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Designing matters; designing minds: The importance of nurturing the designerly in young people

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Abstract

Design education, at face value, is often seen as being vocational – that it is about educating the next generation of designers. But all humans are 'designerly' by nature. We have a predisposition to envision and create new future realities in a way that has been described as an intrinsic and defining characteristic of being human and that is vital for cultural evolution. It is a capability that exists as innate potential.

In this paper I argue that it is a critical responsibility of educators to develop design capability in all learners at all levels of education. To do this effectively requires a radical questioning of assumptions about the similarities and differences between educating young children and future professional designers, about the nature of difference between novice and expert designer, and of the value placed on developing the designerly potential in all.

I also argue for a closer alignment between researching designing in a professional context and researching designing in younger learners as a way of bringing mutual benefit and a greater understanding of the value the designerly has, both for the individual and for civilisation.

In the first section of the paper I lay out some of the concerns that have been raised, historically and currently, over the place of design education in the curriculum. I then move to explore the issues raised through drawing on a number of research projects conducted in the Technology Education Research Unit at Goldsmiths. Finally I consider aspects where research has not, so far, provided the answers and suggest where we might begin in seeking further understandings.

Key words

Designing; designerly; educational; vocational; novice; expert; design education; design research.

What is 'the designerly'?

The term 'designerly' first made its appearance in design education literature in the 1980s (e.g. Cross 1982; Baynes, 1989) at a time when there was a developing understanding about the design capacity of all humans and a growing concern for the inclusion of design in general education (e.g. Archer 1976; Cross, 1979; Design Council 1980). This era was hot with debate about the development of design education and over the ensuing years belief in the importance of design education has been fuelled by greater understanding of the propensity for humans to think and act in designerly ways. At the heart of early discussions was a belief that amongst the myriad of abilities human beings possess are three that make a particular contribution to the 'designerly: our ability to 'image' in our minds things we have experienced and also that we haven't; our ability to manipulate those images, both in our minds and through externalised actions such as talk or drawing; and our ability – and determination – to utilise imaging and modelling of ideas to create new future realities.

There is nothing like concrete exemplification to aid understanding and so, to illustrate these abilities, I will draw here on two examples 'borrowed' from elsewhere that I have found to be intensely powerful in demonstrating the abilities in question. The first, 'borrowed' from Ken Baynes when I studied with him in the early 1980s, demonstrates our fantastic imaging capacity.

> *First close your eyes. Now imagine it is a hot, sunny day and you are sitting under a cool leafy tree. You are going to have a cup of tea. Imagine what you will drink the tea from. Pick up the teapot and pour some tea. Now decide if you will have milk or lemon…then add this to your tea. Take a spoonful of sugar, add it to the tea, stir it round and tap the spoon on the side of the cup. Now drink your tea.*

Did you 'see' the cup? Smell the lemon? Taste the milk? Hear the spoon 'chink' on the side of the cup? I have used this imaging exercise countless times with students, teachers and others and always it brings to the surface the extent of our imaging facility – that we can 'see' in the mind's eye with all of our senses – taste, smell, sound, touch as well as sight – a point corroborated by Eisner.

> *We not only can generate in the mind's eye a visual image; we can see that image even while hearing music "around" it. We can taste a banana without actually tasting it. We can envision an opera without actually seeing or hearing it.* (Eisner, 2002, pp.4)

The second exercise provides experience of modelling images for an intended purpose and is borrowed from my colleague Richard Kimbell.

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Imagine an eight year old girl, playing in the garden. She climbs onto a high wall, falls off and damages her back. The accident is so bad that she will have to remain lying on her back for three months. She loves doing jigsaws. How could she do them while lying on her back?

In my experience, it takes little more than a split second for imaging and modelling solutions to kick in – at least as initial ideas – using magnets, Velcro, computer displays, mirrors are the ideas that typically emerge in the first few seconds. And once people try to explain their ideas, the need to be explicit causes them to clarify the image in their mind, which in turn causes them to develop it towards being a new idea to deal with the situation. Again Eisner points to the crux of what is happening – imagining future possibilities.

