Co-creating sustainable design

Session 3

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Scales, spheres and relationships: an approach to educating future designers

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In this paper we argue that the current conceptions of sustainability through the Triple Bottom Line are limited, resulting in the social and environmental bottom lines being traded off against economic concerns. Design education reinforces a linear reductionist paradigm of practice. When applied to design for sustainability this paradigm echoes the prioritisation of the economic bottom line through eco-efficient design. So when students are confronted by the complexity of wicked problems and sustainability, they can become overwhelmed and default to eco-efficiency solutions.

Our insights are drawn from critical reflection on design education for sustainability practice, a literature review of design education for sustainability and a reflective workshop with education practitioners. These insights have led us to develop a reflective framework of six spheres to enable a more holistic understanding of design for sustainability. By visualising these spheres as interconnected, students and designers can engage in constructive reflection and conversations about their ideas in a world of complexity and interconnectedness.

Keywords: design education, sustainability, wicked problems, visualisation, scaffolding
1. Introduction

This paper shares insights that arose from teaching sustainability in design. We identified four key interrelated problems. In triple bottom line sustainability, the social and environmental bottom lines are ‘traded off’ in favour of the economic bottom line. Design education for sustainability also focuses on eco-efficiency to solve sustainability problems. Furthermore, because design education traditionally focuses on linear problem solving, this means that students are poorly equipped and are potentially overwhelmed by the complexity of ‘wicked problems’ and achieving genuine tripartite sustainability. We explore these problems in more detail through a critique of the triple bottom line and proposing a broadened working definition of six spheres. We also examine the issues with linear problem solving in design and the tensions inherent in wicked problems and how this is reinforced in design education and limits holistic thinking. To counter these difficulties, we propose six spheres of sustainability and a visual framework to enable students to engage with complexity in a constructive and reflective manner. We propose that the importance of building capacity in students as future designers means that they need to ask critical questions in order to locate their own possible points of design intervention among the spheres of interconnectedness. This reflexive approach necessitates that students begin by consciously designing themselves, so that design becomes an inward movement of change rather than an external one of changing systems, products or behaviours. We suggest that a classroom can be a safe – yet challenging – environment to scaffold ways for students to start the interventions they need to make to themselves and their everyday practices to achieve genuine sustainability.

This paper draws on insights from reflection by the authors upon their teaching practices combined with evaluation of the literature on sustainability and design. Design educators in Melbourne, Australia were invited from Monash, Melbourne, Swinburne and RMIT University to share their teaching practice in a three-hour workshop. The participants teach theoretical and practical courses related to sustainability and shared what they considered as important approaches to teaching sustainability through three methods, dimensions, resources, and activities that they use. Participants had in common a personal commitment for bringing sustainability into design education rather than an institutional or curriculum obligation. This echoes Ramirez’s findings (2006, 2007) that evidence a gap between institutional and theoretical understandings of sustainability and the way in which it is articulated to learning and teaching activities.

The framework for teaching sustainability proposed in this paper was developed from the conversation with workshop participants, and is intended to be trialled in class early in 2015. At the point of this paper’s publication, we can only speculate about its application but the outcomes will be documented and shared at a later date.

1.1 Critique of sustainability

In reading the design literature, we became critical of a view that ultimately limits sustainability to the economic bottom line through eco-efficient design. In the past, various design practices have promoted and branded sustainability as ‘green design’, ‘eco design’ and ‘environmental design’ (Magde 1993; 1997), which has narrowed its concern towards natural resource consumption and environmental impact. Walker (2011) further laments how the notion of ‘design for sustainability’ still perpetuates patterns of consumption albeit using less resource intensive materials or cleaner technology which follows an eco-efficiency mindset. Following the Brundtland Commission report, attempts have been made to use the Triple Bottom Line framework
(e.g. Fiksel 2009; Fry 2009; Fuad-Luke 2009; Margolin 1998; McDonough & Braungart 2002; Papanek 1995). This framework emerged in the 90s as a means to consider social, economic and environmental dimensions as the three pillars of sustainability (Brundtland 1987). However, environmental and social frameworks are often considered as a way to minimise harm and provide a return on investment, rather than facilitate a positive contribution.

To counter these issues and limitations, the literature reflects a moving away from the triple bottom line revealing a desire to expand the definition of sustainability. Studies by various authors propose alternative frameworks, all concerned with broadening and specifying different categories. Partidario and colleagues (2010) articulate qualities such as the material, moral and cultural together with the qualities landscapes, livelihoods, and lifestyles. Emotional dimensions are also included in the framework by Sipos and colleagues in their discussion of ‘transformative sustainability learning’ that engages the head, hands and heart (Sipos et al 2008, 68). They explain that the approach is to integrate ‘trans-disciplinary study (head); practical skill sharing and development (hands); and translation of passion and values into behaviour (heart)’. Similarly, Walker (2011) adds ‘personal meaning’ as a fourth ingredient to ensure sustainability is relevant and meaningful to an individual person. And building on Inayatullah (2009), Walker (2014) further suggests the inclusion of spiritual well-being.

