MATERIALS AWARENESS

the ability to expose the hidden impact of materials on sustainability

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Everyday we individually engage in the creation and consumption of products and materials in one way or another, whether it is the computer used to type this on, or the reams of paper learners use. Whilst consumption is necessary on a personal, social and economic level, excessive over-consumption on an individual and macro-aggregate level is the primary cause of environmental problems. This chapter explores 'materials awareness' within the realm of everyday experience as a way of empowering learners to become active citizens by leveraging their consumer power and effecting change.

Craft and designer-maker traditions and materials have evolved and changed remarkably due to advances in technological industrialisation. In the contemporary mass production context, a plethora of new products and materials are constantly being generated. The dominant paradigm of affluent developed nations blatantly promotes hedonistic consumerism and rampant materialism, and this ideology risks becoming entrenched across the world. The constant modification and updating of products, where cost and convenience is of primary concern forms the basis of our selfish-capitalist economy and throwaway culture. The whole system is premised on increasing levels of consumption. Regardless of true needs, sophisticated marketing and advertising stimulate unprecedented artificial wants, encouraging excessive consumption (see *Advertising Awareness,* this volume). A seemingly inexhaustible range of choices, representing a vast array of powerful, symbolic, status-defining goods that establish self-image and social-cultural relations, has blurred image with reality and altered perceptions of well-being. Firmly ingrained, the addictive and habitual human activity of consumption engages us daily with a multitude of products from buildings to home-furnishings, cars to electronics, clothing, food and garden equipment. According to Leonard (2007), the proportion 'of products that remain in use six months after purchase is a pitiful one per cent'. Rapid product obsolescence, design for disposability and constructed needs have created a supremely inefficient system of production.

Overwhelmingly, consumption in consumerism-based cultures is disproportionate to developing and poor nations. Paradoxically, nations demonstrating the highest levels of consumption exhibit the lowest levels of environmental degradation since problematic waste and pollution are externalised. Disparities are intensified by obsessive global economic growth and competition for profit, accelerating exploitative inequality and ecological injustice. To facilitate over-consumption, wealthy industrialized nations, transnational corporations and rich individuals strategically monopolize access to global natural resources, energy and trade. Maintaining and exacerbating their cross-national

and socio-cultural power marginalizes the poor both within nations and internationally. The exploding populations and phenomenal rates of growth of developing nations, such as China and India, which aspire to match the material living standards of the West, indicate the growing scale of the problem. Resultant protectionism and security repercussions will only magnify current social unrest, fragmentation and exclusion. As Kofi Annan once said, 'A path to prosperity that ravages the environment and leaves a majority of humankind behind in squalor will soon prove to be a dead-end road for everyone'.

The Intergovernmental Panel on Climate Change (IPCC) confirms the science of anthropogenic climate change beyond reasonable doubt; our consumption habits, products, materials and associated production processes designed to feed this appetite are significantly out of step with the natural balance. Nature cannot keep up with either the unprecedented speed or scale of material exploitation, environmental degradation, and persistent toxic chemical contamination and pollution. These have an impact on all four of the Earth's ecological 'spheres' - air, organisms, water and soil. Choosing to purchase the latest mobile phone or a bottle of water is only the *visible* tip of a vast material iceberg. The moment an individual hands over money to purchase a product they are connecting to a web of global activity that is *invisible*. The crucial skill of *Materials Awareness* is the power to use knowledge and imagination to make that web visible, to understand the full implications of purchases and act on that understanding.

The problem essentially lies in the secret life of materials: the entire 'story' or life-cycle of materials and the consequences are hidden before, during and after consumer use. Therefore, the critical challenge for learners and educators at every level is to investigate and expose the *invisible* material trail. Capra's (1999) vision, of an ecological framework and systems thinking are vital core concepts, entailing a 'new way of seeing the world and a new way of thinking…in terms of relationships, connectedness, and context' which transcends disciplinary boundaries. Materials awareness can help learners develop this new way of thinking since following the invisible material trail leads to discovery of connections of all kinds. Reconnecting consumers to the ecological networks of which they are part and relocating old practices and habits in new ways may help to move us towards a more sustainable future.