Were we limited to the recall of the images we had once experienced, cultural development would be in trouble… Imagination gives us the images of the possible that provide a platform for seeing the actual, and by seeing the actual freshly, we can do something about creating what lies beyond it. ...We do indeed see in our mind's eye. (Eisner, 2002, pp.4)

Nurturing the designerly is not new

The idea that being designerly is something we all have potential in – a key facet of being human – is supported well in the literature (e.g. Archer, 1992; Baynes 2006; Black & Harrison, 1985; Bronowski, 1973; Csikszentmihalyi, 1996; Nelson & Stolterman, 2003). But there is a difference between something existing as human potential and the way that potential is realised through educational experiences. If the designerly is to be nurtured in young people, it follows that it must receive some prioritising within our education structures. I will turn later to the concerns and possibilities that currently surround this, but it is both important and interesting to note that the idea of nurturing the designerly is not a new one. Bruce Archer, writing in 1976, points to the inclusion of the "making and doing aspects of human activity" having a long history and reports the original conception of the 'three Rs' not being reading, writing and arithmetic but as reading and writing; reckoning and figuring; and wroughting and wrighting. Of the latter pair he clarifies that

Wroughting...meant knowing how things are brought about, which we might now call technology [and] wrighting...meant knowing how to do it, which we would now call craftsmanship. (Archer, 1976; 2005, pp.9)

Whitehead made an even stronger case in 1929 in his essay on Technical Education's relation to Science and Literature, arguing for creating balance in the curriculum through the inclusion for all technical education, which had been neglected because of:

two disastrous antitheses, namely, that between mind and body, and that between thought and action. (Whitehead, 1929, pp.50)

In an incredibly visionary way, Whitehead highlighted certain fundamental underpinnings of 'technical education' that resonate generally with the concept of the designerly and specifically with the words above of Eisner, characterising technical education as:

creative experience while you think, experience which realises your thought, experience which teaches you to coordinate act and thought, experience leading you to associate thought with foresight and foresight with achievement. (Ibid pp. 54)

Whitehead was concerned with the education of the whole person – and for him, without such experiences an education was incomplete and out of balance. Had such views received greater prominence in their time who knows how different design education might look today?

More recent concerns over design education

Whitehead was a philosopher and mathematician with a great interest in, and strong views about, education. More recently it has been designers and design educators who have been the activists identifying the importance of designing as a human capability and of general education as having a key role in developing that capability. While there is a sense that this has very much been a pre-occupation within the English school system, it has not been exclusively so. For example, in the early 1990s a group of designers were pressing this claim within USA schooling. In 1990, Shannon (a designer) wrote of design:

as an integrative, life affirming, human capability has been subordinated in our culture. But ... that a broad program of public design education, beginning in the public schools, can reestablish design's evolutionary role at the center of our lives. (Shannon 1990 pp.40-41)

Shannon's concern was that the perception of design as a highly specialised and professionalised activity had disenfranchised the general population at a time when "designing the world we live in is everyone's opportunity and responsibility". The problematic nature of the dichotomy between designing as a specialist activity of the few and the ubiquitous designing of everyday life, echoes through concerns over design in general education.

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Arguments centre around the age-old conundrum of whether school education should be driven by educational or instrumental (vocational) concerns – design education for all, for life, or design education for the few who will choose to make a professional career as a designer. In 1985, Baynes was clearly making a case for the former in claiming the primary aim of design in general education to be

> *Develop[ing] everybody's design awareness so that they can:*
> - *enjoy with understanding and insight the (man)made world of places, products and images;*
> - *take part in the personal and public design decisions that affect their lives and the life of the community;*
> - *design and criticize design at their own level for their own material and spiritual needs;*
> - *bring an understanding of design into their work.*
>
> (Baynes, 1985 pp. 241-242)

Over 20 years later he was re-iterating the claim, seeing design education as "*even more important*" because of:

- *the steady growth of consumerism;*
- *the threatening environmental crisis;*
- *the growth of new ways of communicating – and so learning - using digital media;*
- *changes in the economy and the means by which wealth is created*
- *changes in children's culture and the way society regards children.* (Baynes 2006, pp.7)

In this claim he is hinting at political and economic drivers for design – the current global focus on the creative industries and the belief that creative capabilities lie at the heart of economic competitiveness (Cox, 2005, Frayling 2006). This recent emphasis runs the risk of driving an instrumental wedge into the development of design capability in young people if it leads to an increase of specialisation and vocationalism, rather than recognising the more holistic contribution individuals can make to their communities and society through taking a designerly approach to the world. Whilst, either directly or by inference, the case has been made for this broader contribution (Kimbell & Perry, 2001; NACCE 2001; Seltzer and Bentley, 1999), two particular dangers remain. First is the top-down impact that specialist examination courses have on the curriculum of younger children (for example the highly skills-focused D&T experiences that have become characteristic of the provision for 11-14 year olds in English schools). Second is a more subtle danger – wherein the broader educational benefits of a specialist design education are either not recognised or are ignored. This second danger was highlighted by Chris Frayling speaking at the 2006 Seminar – *Design Education: now you see it, now you don't*, referring to the experience of Higher Education design students.

