

Environment, Ethics and Cultures

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Scope

Technology Education has gone through a lot of changes in the past decades. It has developed from a craft oriented school subject to a learning area in which the meaning of technology as an important part of our contemporary culture is explored, both by the learning of theoretical concepts and through practical activities. This development has been accompanied by educational research. The output of research studies is published mostly as articles in scholarly Technology Education and Science Education journals. There is a need, however, for more than that. The field still lacks an international book series that is entirely dedicated to Technology Education. *The International Technology Education Studies* aim at providing the opportunity to publish more extensive texts than in journal articles, or to publish coherent collections of articles/chapters that focus on a certain theme. In this book series monographs and edited volumes will be published. The books will be peer reviewed in order to assure the quality of the texts.

Environment, Ethics and Cultures

*Design and Technology Education's Contribution to Sustainable
Global Futures*

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8. AGENCY AND UNDERSTANDING

The Learner as a Sustainable Designer

INTRODUCTION

This chapter focuses on how learners can be supported to utilise their design capability to take on the challenge of creating a world that has a chance for a more sustainable future. It begins with three premises. The first is that all human beings are born designers; that there is something fundamental about being human and being designerly in the ways that we go about our lives. The second premise is that in order to optimize the designer in all human beings we have to attend to how that capability is nurtured. My hunch is that when designerly capability is nurtured, human beings have a greater sense of well-being than they do if they are frustrated as a result of the lack of development of their design capability. Building from this is a belief that if all human beings feel that the designer in them enables them to make a satisfying contribution to their own and the lives of others, that society in general will benefit: that the well-being of the designer in each human makes for the well-being of society as a whole. The final premise is that, if this is to be achieved, the provision of design education for all children is critical. Moreover, this education needs to focus on the development of design capability in ways and contexts that allow children to grow into people who can take on ambitious and crucial projects that they recognise as having great social and cultural relevance; that they feel they can genuinely make a difference to the quality of people's lives.

The chapter begins by exploring these ideas, first by considering the ways in which human beings benefit both personally and emotionally from engaging in positive activity and how this relates to the designer in all human beings. Democratic notions of the designer are then developed further by linking in the 'made' world; the importance of making in the enterprise. Finally there is an exploration of how this potential can be developed through design and technology education that creates both agency and understanding. In all of this there is a critical link to the relationship between such an education and creating a more sustainable world by developing in the learner the ability to use their design capability to address issues of social and cultural relevance such that the challenges of sustainability become achievable through individual actions.

HUMANS AT THEIR BEST

The environmentalist Thomas Princen places a good deal of emphasis on the value and potential of individuals in making a difference for the future. He focuses, for example, on the benefits of engaging in a localised way with individuals and communities for positive actions that contribute to a future, more sustainable, world. He draws particular attention to the principle that human beings tend to be at their best, and possibly feel best about themselves, when they are proactive in contributing to and taking control of the world around them. In particular he describes humans as being at their best when

1. they are faced with a genuine challenge;
2. they are creative and productive;
3. they find meaning in their own problem solving and in acts larger than themselves;
4. they help themselves and help others;
5. they self-organize and self-govern;
6. they feel they are getting a fair shot at the benefits of their work.

Princen, 2010, p.175

These statements are seemingly simplistic but they have great resonance with how people feel in their daily lives. Princen sees these characteristics as evidence of what he describes as a human being as a “quintessential adaptive creature” – a fundamental aspect of being human that includes “the capacity to adapt to new and changing environments during one’s lifetime” (p.175). In considering our ability to adapt, he is highlighting the impact that employing that ability has on our well-being. The description of humans at their best also has resonance with ideas from quite different sources. In describing what he called ‘flow’, Csikszentmihalyi highlights the happiness people feel when immersed deeply in an activity and links this to the “best moments” that

usually occur when a person’s body or mind is stretched to its limits in involuntary effort to accomplish something difficult and worthwhile.
(Csikszentmihalyi, 1992, p.3)

These ideas also have similarity with those that Daniel Pink identifies as being critical in considering human motivation. Pink (2009) suggests that three elements are particularly important in this respect, these being autonomy, “innate capacity for self-direction” (p.90); mastery, “the desire to get better and better at something that matters” (p.110) and purpose “which provides the context” (p.134).