A common first exercise to link learners to their own daily actions and consumption habits is through carbon footprint calculators, which give an indication of the scale of individual behaviour. However, this method has limitations: it fails to take into account the social and environmental impact of materials; the systematic erosion of the Earth's carrying capacity due to a wide variety of factors beyond climate change, and ignores the effects of *trans-boundary* toxic pollution of organisms that sustain Earth's life support systems.

Synthetic plastic is a notorious example of a material with impacts across the web of life. The search to produce a cheap, durable, lightweight material that transports and stores

efficiently has created a wide range of goods that we now depend on. It can be made into virtually anything and is practically everywhere; we drink from it, eat from it, cook in it, sit on it, type on it, play with it, drive in it and pay with it. However the production, use and disposal of plastic causes widespread ecological damage; inadvertently the very properties that make it particularly useful also make it a persistent pollutant (Moore 2002). Learners can explore the origins of plastic in petroleum, the impact of petroleum extraction on the environment, its role in international conflict, the pollution resulting from plastic such as the Great Pacific Garbage Patch which is now the size of Texas, and the impact of plastic pollution on marine and land wildlife. They can go further still, and investigate the highly toxic chemicals that are used during plastic production, the chemicals that can leach out when plastic is exposed to the sun, and examine the terrible health and environmental consequences when plastic is disposed of through landfill or incineration.

Plastic is just one example. There are countless other materials causing environmental damage and chemical contamination that learners can explore. For example, a toy duck:

> contains chemicals known (…) to cause cancer and birth defects or other reproductive harm (…), what kind of culture would produce a product of this kind and then label it and sell it to children? (McDonough 2005)

Other examples, such as e-waste containing over 1,000 different substances, many of which are toxic, continue to create serious pollution on disposal in Asia, despite 'take-back schemes' and regulation. The likelihood is that learners will be completely unaware of the unfair occupational and environmental health threats that expose men, women and children to hazardous toxins in developing countries.

Beyond understanding the social and environmental problems associated with materials, learners also need awareness of solutions for avoiding or mitigating those problems. Dryzek (2005) identifies a range of different responses to environmental issues which can be usefully applied to materials awareness. He categorises responses according to two dimensions, *prosaic/imaginative* and *reformist/radical. Prosaic* responses involve action but without any commitment to political or social change. *Imaginative* responses, on the other hand, seek to rethink relationships between humans and the environment and build a different kind of society. Prosaic and imaginative responses can vary according to degree from *reformist*, involving slight adjustments to current systems, to *radical* which involves widespread, major change. Dryzek uses these two dimensions to categorize different environmental *discourses.*

The first discourse he describes is *environmental problem solving,* characterized as *prosaic-reformist.* This discourse is gradually being adopted by industry, and seeks, among other things, to reduce the impact of environmentally damaging materials by using them more efficiently. Yet 'eco-efficiency' has yet to be fully implemented and is not a long-term solution since increasing demand for products could outweigh efficiency

gains. The second discourse is *survivalism,* characterized as *prosaic-radical,* and takes 'limits to growth' seriously, calling for major changes to allow the current system to continue into the future, but without challenging the consumerist basis of society. Of particular importance for this chapter is the *sustainability* discourse (*imaginative-reformist*), which widens the intellectual discourse to cultivate an attitude of inquiry. Learners are encouraged to consider alternatives to the systems of material flows and waste at a systemic level. Also of importance is the *green radicalism* discourse (*imaginative-radical*). This discourse seeks to re-vision wasteful, profligate 'human-centred' norms and promote instead an earth-centred norm of reality and value, based on a deep approach that all life on earth has intrinsic value (see Hannigan 2006 for more on environmental discourses).

