding of their strategic roles and to unlock their potential to help make the world more habitable for the generations to come.

We can think of the upcoming problem solvers in our studios as holding the key to the persistence or perdition of life on this planet. Unlike in the past, when our predecessors in this profession profusely prescribed a multiplicity of plastics, heavy metals and ozone-depleting chemicals in their products with little awareness of the damaging effects of these actions on a global scale – now there is no more excuse not to know the potentially negative consequences of the work we do. We need to empower our designers-in-training with real learning and ensure that they conscientiously grow with the belief that they can actively be part of the sustainability solution, not the problem.

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