Others have highlighted our ‘adaptive’ ability as a critical element of being human. Bronowski (1973) refers to a human as the only creature “not locked into his environment” (p.19). He places imagination and reason as core attributes in this, and particularly our “ability to draw conclusions from what we see to what we do not see, to move our minds through space and time” (p.56).

Bronowski links our capacity to be adaptive and creative not just to our ability to imagine future scenarios that are different to our present realities, but also to our ability to create these future realities, including through our physical capabilities as makers. Bruce Archer clarifies this by providing definitions to point to key features here – of technology and of design. He begins with technology, stating that

one fundamental attribute of human beings – that is, one of the attributes that define creatures as being human – is that they devise and make tools, and use these tools to adapt their environments. If Technology is ‘knowing-how’, then Design is ‘envisaging what’. The capacity for envisaging a non-present reality, analysing it externally and modelling it externally, is the third great defining characteristic of humankind. (Archer, 1992, p.8)

Ken Baynes likens the human ability to design to the ability to use language. Building on Chomsky’s idea that babies are born with a Language Acquisition Device that creates a pre-disposition to develop linguistic skills, he suggests that humans also have a Design Acquisition Device – a “wired in pre-disposition to explore and change their environment” (Baynes, 2010, p.7). In highlighting this he is also highlighting the contribution all humans can make to designing our collective futures – that this is not just the territory, or even the ‘right’ of the “hero designers”. He sees designing in an ideal world as being a democratic practice in which “the designer is not a special kind of person: every person is a special kind of designer” (Baynes, 2010, p.25).

Linked with the positive viewpoint of Princen’s characteristics of when humans are ‘at their best’, we are offered a utopian perspective of both design itself and of the potential of designing in enabling the creation of sustainable futures. But while design might have the potential to ‘save the world’ it has also demonstrated its potential to destroy the world through the ways in which designers have paid attention to creating and feeding a consumer society that has resulted in a depletion of resources, a degradation of environments and massive inequalities in the ways that people can live their lives. Baynes reminds us of a more dystopian view of design when he comments that “designerly thinking – is one of the most dangerous of all human characteristics (Baynes, 2009, p.5).

Shannon (1990) also comments on the negative implications of the hero designer, highlighting the way in which the creation of designers as an elite group of experts has disenfranchised the rest of us from our role as active contributors to shaping positive futures. The general public become the passive recipients of the designed world, potentially the victims of the power of design. Keirl enriches the discussion further as he comments wryly

Our capacity to design and make sets us apart from other species although our capacity to head into the future uncritically may, in another sense, not set us so far apart at all!. (Keirl, 1999, p.79)

The need for the designer within us to engage more effectively with shaping a more sustainable future is highlighted by Tony Fry, captured in his statement referring to

how the future might unfold, that “as the necessity of futuring, there are two naked facts that unavoidably confront us: we have no choice, and we have no agency to call upon other than ourselves” (Fry, 2012, p.5). In reflecting on the ubiquitous impact of the designed world, he points out that we humans design things and, in turn, those things then ‘design’ us – we design the mobile phone and the mobile phone then designs the ways in which we operate in the world. Seeing more possibilities, we then re-design the mobile phone. This iterative relationship has largely taken us into a vicious circle of consumption. A better way forward would be replacing the vicious circle with a virtuous one – to design towards a future where, in Thomas Princen’s words, we all learn to live well by living well within our means.

The iterative relationship between the designer and the designed is captured in the concept of ontological designing. The concept is fundamental in considering how the relationship can move forward in a virtuous manner, and also in considering the role that all humans have to play in achieving this. The theory of ontological designing is outlined in the following manner by Anne-Marie Willis.

