**Rhetoric and Interpretation: The Values Students and Special Interest Groups Attribute to Design & Technology**

Alison Hardy
Nottingham Trent University
Alison.hardy@ntu.ac.uk

**Abstract**

This research compares special interest groups' and students' rhetoric about the value of Design & Technology (D&T) in England, specifically in relation to learning about technology, employment and creative endeavors.

Drawing upon the Design and Technology Association (D&TA) campaigns and interviews with students, I identify the values these two ascribe to D&T. These values will be compared with the values implied in the English National Curriculum for D&T: the current version (Department of Education, 2013b) and previous iterations since its inception into the National Curriculum in 1990.

Analysis of the two groups' values demonstrates a disparity between the two groups' views of the value of D&T. Whilst D&TA and students concur on some values, there are noticeable differences. Generally, students place greater emphasis on D&T's value to their everyday lives, future employment, and personal fulfillment, whereas the D&TA campaigns focus on how D&T engenders both personal and national economic benefits; creativity is valued by both groups but in different ways. These findings imply a discord between them about the contribution D&T makes to an individual's education and future life.

By comparing the values of these two stakeholder groups, who have no direct power to influence the enactment of government policy (Williams, 2007), this research provides an insight to some of the potential divergences that may occur as D&T teachers, who do have the power, interpret the National Curriculum using D&TA's materials to advocate the value of D&T to their students. This research could help other special interest groups explore how D&T is valued and how they lobby government for future curriculum change.

The next stage to this study is to explore how the D&TA's rhetoric about D&T, and the values discovered in this study, are enacted in classrooms.

**Keywords:** *Curriculum; design and technology; stakeholders; students; subject associations; values.*

**Introduction**
This research compares special interest groups' (SIG) and students' rhetoric about the value of Design & Technology (D&T) in England, specifically in relation to learning about technology, employment and creative endeavors. The SIG investigated here is the Design and Technology Association (D&TA) – a subject association representing their members who are primarily D&T teachers; the students are aged between thirteen and fourteen years old.

These two groups can be classified as stakeholders, they have an interest, or stake, in D&T. Extending this analogy further and drawing on Mitchell, Agle and Wood's (1997) stakeholder theory, they are stakeholders who have the characteristics of urgency and legitimacy for different reasons, but neither group has any power to decide what D&T teachers teach in the classroom. In other words, only the D&T teachers decide how the National Curriculum policy for D&T will be taught although D&TA and the students can overtly and inadvertently influence what is taught. By comparing the values of these two stakeholder groups, who have no direct power to influence the enactment of government policy (Williams, 2007), this research provides an insight to some of the potential divergences that may occur as D&T teachers interpret the National Curriculum using D&TA's materials to advocate the value of D&T to their students. Therefore, this paper highlights the congruence and disparity between the values attributed to D&T by these two non-powerful but important stakeholders.

The values examined here are a small snapshot of the data drawn from a recently completed PhD study investigating the values attributed to D&T by different stakeholders. The main study identified 32 different values across 22 interviews with participants representing seven stakeholder groups. The data analysed in this paper is from the four interviews with students who are dependent stakeholders (Mitchell, Agle & Wood, 1997) and focusses on eight values about creativity, technology and employment (Table 1).

**Literature review**
The subject entitled 'design and technology' (D&T) appeared in the 1990 National Curriculum (Department of Education and Science, 1990) and for the entirety of its history, and notably since a Coalition government took office in 2010, D&T's stated purpose as part of the National Curriculum, and its value to an individual's education, has been debated and disputed. However, there are several recurring political and societal justifications for the subject being taught in school. These include meeting individuals' and society's economic needs, and responding to the effect of new scientific and technological knowledge.