1.2 Problems with design education for sustainability – broken relationships

Design methodology is often represented by two models: a linear model and a wicked model. The linear model features two distinct phases of problem definition and problem solution in a logical sequence of analysis and synthesis yielding a successful outcome. This assumes that a boundary exists around a problem, which a designer skillfully demarcates and then solves (Buchanan 1992). The double diamond (The Design Council 2007) is a popular model and example that demonstrates this linearity, indicating a process that moves in one direction, with a resolution at the end. In contrast, Rittel’s wicked problems (Rittel and Webber 1973) are moving targets of interlocking issues, interests and constraints. There are no definitive conditions or demarcation to a wicked problem, and every ‘wicked problem’ is a symptom of another, ‘higher level’ problem.

The tension between these two models manifests in contemporary discussion of design. A number of recent studies show that there are many forms of design process (Sauder d estudio 2014, Tan 2008). But as Tan points out, these design processes and their visualisation tend to be largely the same and mostly about providing an insight on the design process to the outsider. What happens inside these processes is rarely revealed and harder to describe. In most cases these processes have a reducing quality, narrowing down to an appropriate solution. Birkeland (2002) critiques the dominant linear paradigm of design as leading designers to unconsciously express values that are in opposition to a systems or ecological view. The dominant paradigm features: linear progress; individual autonomy; essentialism; reductionism; mechanism; instrumentalism; hierarchical dualism; anthropocentrism and linear causality (ibid). Models such as the double diamond has echoes of reductionism, and while there are attempts to include systemic thinking, a more holistic view of the situation is neglected. The abstraction of the double diamond gives a perception of certainty and a logical understanding of a design process. In other words, the ‘wickedness’, including conflicting values of stakeholders and shifting sands of context, are surgically removed.
Regardless of the overall design process in use, the more interesting question is: what guiding principles could help designers and design students to think ‘holistically’?

The tension between linear thinking and wicked problems continues in design education. The symptoms of an unsustainable practices – such as levels of energy and water consumption, unsustainable food production methods, rising atmospheric temperatures etc., are presented to students as ‘problems’ to attempt to ‘solve’ through their particular discipline (industrial, graphic, fashion, urban design). In this regard, the brief, which is a standard industry practice of formalising a framework, documents the clients’ problem context and a set of issues for consideration or presents a hypothesis that details the features of a solution that can address the problem.

While design education necessitates the opening and closing of a studio brief, requiring a ‘finished’ outcome suggests finality to the process. While Life Cycle Assessment (LCA) and design for disassembly asks the student to think about the broader relationship of the artefact to the world, as we found from the educators workshop, the lens is often still an environmental one. We found that teaching practices are still focused on the triple bottom line, and while there are exceptions, most focused upon technological solutions and commercial products. From our own teaching practice we have noted that without scaffolding to confront the wickedness and complexity of the broader issues, students can become overwhelmed and disempowered.

2. Spheres and scales visualised

We have combined six spheres – social, political, economic, environmental, technological, and spiritual – as they are continually repeated in literature but in different ways. We see that each of these spheres is interrelated, influence one another, and cannot be isolated or segregated which we illustrate now. The social, economic and environmental spheres carry over from the triple bottom line, however we see these as overlapping and connected with all other spheres.

The economic sphere includes alternative and sharing economies such as peer-to-peer transactions and time banking that bridge towards the social sphere. From the concern for conservation of biological and ecological systems, the environmental sphere also draws upon an evolving history of consideration in design to the point where it attempts to dematerialise what is designed. This again links towards the economic and social spheres through sharing economies. The social sphere includes key ideas of equity, health, education, social cohesion, well-being, community and self-determination.

The political sphere encompasses democracy, structures of power, governance at state, national and global scales as well as the personal scale as activist, mediator or promoter of political ideologies, knowingly or unknowingly. Participation and advocacy are also features of this sphere. The technological sphere encompasses tools and manipulation of materials. It acknowledges the fundamental historical link between design, mass production and planned obsolescence. However the democratisation of technology brings the scale back down from mass production to cultures of making locally and the re-emergence of craft. The spiritual sphere is not a religious framework, but a form of self-awareness, self-development and mindfulness nurtured in the every-day encounters of the world. Terms like ‘growth’, ‘being’ and ‘becoming’ (Inayatullah 2009; Ingold & Gatt, 2013) emerges in this sphere, where sustainability is seen as a personal journey and learning process instead of an ideal fixed set of goals and outcomes (Tovey, 2009).
These examples illustrate that these spheres are complex and the edges are fuzzy. The value as a reflective framework is in considering and questioning: what is the role of each sphere; how is it manifested and to what ends?