> *ROYAL COLLEGE OF ART students…feel strongly that they should be both vocational and academic. …The vocational argument is very strong at the moment with the growing importance of the creative industries to the UK economy. ...This vocational/academic issue is very significant for today's students because...in 2003 there were 140,000 students completing HE/FE design courses [and] a total of 6,315 graduates got jobs [in the design industry] in 2004. So there is clearly a mismatch between education and the expectations of the creative industries. And if the arguments are purely vocational it is incredibly inefficient* (Frayling 2006 pp.3)

In all of the above, there is relentless echoing of two unhelpful schisms that militate against 'nurturing the designerly'. First there is what Whitehead referred to as the "*disastrous antitheses...between mind and body, and... between thought and action*' and the way this is enacted through the relegation in general education of – what Cross (1982) aptly referred to as the 'third culture' – design. Second is the schism between the designer in us all and the Designer as specialist – what, in coining a phrase from creativity (Craft, 2001), could be referred to as little d and Big D. Both schisms have the potential to distort educational experiences offered through the curriculum; both need exploring and understanding further if we are to meet the challenge of nurturing the designerly. Some of this understanding exists in research already undertaken, including that which has been conducted in the Technology Education Research Unit at Goldsmiths. I will turn now to sharing some of the insights that this research can contribute.

Thought and action

The first area that was the focus of much of the early research conducted in TERU related to the roles of thought and action in designing processes and began with research conducted for the, then, Department for Education and Science into the design and technological capability of UK's 15 year olds – *the APU D&T project*. This project has been reported extensively elsewhere (most notably Kimbell et al., 1991; Kimbell and Stables, 2007) but the key matter for this paper was model of thought and action that was both derived and validated through the project. At the time of undertaking the research the predominant model of designing operating in schools was a linear model drawn in the early 1970s from a particular aspect of research into professional designers through the design methods movement (Jones, 1970). As a team of

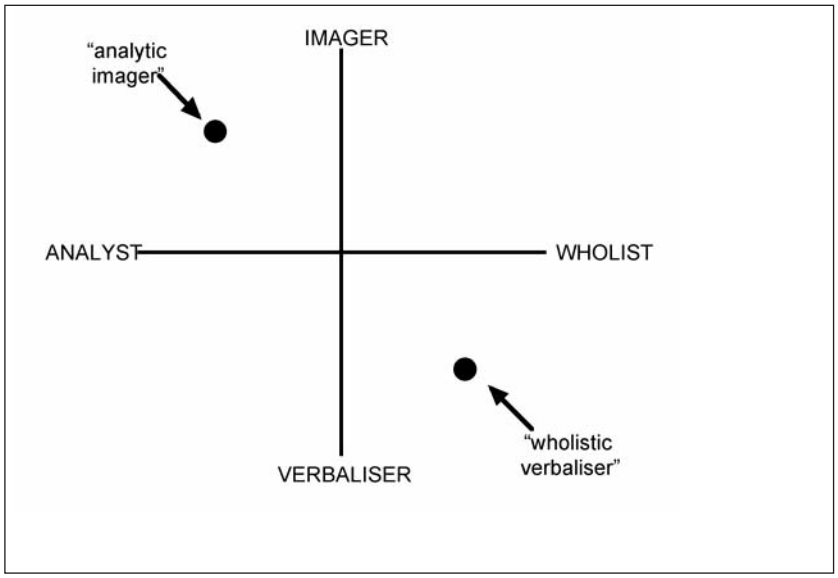

Figure 1. APU D&T model

design education teacher practitioners, we were uncomfortable with this model, convinced that it was prescriptive, sanitised, divorced from the reality of how designing actually takes place and, at the end of the day, adopted in schools for the simplistic, managerial potential it afforded. Drawing on our own experience, our reading and our initial fieldwork, we created an alternative model (***Figure 1***) that captured a responsive, iterative process of imaging and modelling, reflection and action.