To begin simply, ontological designing is a way of characterising the relationship between human beings and lifeworlds. As a theory its claims are:

- that design is something far more pervasive and profound than is generally recognised by designers, cultural theorists, philosophers or lay persons;
- that designing is fundamental to being human – we design, that is to say, we deliberate, plan and scheme in ways which prefigure our actions and makings – in turn we are designed by our designing and by that which we have designed (i.e. through our interactions with the structural and material specificities of our environments);
- that this adds up to a double movement – we design our world, while our world acts back on us and designs us. (Willis, 2006, p.80)

CRITICAL CAPABILITY

The word design carries with it an embodied notion of intent, purpose and choice. If something is ‘designed’, then by definition it hasn’t happened ‘by accident’. So the act of designing, as is indicated in the description of ontological designing carries with it an understanding of the potential impact of the designed artefact or system. Dystopian views of design point not just to the negative impact of intended consequences of designing (such as machine guns) but also to unintended consequences – what could literally be seen as ‘thoughtless’ design. This is not to suggest that a designer can control the uses that anything they have designed is put to – as anyone who has ever opened a tin of paint with a screwdriver can testify. The concept of the “designer fallacy” (Ihde, 2006) – that there is “some degree of material neutrality or plasticity in the object, over which the designer has control” (p.121), can be seen in almost every major technological innovation the world has witnessed, as Ihde exemplifies through examples such as the phonograph, the typewriter and the ‘paperless society’.

But what a designer can do, is to do their best to conduct a ‘risk analysis’ in relation to the potential intended *and* unintended uses of the design. To design in this manner, to design thoughtfully, preparing for that ‘Aladdin moment’ that once a genie is out of the bottle – once a designed ‘thing’ is released into the world - it is nigh on impossible to control its use and its impact. Sennett (2008), referring to Pandora rather than Aladdin, makes a similar point when he points to the “fiction that opening the casket is a neutral act” (p.1). Managing this situation requires an understanding of both the designed ‘thing’ itself and the context in which it exists.

In tandem with understanding, and also highlighted in the previous section, is the importance of *agency* – the ability to take action, to consciously intervene to bring about a desired effect. The word agency carries with it a sense of control. Viewed from with the perspective of the Capabilities approach, promoted by Amartya Sen, agency is critical as a liberating force for an individual. He characterises a person with agency as

someone who acts and brings about change, and whose achievements can be judged in terms of her own values and objectives, whether or not we assess them in terms of some external criteria as well. (Sen, 1999, p.19)

The extent to which an individual is their own judge in terms of values is core to the Capabilities approach which, at its simplest, is presented as what a person can be (their values and beliefs) and what they can do (their actions). In qualifying what this means, it is useful to see how Sen sets passivity against action.

Need is a more passive concept than ‘capability’ and it is arguable that the perspective of positive freedom links naturally with capabilities (what a person can do?) rather than with the fulfilment of their needs (what can be done for the person?). (Sen, 1984, p.514)

Whilst Sen’s major area of focus is that of equity, freedom and development in an economics context, the idea of agency translates easily into a design context, for instance as given in the illustrative example provided by Fry.

To lose the ability to design is to lose everything. Here is the distinction between, for instance, the homeless who make a world for themselves from whatever they find on the street and those who totally abandoned their very being to its fate and reach their historical end. (Fry 2012, p.32)

What we can be and what we can do is, in Sen’s view, the basis of functioning as a human being. Fry presents a similar idea, but relates this directly to our human capability as designers.

The nature of our becoming by design... What it actually means is changing, by design, our relation to one another (our socio-political ecology), to object-things (and those loads of exchange upon which our existing economy and technosphere stands), and our perceptual field (how we see, know and feel). (p.37)

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His view is that this is what we need ‘to be’ in order for the world (and humans) to continue ‘to be’ – to exist.