Our visualisation of these six spheres was partly inspired by the *Circuit of culture* (Du Gay et al. 1997), which features five aspects: representation; identity; production; consumption; and regulation, each connected to the other. A cultural artefact cannot be examined only from one aspect alone as they are interrelated. We also believe that the six spheres identified are interrelated and cannot be disentangled. We use dotted instead of solid lines to show each of the six spheres connected with all others and give a sense of the fuzziness between the spheres (fig 1).

![Diagram](image)

**Figure 1**: Six spheres of sustainability

The six spheres operate at and move through different scales. The scales we propose in this paper are drawn primarily from two frameworks: the *Health Map* (Barton and Grant 2006), and *permaculture design zones* (Holmgren 2002, xxvii–xxviii). The *Health Map* shows how an individual’s health and wellbeing is impacted by environmental factors. For example, transport options in the built environment influence patterns of travel (such as walking or driving) at the personal level, which in turn has flow on effects on air quality at the local and community levels, as well as contributing to levels of greenhouse gas emissions at the global level (fig 2).
Holmgren’s further adaptation of permaculture design zones asks people to consider the world at different scales. At the personal or household zone one has the most direct influence over personal circumstance, moving out to the global zone where uncertainty increases and personal influence decreases (fig 3).

Both frameworks aim to aid the user to think critically about the action they take in the world; the Health Map as a ‘tool that provides a basis for dialogue and provokes
enquiry’ (Barton and Grant 2006, 252–253) and permaculture design zones as a meta-analysis of physical, geographical and conceptual zones for people ‘to better understand their world and to act both for themselves and for the future’ (Holmgren 2002, xxviii).

We propose a simplified version of these to consider the different scales design can intervene in and flow through (fig 4).

![Scales Diagram](image)

**Figure 4: Scales**

3: **Designing re-connectedness – a reflective framework**

Designing re-connectedness is a proposition in design education to equip students with methods, theory, frameworks and mindsets that enable their own pathway of inquiry and develop a change-making practice. In an attempt to prevent students from being overwhelmed by the ‘wicked’ complexity and an over-saturation of fear and facts, we propose a way to initially position the student-designer’s entry points into a ‘wicked problem’.

The framework includes diagramming six spheres and scales to aid a holistic awareness of sustainability, and to promote ongoing conversation about the nature of designing for wicked problems. Reflection upon critical incidents throughout the semester is also included, to support deeper understanding of their personal development. And by adopting a more open-ended approach with the design brief we encourage the understanding that a design project is open ended, dynamic and never truly complete. For this paper we will focus on the spheres and scales and illustrate how it might be applied in practice.

The aim is to keep all six spheres entangled in sustainability in view, and for students to locate their evolving design ideas as a working hypothesis for exploration and development. The idea is placed in the centre connected to all the spheres. We use the word ‘resolutions’ instead of ‘solutions’, after Horn and Weber’s mess maps (2007) due to the impossibility of creating a permanent solution to wicked problems (fig 5).
The example shown (fig 6) is a prototype of how the spheres might be used to analyse a project idea. Students are not asked to address all sphere and scales but instead to identify where their proposed project is located and consider what each sphere means in the context of their knowledge and ideas.

Figure 5: Six spheres framework

Figure 6: Six spheres framework in practice
In considering how a sphere relates to their project or how each sphere is addressed by their ideas, students can write notes and questions, use distance and scale and other diagrammatic or expressive devices to illustrate the relationship of spheres to their project. Students might also consider at what scale their idea might be placed and how it might connect to other scales (fig 7).

Figure 7: Scales in practice

The tool is not intended as a finished communication device to be easily read by another person: creating mess is part of the process. Mess maps (Horn and Weber 2007) are used to aid participants in identifying the complexity and causes of wicked problems. The process is one of ongoing conversation with others and the process of mapping. Mess maps are not necessarily legible to external people, but are a critical tool for those involved.

This approach aims to assist with questions, reflects and communicates the student-designer's awareness, perspective and concerns, and helps to reveal their systemic relationship and personal responsiveness to the spheres they are entangled within. It is also a means of engaging students in an ongoing conversation in the complexity of the project space, help externalise the potentially overwhelming nature of the projects, and recognise that the work is ongoing, dynamic, iterative and positioned in a broader context.

Conclusion

Following concerns about the limitations of the triple bottom line, we propose a broadened view of sustainability through six spheres: environmental; social; technological; economic; political; and spiritual, and understanding these as interconnected inseparable frames of the world. In teaching design for sustainability, issues arise around the focus upon ecological interventions, the potential to overwhelm students with the complexity and wickedness of the terrain and possibly stifling students or leading them towards implementing predefined toolsets in uncritical or unreflective ways. Building upon the six spheres we propose a visual framework to scaffold student understanding of the complexity of designing for sustainability and
wicked problems and then constructively engage with this through reflective mapping and diagramming.

We invite readers to apply this framework and to share their findings and variations upon the framework. This proposed framework will be applied in a communication design course in 2015, with the aim to further examine and critique our teaching approaches. We hope to present our findings in future publications.

References


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