The model formed the basis of our approach to assessing capability, allowing for an initial holistic judgment of the overall quality of the work (what the learner was trying to do and the action and reflection they engaged in to achieve it) and then a description that enabled us to map how they had gone about their work. What became clear from the analysis of the work of the learners (in total close on 20,000 short, focused design activities) was that first, at a general level the model was a remarkably good match to the ways the young people approached their design tasks and that, second, by linking the judgement of the quality of the work to the descriptive mapping of learner's approach enabled us to see typical variations in ways of working that could be used to better understand differences in approaches and the strengths and weakness evidenced. At a crude level, four characteristic ways of designing were determined (***Figure 2***). The first showed a **balance** between action and reflection in which there was evidence of a web of iteration between the two. Where we witnessed this we also frequently witnessed designing that had been judged to be of a high quality. The second and third were mirror images of each other – one showed a **reflective skew** to the designing, typically where the context of the designing and the issues to be addressed played a dominant role and the other an **active skew** where an initial idea was relentlessly pursued without too much thought being given to how much it addressed the needs in the situation. Both skews had the impact of depressing the overall quality of the designing – the former where a learner, typically, became virtually de-mobilised either because the perception of the range of issues to be dealt with were too overwhelming, or because they had neither the confidence nor the repertoire with which to take action. The active skew tended to be evidenced where ideas that had run away with themselves to become, ultimately, weak solutions to the task in hand of which the learner had lost sight in the momentum of realising an ill-considered idea. The fourth approach we termed un-hinged and was typified by learners who could see and articulate the issues to be addressed, but whose design ideas appeared to pay no attention to these.

This initial project provided not just a way of understanding the messy reality of human designing, it also began to provide a perspective on ways to support learners in developing their capability – for example by developing confidence and a practical repertoire in modeling for reflective designers and by encouraging those with an active skew to take pause for thought. It also was the springboard for further research focused on designing styles, by linking our work on thought and action

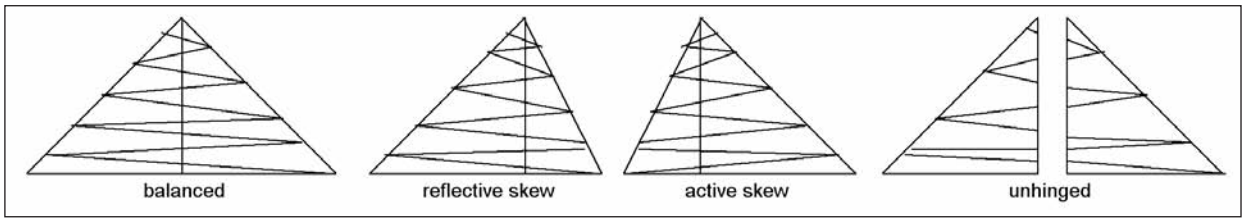

Figure 2. balanced, reflective skew, active skew unhinged

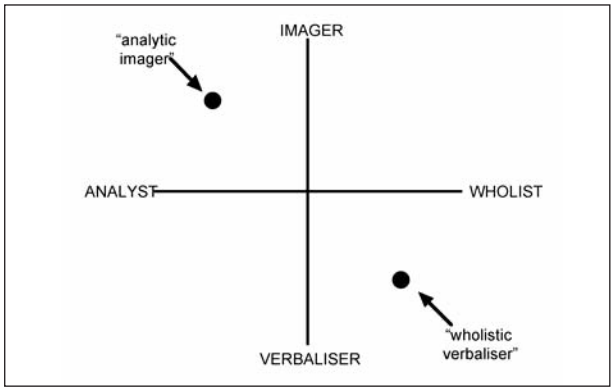

Figure 3. Cognitive Style Analysis matrix

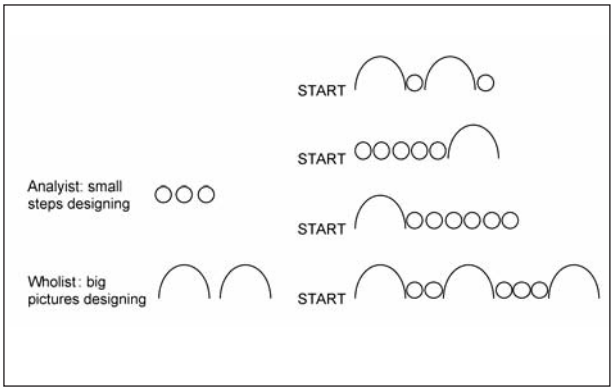

Figure 4. Big pictures small steps

with the research of colleagues in Goldsmiths Psychology department on cognitive style. The first refinement in understanding of designing approaches that this produced was the addition of a further dimension to describing approaches to designing from Cognitive Style Analysis (Riding and Cheema, 1991; Riding, 1992, Figure 3) that, amongst other things, was used with student design and technology teachers to help them reflect on their own approaches to designing (Lawler, 1996).

The research also added to our belief that there is no simple, one-size-fits all model of designing (as implied in a linear model) because what **didn't** emerge was a single

'designer' cognitive style. This led Tony Lawler to expand on this work to create a way of describing designing styles that reflected the concept of cognitive style, based around what he came to term "big pictures" and "small steps" designing (Lawler, 2004) which he characterized as shown in ***Table 1***.