In focusing on exercising individual, or personal, agency, neither Sen or Fry are promoting an egotistical perspective. Both link the power of individual agency when linked to social, cultural and political contexts. Speaking in the context of the economics of development, Sen goes further by saying that, to overcome world problems (such as poverty, deprivation etc) individual freedom needs to be seen as a social commitment (Sen, 1999). So, from the perspective of developing design capability, in which agency is enacted within a framework of social, cultural, environmental and potentially even political relevance.

Attempting to achieve both understanding and agency with learners in a formal educational setting is a challenge that will be discussed later in this chapter. But if the learner is to become a sustainable designer these ambitious goals becomes an imperative.

MAKING AND BEING HUMAN

Bringing the capability focus more directly onto designing allows us to also consider that when exercising *design* capability we are in the special arena of agency and understanding that links with our human ability as a maker – homo faber – and the duality highlighted by Archer of ‘knowing how’ linked to ‘envisaging what’, or what also might be presented as the hand and the brain. Fry highlights the importance of the relationship between the two.

We should understand that, in making a world, we largely made it by hand and, in doing so (from the perspective of ontological design), made ourselves what we are. Certainly, the development of our brain was crucial, but, without the capabilities of the hand, the brain was an agent without an actor. (Fry, 2012, p.47)

Writing nearly a hundred years earlier, A. N. Whitehead, in an essay making a strong case for what was then described as ‘technical education’, also highlights this critical relationship.

The connections between intellectual activity and the body, though diffused in every bodily feeling, are focused in the eyes, the ears, the voice, and the hands. There is a co-ordination of senses and thought, and also a reciprocal influence between brain activity and material creative activity. In this reaction the hands are peculiarly important. It is a moot point whether the human hand created the human brain, or the brain created a hand. Certainly the connection is intimate and reciprocal. (Whitehead, 1929, p.60)

Dating from even earlier that Whitehead, educators had been exploring this important connection through the development, initially in the Nordic countries, of educational Sloyd – an aspect of general education in those countries that still exists in the

present day. Uno Cygneus, seen as a founding father of Sloyd in Finland, spoke not just of the mind but also ‘the hand and the spirit work in concert.’ (Thorbjornsson, 2006, p.12). Kajsa Borg, writing about the early developments of educational Sloyd in Sweden, outlines how

The pupils were asked to make handicraft objects that were needed or could be used in their homes. The work was expected to train the children’s bodies and minds, and to support their cognitive development. The main purpose of the subject was NOT to learn the technical skills, but other aspects that were trained while working by hand, such as respect for manual work, seriousness and carefulness in any task or work.’ (Borg, 2006, p.38)

The holistic development of the individual through engaging in making, in whichever national context the curriculum has been set, has consistently focused on thoughtfulness in relation to the material and made world and it is not surprising that current Sloyd curricula, e.g. Sweden (Borg, 2006) and Iceland (Thorsteinsson & Olafsson, 2013) have a focus on the environment and sustainability. The complex and rich context for learning that making provides is further illustrated in the anthropological case studies Marchand has drawn from his research into apprenticeship in the vastly differing contexts of minaret builders in Yemen, mud masons in Mali and fine-woodworkers in London (Marchand, 2008). Describing the nature of the knowledge of the makers as embodied knowledge – “knowledge beyond language” including in domains such as “emotional, sensorial, spatial and somatic” (p.257) he describes the richness of learning through making as including

technique, worldviews and a set of guiding principles for ethical judgement; and in some cases, training encompasses devotional religious practices, the performance of magic and correct enunciations of powerful benedictions. (Marchand 2008, p 250)

A combination of the above perspectives of the value of making, the unique way in which making manifests in humans, the resonance with both the Capabilities approach and the concept of well-being and the important role it plays in both agency and understanding, it can be seen as a critical aspect of design capability. The intimate relationship between making, materiality our made world and sustainable futures highlights the importance of its inclusion in the educational experience of the learner becoming a sustainable designer.