Expanding perceptions and values can essentially move learners and educators beyond *reactive* and *adaptive* levels to *transformative* levels, to challenge and reframe present notions that are threatening the systems that support human life. This represents an entire paradigm shift. To contribute to creating this paradigm shift, learners will need to be motivated to think beyond their immediate cultural environment, which is preoccupied with self-centred over-consumption, materialism and competition. The challenge is to embody the basic principles of ecology, eliminate waste and cultivate sustainable communities to meet genuine human needs where competition is perceived in terms of the origin of the word in *com-petare: to strive together* (see *Effortless Action*, this volume).

Rather than endorsing cradle-to-grave products and materials that are dumped in landfills at the end of their 'life', McDonough and Braungart's (2002) *imaginative-reformist* vision of a 'Cradle to Cradle' closed loop system offers an example of an innovative alternative based on ecological principles. Industry could be transformed by creating products whose materials are perpetually circulated in closed loop cycles. Maintaining materials in closed loop cycles maximizes material value without damaging ecosystems, offering a new ethics of consumption. McDonough (2005) asks, 'why not set out, right from the start, to create products and industrial systems that have only positive, regenerative impacts on the world?' Cradle to cradle 'envisions a world powered by the sun where growth is good, waste nutritious, and productive diversity enriches human and natural communities' (ibid).

McDonough and Braungart (2002) distinguish two main cycles modeled on the elegance and effectiveness of natural cycles and ecosystems. The biological cycle is composed of biodegradable materials called biological nutrients and the technical cycle is composed of 100% 'pure' reusable materials called technical nutrients. For example, Climatex Lifecycle upholstery fabric is a blend of organic, pesticide-residue-free wool dyed and processed entirely with nontoxic chemicals. All materials and processes are chosen for human and ecological safety. As a result, the fabric's biological waste nutrients can be returned to the soil. Alternatively, Shaw Industries, a commercial carpet company, provides a model for technical 'up-cycling'. The company guarantees that all nylon 6

carpet fibre and its polyolefin backing can be recovered and returned to nylon 6 carpet fibre and polyolefin backing. The underlying idea is pure raw material back into raw material. In conjunction with this, adopting principles such as design for longevity, disassembly and reuse can shift the strategic emphasis from efficiency to sufficiency and reduce material flows.

Once learners have gained an *imaginative-reformist* perspective it is possible for them to devise solutions for themselves which minimise the environmental impact of materials, or at least to exercise their consumer power in choosing products which have been ecologically designed. At a deeper level, however, gaining an awareness of how prevailing human exploitation of materials, material flows, and waste systematically causes ecological destruction can lead learners to reflect on the personal and social change necessary for reduction of consumption and de-materialization. By inviting engagement at the experiential level, the invisible impacts of habitual consumption of products and materials can be exposed, and alternatives explored.

Example Group Activity

Objective: To evaluate visible and invisible materials and processes in order to understand how consumer habits affect the environment (see Thorpe 2008).

1) Identify an everyday consumer object/product that is immediately at hand. Describe the various materials and processes that contribute to its production and disposal.

2) After identifying the *visible* materials, consider other relevant aspects that may be *invisible*:

    - *Scale:* how many of these objects are there in the world and how fast do they 'turn over'?
    - *Origin:* where have the components of the materials come from?
    - *Content:* what chemicals and material types does the object contain?
    - *Resources:* what raw materials are used and what are the environmental and social consequences of their extraction?
    - *Composition of materials*: are the materials used pure or hybrids? What consequences does this have for later recycling?
    - *Size:* what is the relative size of components versus relative potential harm? (e.g. in mobile phones, some of the smallest quantities contain the biggest potential toxic harm)
    - *Additives:* what hidden coatings, protective coverings or chemical treatments are added?
    - *Packaging:* what impact does the packaging have on the environment?
    - *Labels:* are they present, what do they really tell us?
    - *Manufacture:* what are the processing methods and costs?

- *Energy:* how much energy is consumed at each stage of manufacture?
- *Distribution:* how is the object transported, and how many times?
- *Escape:* how do parts of the object, or the whole object, get back into the environment?
- *Social-cultural:* how do all of the above affect individual and community health and well-being?

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