From Lawler's initial work with student teachers and from subsequent use of this in further school-based research projects, in most cases this is not an either/or – and, just as the descriptive mapping we undertook with the APU D&T project, we can 'map' both big pictures and small steps designing within different pieces of design work to create profiles, as shown in ***Figure 4***. While the approach could benefit from further development, it has added to our toolbox of understanding approaches to designing.

Possibly one of the main limitations of all of the above research has been that it has largely been undertaken in the context of general education – and to this I will return. But first I wish to review the insights gained from TERU research into general and specialist perspectives on designing.

The predicament of BIG D little d…

In reflecting on the changes that have taken place since the emergence of design education in the 1970s, Ken Baynes made the following statement.

> *What cognitive science has done is to show conclusively that designerly thinking and action are features of the mental activities of all humans. It has settled the argument between two apparently contradictory views of design.*
>
> 1. *That design is highly specialist, complex and esoteric – that particularly the act of designing is something which people can do only after a long apprenticeship.*
> 2. *That design ability, like language ability, is something that everyone possesses at least to some degree.*

Big pictures designing	Small steps designing
• more at ease with intuitive and emotional decision making • more concerned with beliefs and philosophies • more like 'right brain' thinkers; • more projective and future focused • more random in their actions.	• more at ease with logical, numerical decision making • more concerned with strategies and policies • more like 'left brain' thinkers • more reflective and historical • more systematic in their way of working

Table 1. Characteristics of big picture and small steps designing (from Lawler, 2004, pp. 183-185)

> *We have to now accept that these two views are complementary. The highly complex skills of the professional engineer, fashion designer or CGI artist are simply the specialist development of abilities and understandings we all have.* Baynes, 2006, pp.7

On one level this is immensely helpful – providing a sense of a continuum along which all people sit. But, one could argue due to the lack of good and coherent design education, the reality is different. If it weren't, then humans would universally be operating in 'designerly ways'. Lawson (2004) provides extensive insights into the special expertise of designers – what they know – that sets them apart, but at the same time reflects that:

> *Sometimes it is neither skill nor knowledge per se that is important but a way of seeing or perceiving that may be the crucial ability.* (Lawson, 2004, pp.3)

Two projects conducted in TERU in the 1990s illustrate this and show conflicting sides of the general value of highly developed (specialist) design understandings – the first where this was recognised, the second where it was not.

Decisions by Design (Kimbell et al, 1997) was a project commissioned by the Design Council that aimed to explore: the nature of designerly decision-making; whether management decision-making is a designerly kind of decision making; and, if not, would management decision making be "better" if it was more designerly. The project worked with school managers (typically deputy head teachers) who undertook a design task and observed student designers and through this identified a range of ways that designers operate when making decisions that were alien to the managers, such as:

- continually 'un-packing' the task;
- making thinking explicit;
- dealing with clients and values;
- handling innovation and risk;
- using the power of group work;
- modelling possible futures.

Having gained insights into these designerly approaches, the managers found they could successfully apply them in their normal work context.

While this project demonstrated the potential of non-specialists gaining explicit understandings of designerly approaches that have currency in other settings, *Design Skills for Work* (Kimbell et al., 1997; Kimbell et al., 1999), also commissioned by the Design Council, demonstrated the danger of higher education design courses not making students aware of their transferable skills. The research aimed to identify the transferable skills that were derived from the educational focus of design programmes and established a list not dissimilar from those identified by the managers in the previous project. But these same skills were not explicitly recognised, promoted or valued by either the students or their tutors from the design courses. In identifying evidence of "ubiquitous vocationalism" the research team found that

> *In every course, the degree was seen by the graduates as vocational in the sense that the vast majority of them have a career ambition to become designers, architects, or engineers, working somewhere in industry. They were not pursuing a higher education degree in the classical sense: they were training for a specific profession, and in the main they had an occupational route planned* (Kimbell et al., 1999, pp.14)

Reiterating the words (above) of Frayling "*if the arguments are purely vocational it [design education] is incredibly inefficient".* (Frayling 2006 pp.3)

So, while both projects identified a broader contribution that specialist design education has to make, there is a need to recognise and articulate this contribution if it is to be realised. One might ask when does little d become Big D and vice versa. This raises further aspect of the dilemma of Big D and little d – if in design education, at any level, we are seeking more than pure vocationalism, when does specialist education start, and at what point might we expect to see evidence of expertise? The reason I see this as problematic is because generally, in the wealth of literature around expertise, higher education design students are perceived of as novices. What does this then say about the designerly skills of those in general education?