THE LEARNER AS SUSTAINABLE DESIGNER IN THE CURRENT CURRICULUM CONTEXT

What does all of the above mean for Design and Technology education?

In discussing the publication of his book *B is for Bauhaus: An A-Z of the modern world* (Sudjic, 2014), Deyan Sudjic commented on the increasing importance of design that asks questions as much as design that offers solutions. He was referring

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particularly to what is a critical design approach formalised by the practice of Tony Dunne and Fiona Raby (2005). He also spoke with some concern about what he described as a generation of designers that have missed the experience of making, by which he is referring to physical making. For me, these two points jointly contribute to an important question – what of the next generation of ‘designers’? How should we frame the educational experiences of the next generation? Should we be focusing on the development of the critical designer, the thoughtful maker?

Commenting on the mass design that now populates our material world, Sudjic referred to the ‘Macdonalds of design’ – ubiquitous, palatable but not nutritious. This comment caused me to reflect on much of what is currently practised as Design and Technology in schools. Have we been providing the ‘Macdonalds’ version of a Design and Technology experience? If so, what would a more ‘nutritious’ version be like? In the earlier part of this chapter I have explored the concepts of well-being and designerly well-being; of a capability approach; a critical approach; the value of Design and Technology practice within the context of making; and, especially for sustainable futures, the importance of a Design and Technology education that is framed by social and cultural relevance. Seen through these lenses, how does current practice measure up? How might these lenses be used to inform future developments?

CURRENT CONCERNS WITH DESIGN AND TECHNOLOGY CURRICULA

In an analysis of a set of recent documents critiquing Design and Technology in the English education context (Stables, 2012), I highlighted key aspects of concern that were raised and also illustrations of where practice was seen to be at its best. The issues of concern indicated that all too often the subject was seen as too narrowly focused, too formulaic, spending too much time on tasks with little worth that led to undemanding and often unfinished projects. Too much of what was taught focused on inappropriate assessment, driven by a ‘teach to the test’ mentality. Where the practice was at its best, teachers had high expectations of learners, the subject provided ambitious and engaging projects that enabled learners to deal with major human issues through significant design challenges. The projects fascinated and inspired learners (Ofsted, 2011; Miller, 2011).

At a general level, the subject was seen to be enjoyable, ambitious or not, which could indicate the ‘Macdonalds’ tendency. There was also a tendency to view the curriculum under consideration as overloaded – highlighted in one of the reports being analysed by the comment “There seems to be too much in the DT curriculum to have time to reflect on the broader picture of Big Design.” (Miller, 2011, p.9)

Questions I posed as a result of this analysis included “are we prioritising the right things in D&T education?”, “does the curriculum need de-cluttering?”. While drawing on the English Design and Technology curriculum, there was a suspicion

of resonance in other national and provincial settings. My expressed belief was that the curriculum does need de-cluttering and that this could be achieved by a radical shift in priorities, away from lists of knowledge and skills to be learned and towards a focus on attitudes and engagement – towards a curriculum that first and foremost “sparked enthusiasm, passion, competence, confidence and pride” through engaging learners in challenging tasks that they considered to have social and cultural relevance – what might be seen as Big Design challenges, rather than Big Mac projects that fill a gap but in the end are not intellectually inspiring or satisfying. Such a shift links well to Sudjic’s comments about the value of a focus as much on design that asks questions as on design that offers solutions. If there is one thing that designing for more sustainable futures requires, it is a questioning approach, starting with a fundamental question of which problem of sustainable futures is the creation of yet more products the solution.

This is an area that has been explored by Leo Elshof (2006) in discussing the massive influence of the *product paradigm* on teaching and learning in Design and Technology Education.

The notion of a product paradigm stems from the fact that the conventional manner in which we have considered the role of products in the cultural life of rich, developed nations needs to be reassessed in light of scientific realities and in the paradigms that inform their production (Elshof, 2006, p.19).