Novices or experts?

For me this begs the question of how novices and experts are conceptualised. Cross (2004) distinguishes between talent (that a young person may have) and expertise that comes from years and years of training and practice. He acknowledges the widely held view that people move somehow from novice to expert and, in reviewing a wide range of studies of expertise within and beyond design, comes to the conclusion that designers don't necessarily fit the mold of expertise as identified in other disciplines, describing expert designers (rather engagingly) as appropriately "ill-behaved problem solvers" (pp. 439) and states that much work still needs to be done to develop a robust view of expertise in design. Dorst (2003), drawing

on the work of Dreyfus (2003) presents a more clear-cut perspective, identifying a range of levels.

- Novice – follows strict rules, considers objective features.
- Beginner – more aware of context, exceptions to the rule.
- Competent – selective problem solver, more clearly articulated plans, more trial and error, more reflection.
- Proficient – accurately recognises important features, plans frequently.
- Expert – operates intuitively, performs appropriate actions without conscious mental effort.

But, like Cross, Dorst recognises the complexity in defining expertise and also comments

> *nobody is an expert on all aspects of design, on some problems we might be novices, at others we might be competent, or experts.* (Dorst, 2003, pp. 144)

Whilst recognising the value of the studies that have taken place, there remains the problem of how pre-degree learners are perceived – are they all novices? This seems a huge category to lump all children and teenagers into – and is distinctly unhelpful in developing understanding of young people as designers. Lets look at some examples.

Take Graham – a five year old, designing a house for a toy spider that would provide warmth, be big enough for the spider to live in and not blow away in the wind. ***Figure 7*** shows a photograph of Graham's model and of his planning drawings. Several features are worth mentioning. Part of the roof slopes – so that rain will run off. Parts are covered (albeit somewhat sparsely) with grass – for insulation. The house has a chimney for warmth and is painted the colour that Graham has determined his spider would like. The house also has a slide (that started out as a gutter but that wouldn't stick) and a ladder, so that the spider can climb to the top of the slide. At the start of the enterprise Graham had no idea how to make a ladder, but after imaging it in his head, drawing it out on his plan and being shown how to use a bench hook, junior hacksaw and low temperature glue gun, he had no trouble making one – and as the youngest child in the class then became the resident 'expert' in measuring and cutting dowel.

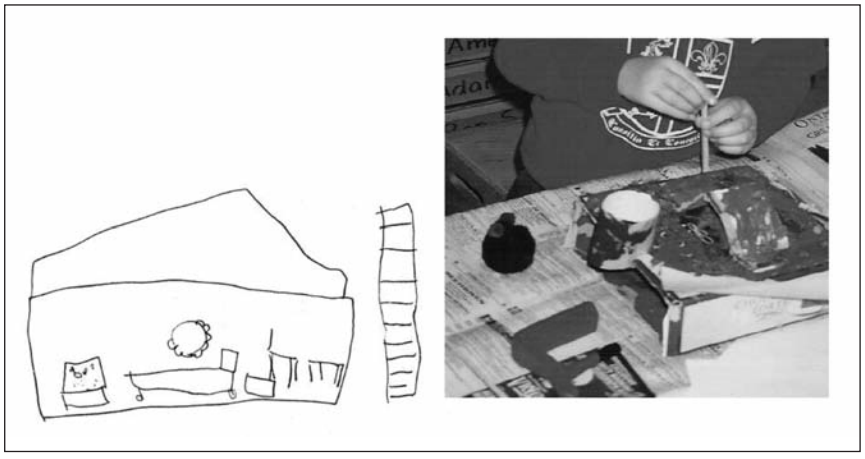

Figure 5. Graham's spider home

And Michael. His class were designing headgear and Michael wanted to design and make a motorbike helmet "so that I can play motorbikes". His teacher encouraged the children to make a drawing of the headgear they wanted to make, then photocopied their drawings and gave them back the photocopy so that they could plan out the detail. From Michael's drawing and the plan, it is clear that he envisions a colourful helmet with a visor that goes up and down and with a parrot on the top. He went on to make a beautiful orange, papier maché helmet with a visor that pivoted on split pins – and with a parrot on the top. Michael was six when he did this.

Christopher's class were studying plants and growing and he and his friends were designing and making a propagator. They had a plan, proposed by one of the other children, based on a plastic bottle with the top hinged, but were having trouble getting aspects of the construction to work. Christopher had a new idea based around a tent frame structure – and went off and did some planning, came back and shared it with the group who then adopted it and put his plan into action. Christopher was seven.

All three examples are impressive – and whilst we might be looking just at 'talent', I suspect not. None fit neatly to the novice characteristics – and all could be described as ill-behaved problem solvers. They certainly weren't following too many rules. So what are we to make of this? Taking all three examples, there is a sense in which the least sophisticated designing is Graham's and the most is Christopher's – so is it about age?

In our current research (Kimbell et al, 2007) exploring the use of digital tools in authentic, focused design activities, we have examples of responses to the same design task from a wide range of ages – the youngest being 9 and the

oldest being 17. The quality of the designing revealed through the portfolios (which include drawing, writing, a photographic storyline of modeling developments and voice memos from the learners reporting on their progress, problems, achievements and so on) is varied – some is excellent, some more mediocre. And some of the excellent work – demonstrating greater competence - comes from the youngest children. So not only is it inappropriate to classify all pre-degree learners as novices, it is also not safe to assume that the older (and presumably more 'trained' and 'practiced' they are) the more advanced they will be as designers.

Capability, expertise and repertoire

So are linear views helpful? We have already seen how linear models of designing distort and mask the messy complexity and diversity of genuine designing. So too may be the case with a linear view of progression from novice to expert. If one considers issues of cognition there appear to be some particularities about young children's cognitive development and how this impacts in nurturing the designerly. For example, we know that children are learning fastest around about the age of 3 and that:

> *The brain's greatest growth spurt…draws to a close around the age of 10, when the balance between synapse creation and atrophy abruptly shifts. Over the next several years, the brain will ruthlessly destroy its weakest synapses, preserving only those that have been magically transformed by experience*. (Nash 1997 pp.7)

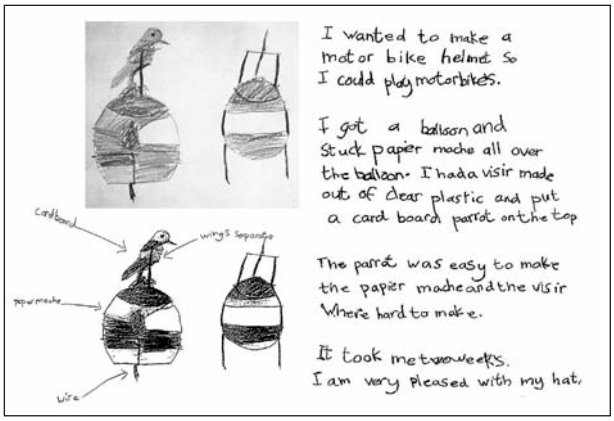

Figure 6. Michael's motorbike helmet

From further research conducted in TERU (the Understanding Technological Approaches project, Kimbell et al, 1996) in which we used close observation to track the design intentions and manifestations throughout the full length of class design projects across all school age groups, demonstrated that it was often the younger children who used the greatest range of strategies when generating and developing design ideas. (Stables, 1998).