With a concern for the lack of criticality that is brought to understandings of impacts of current production and consumption habits, Elshof makes the case for questioning and reassessing “the manner in which we teach young people about product design, development, manufacture, use, and disposal” (p. 19). In discussing problematic elements of the product paradigm, he poses the value of addressing the symbolic nature of products including the cultural perspectives that are embodied in products as “carriers of a worldview” (p.21). In presenting an argument for the development of an eco-product literacy he draws attention to the cultural lag of Western methods of production and consumption, in respect of their negative impact on environmental sustainability. Providing a learning landscape where products are analysed to understand the ways in which they are really addressing needs and wants – and whose needs and wants - he highlights the importance of developing an eco-product literacy that creates understanding of the impact of the production and consumption of products not just on the environment, but also on matters such as social justice and equity.

Throughout the historical development of what is now formulated in many parts of the world as Design and Technology or Technology Education, a core feature is designing and making products. Take away this activity and what does this do to the very identity of the subject? I have made a strong case earlier in this chapter for the importance of making, but questions need to be asked that challenge assumptions within the discipline. What is the value of making for the development of the learner? Is making always concerned with the physicality of materials? Is the result of designing always about the creation of a physical product? Exploring these ideas

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from an explicitly different worldview, that of Taoism, Flowers (1998) presents a more holistic perspective wherein the outcome is driven by the challenge, not the need to engage with a particular material.

the result of product design activities for technology students is that these students learn materialism to an extreme. They are taught that just because something can be invented or produced, it should be. They are taught that creatively designing products is a good thing, regardless of the outcomes. ... Maybe the solution to a problem would be a change in corporate policy, new legislation, a consumer education program, or changes in how a product is marketed. These are each examples of design, but it is a system, not a product, that is designed or redesigned. Maybe the best solution is non-action, and acceptance of the situation without change. (Flowers, 1998. p.21)

He goes further by exploring questions of consumption – when is enough, enough? Quoting from Taoist texts the concept that “[one] who knows that enough is enough will always have enough” (Lao Tsu, 1972, #46) he asks “Is the goal to achieve a sustainable future, or to keep accelerating? Are there enough designs? Is there enough technology?” (Flowers 1998, p.23). He suggests that if learners “know when enough is enough,” they can be liberated to explore outcomes more independently and thoughtfully. His wry comment on this is that

Students who are practiced in considering this wider range of alternatives will be better prepared to face the demands of global citizenry than those who merely make yet another CD rack. (Flowers, 1998, p.25)

MODELS OF LEARNING FOR SUSTAINABLE DESIGNING

Encouraging a critical approach to understanding production and consumption is not new in Design and Technology Education. This approach has been consistently explored and promoted in recent history, for example Petrina in the context of taking a political stance (2000); Layton (1992) and Conway (2000) in exploring ethics and values; Keirl (1999) in the context of citizenship and democracy; McLaren, with a focus on critiquing products (1997, 1999); Walker, with a focus on a spiritual dimension (1999); Pavlova in the context of social change (2005). With each dimension presented there is an implicit or explicit necessity for a shift in approaches to learning and teaching. If we want learners to be empowered to break from a current paradigm of thoughtless production and consumption to one where they are empowered with agency to make more critical approaches towards a sustainable future, then models of learning and teaching need also to shift from a default transmissional pedagogy towards one that is more transformative in approach. Drawing from the work of Freire and Macedo (1995), Pavlova (2013) presents a social emancipatory view of transformative education that promotes three approaches to learning and teaching

critical reflection (to identify the ways students' agency could transform society and their own reality); a liberational approach to teaching (facilitating cognition, problem posing and discussions); and an equal, horizontal student–teacher relationship. (Pavlova, 2013, p.660)

Linking critical reflection of the learner to the development of their sense of agency has resonance with ideas presented earlier in this chapter. The notion of developing agency through Design and Technology education is present in the forceful idea of taking action. Linked to critical reflection, we have the groundings of thoughtful action and critical capability, drawing on ideas of Sen (1999) and Fry (2012), as presented earlier.