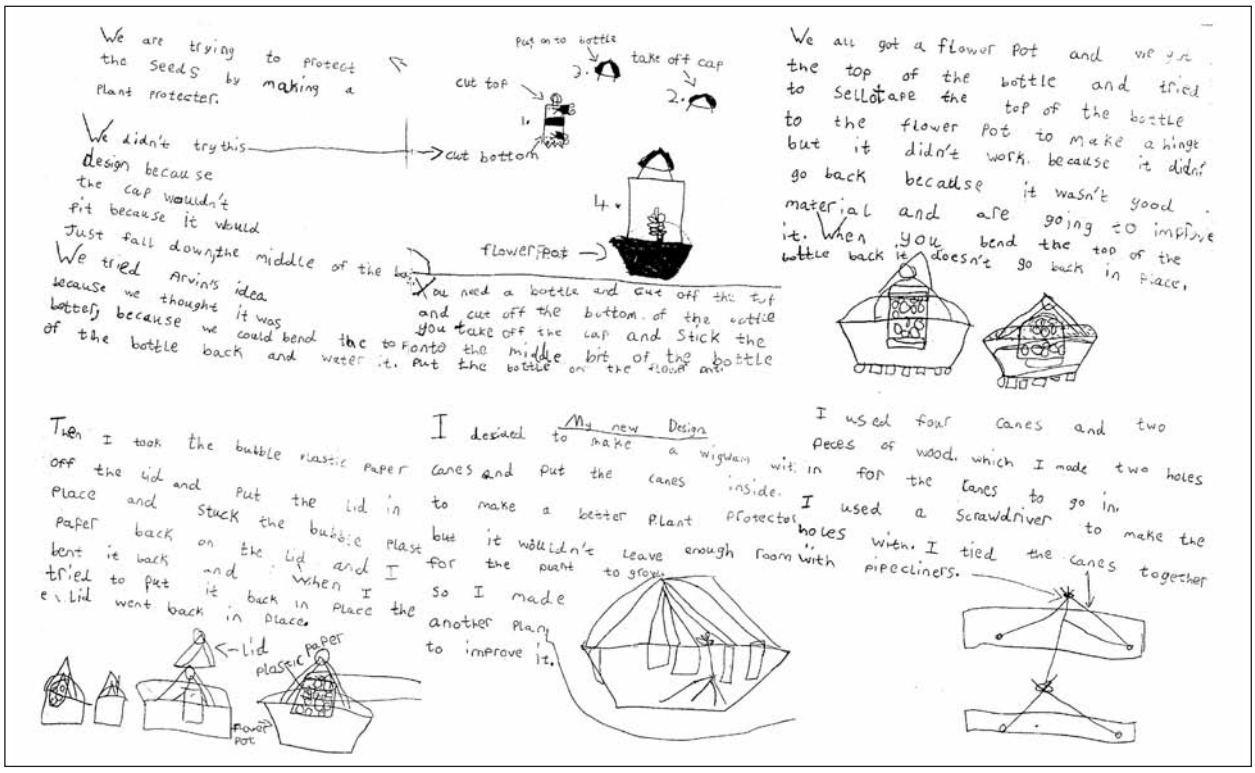

Figure 7. Christopher's propagator

RESEARCH

This was, in part, because of the more directive (and potentially restrictive) approaches of teachers as children move to secondary education. And if expertise is, in part, based on experience, repertoire and precedent (Lawson, 2004) then could restricting repertoire (even inadvertently) not just "ruthlessly destroy" previous learning but also be restricting expertise?

Further insight into the complexity of how designing progresses in young children, comes from a study by Roden who tracked the designing strategies of very small children (Roden, 1999). She found no neat and tidy linear progression, classifying what happened to the types of strategies in four ways: strategies that changed with age; strategies that declined with age; strategies that stayed the same in nature but became more elaborate; and emergent strategies.

What is undeniable is that experience and the repertoire it creates are critical to the nurturing of the designerly and this has become apparent in current research we are undertaking to explore the interplay between sustainability (ecodesign) and creativity (Stables, 2009) and how this relates to preparing future Design and Technology teachers to support learners in addressing sustainable design (Stables and Lawler, in preparation). Through interviewing what could normatively be viewed as 'novice' (student) designers and 'expert' ecodesigners, it is becoming clear that being confident both to design for sustainability and to educate others to do the same cannot be 'hot-housed' through a couple of student projects, but must be 'slow-cooked' through a continuous and embedded practice.

Developing the research agenda: understanding the designerly

While the snippets of research drawn on above indicates the progress we have made in understanding ways of nurturing the designerly, it is all too visible that there is more to understand – and more to achieve in applying understandings into educational practice. This idea has what could be seen as parallel support from the design research community.

> *We are still building the appropriate paradigm for design research. My personal "touch-stone" theory for this paradigm is that there are "designerly ways of knowing" …I believe that building such a paradigm will be helpful, in the long run, to design practice and design education. …We still know relatively little about the mystery of design ability, and that limits our "proper study of mankind". This is the goal for design research.*
>
> (Cross, 1999, p. 10)

But are we sharing our research? I have drawn considerably on thinking from those concerned with design education for the professions – have they drawn on our research? Have we (those concerned with design in general education) taken the time to communicate with them? And if not, why not? Do we assume that our research is not valuable to others? Professional design increasingly sees itself not as an island – drawing together with psychologists, cultural theorists, anthropologists…but with educationalists?

Do we build walls unintentionally and carelessly in all the wrong places?

We have seen from research the impact of the careless boundaries that have been constructed that deter design students from seeing teaching as a satisfying and dynamic career (Kimbell et al, 2000) and we have seen the positive impact on teachers through careful collaboration in workshops with designers (Kimbell et al, 2002). But genuine research dialogue across all phases of design education remains elusive.

Preparing this paper has provided the opportunity to reflect on why, over so many years, I have believed so intensely in the importance of a designerly approach to the world; on the amount that has been discovered and achieved; and on the extent to which some of the concerns from the early days of design education resonate so completely with the current educational climate. Effective design education is educating for both Big D and little d designing – educating to design and education through design. Achieving this will mean building on past understandings – and creating new understandings through a dialogue both within and beyond the immediate community of those concerned with design in general education.

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