Focusing learning and teaching in Design and Technology into contexts and activities that put learners into positions where assumptions are challenged, norms are questioned, their own worldview can be contrasted with that of others, can provide engaging springboards to 'intrigue and fascinate' learners. Balancing the understandings such contexts could create with creating agency to take positive action is vitally important. In exploring this idea with 'eco designers' and student Design and Technology teachers (Stables, 2009) the following comment, forcefully brought home this point.

they know that there's an issue around recycling and energy for example so you have to be really, really transparent about, "Yes. It is complex". ... And that is difficult because they're very young and ... you want them to be enthusiastic but you have to do that and find the right balance of the sort of agency and information – because too much information and too little agency is no good. And the opposite is no good either. (Stables, 2009, p. 214)

GLIMPSES OF POSITIVE SCENARIOS FOR DESIGN AND TECHNOLOGY EDUCATION

Section three of this book provides excellent examples of where a critical capability is being developed through balancing agency and understanding – where learners are encouraged to consider complex and challenging questions about the impact relationship between sustainable futures and design and technology. I would like to finish this chapter with a small case study from my own research – one that focused directly on positioning social and cultural relevance at the centre of a design and technology challenge.

The project formed the core of a very small scale pilot project that set out to explore the consequences and outcomes of putting learners' identification of meaningful design contexts at the centre of project work. The research started with giving 46 fourteen year olds a questionnaire that asked what they wanted to learn about in Design and Technology. The questionnaire contained 30 questions that ranged from designing transportation systems of the future, to designing that helped address issues of climate change, designing ways of addressing health issues and design

that could help create world peace. On the basis of the questionnaire responses, the learners were grouped into teams of four learners who shared common interests. Teachers then planned a one-day Design and Technology ‘enrichment’ day, where they set the teams the challenge designing for a world of the future, considering how lifestyles and technologies might change. Outcomes from the challenge ranged from designing that addressed issues of health and isolation by creating a website to bring communities together for social sporting activities to designing that focused on the tragic impact on bomb disposal experts of the death of bomb disposal dogs by creating comfortable, flexible, protective dog armour, to concept development ideas for using geo-energy to reduce climate change, for example artificial trees that suck carbon from the air and launching millions of tiny mirrors into space to reflect sunlight. Pondering the comment of Flowers cited earlier, all a long way off making yet another CD rack.

Possible more significant outcomes from the day were indicated by the learners through an evaluation questionnaire in which showed, for example, very high level agreement that letting the learners choose the design topics worked well, that they felt proud of what they had done, that the ideas were being driven by the learners, with teachers acting as support. Feedback from the teachers focused on the learning that took place – not of the knowledge learned, but of how to work in teams, how to communicate, how to learn independently and most significantly how the learners had learnt about themselves. They also commented on how the learners had surprised them with their maturity, their seriousness, the level of debate they engaged in.

The project was no more than a taster, but it gave welcome insight into how ready young people are to take on challenging projects where they feel a real commitment and where they feel they can make a difference to their world. One key consideration in engaging learners in challenges of sustainability is the very real impact that unsustainable practices will have in their lifetime. Just as there needs to be a balance between agency and understanding there also needs to be a way of engaging learners with issues without presenting either overly optimistic or nihilistic perspectives. The value of maintaining a balance of perspective is indicated in the much quoted comment of Donella Meadows (2001)

I’ve grown impatient with the kind of debate we used to have about whether optimists or the pessimists are right. Neither are right. There is too much bad news to justify complacency. There is too much good news to justify despair.

In the case of the young learners engaged in the pilot project above, they chose to address challenging, complex topics and they showed their capability in doing so. Their commitment and enthusiasm allowed them to show an unexpected level of maturity in treading a positive path. In doing so they surprised their teachers and possibly themselves. Along with learners presented through the case studies that follow later in this book they also gave clear indications of the readiness of young learners to become sustainable designers.

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