The origins of the need to prepare young people for employment in technical careers can be seen pre-1904. Primarily designed to create an educated workforce in order to maintain the country's world economic status, the 1904 Act introduced a general education stipulating a secondary course that included 'drawing … manual work' (Gillard, 2011, '1904 Regulations for Secondary Schools') and aimed to enable students to access technical and vocational courses at a higher level (Gosden, 1984) and prepare them for 'advance[d] technical instruction' (Board of Education, 1913, p. ix). When introduced it was a gendered curriculum, boys educated for future vocations, and girls given a domestic education that Heggie (2011) believes was intended to address the 'servant problem' and impose a form of socially engineered idealised femininity training girls to run a household. The 21st Century curriculum is not genderised but there is still evidence of disparity between girls' and boys career aspirations (Archer et al., 2013) and students' views are informed by activity stereotyping in the classroom (Eccles & Wigfield, 2002). Remnants of the 1904 Act is evident in the 21st century D&T curriculum:

'High-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation.' (Department of Education, 2013b, p.192)

The content of the D&T curriculum has subtly changed throughout the six versions of the D&T National Curriculum since 1990, although there have been several regular features, including creativity and technological awareness. The importance of students learning technological knowledge was another early justification for design and technology being taught in schools because it enables students to 'increase human potential' (Association of Advisers in Design and Technical Studies, 1980, p.2). An awareness of the impact of technology has featured constantly but in various forms:

make critical appraisals of … the implications of artefacts and systems' (Department for Education and Science and the Welsh Office, 1988, p.17.)

reflect on and evaluate present and past design and technology, its uses and effects' (Department for Education, and Employment, 1999, p.15.)

Creativity and creative thinking is explicitly mentioned in each version, or its recommendation report (for examples see *Working Group Report*, 1988; Department of Education, 2013a; Qualifications and Curriculum Authority, 2007). Like 'technology', creativity can be expressed in several ways. Definitions for creativity include words such as "Novelty … effectiveness … ethicality" (Cropley, 2001, p.6). Creativity has also been defined as a way of thinking, identified as a 21st Century Skill (Binkley et al., 2012). This form of thinking relates to de Bono's (1971) ideas of lateral thinking and Fisher's (2005) view that creative thinking involves …. Within the design and technology curriculum creativity is often used as a term applied to the design process, a skill related to design thinking (Kelly, Kimbell, Patterson, Saxton, & Stables, 1991; Kimbell & Stables, 2008). This form of creativity leads to an original or innovative product idea, system or environment, whereas creative thinking does not necessarily involve any of these. Kimbell and Stables (2008) determined this difference when discussing what was design and technology activity and what was not design and technology activity. So, both creative thinking and being creative when designing involve creative thought, but the outcome does not necessarily involve a new product idea for example. For Binkley et al. (2012), creative thinking focuses on the cognition and is transferrable. Learning to think creatively refers to thinking in a non-lateral way (e.g. de Bono, 1971) as a specific way of thinking (Binkley et al., 2012; Fisher, 2005) and refers to developing the skill of creativity.

Since its inception in 1990, D&T has moved from being a core subject when it was a compulsory subject for all students up to the age of 16, to a marginalised subject now taught to most students up to the age of 14 and a dramatically reduced number to the age of 16 (Hardy, 2015). There are complex reasons for this decline in status, which began in 2004 but accelerated with the proposed introduction of new school performance measures in 2011 (Hardy, 2016). There is not the space here to explore these reasons but D&TA ran two campaigns (Design and Technology Association, 2011; 2015), aimed at government and other stakeholders about why D&T was an essential component of a broad and balanced curriculum. I posit these campaigns run counter to the values attributed to D&T by students. In the next section my suggestion is explored by analysing the value-agreements and disparities between these two groups.

**Method**
The students were interviewed in small groups from two schools. Four mixed-gender groups of students were interviewed. The twelve students were aged between thirteen and fourteen.

The D&TA campaign documents (Design and Technology Association, 2011; 2015) that championed the importance of D&T in 2011 and 2015 were analysed for references to technology, creativity and employment.

**Findings**
Identified in the data were different facets to the three themes, not all of which were mentioned by both groups. The two groups, D&TA and students, attributed values about creativity, employment and technology in different ways (table 1).

Table 1: Overview of values attributed to D&T by D&TA and students.

|  | D&TA | Students |
|---|---|---|
| *Creativity* | | |
| Making and creating | | ■ |
| Being creative when designing | ■ | ■ |
| Learning to think creatively | ■ | |
| *Technological awareness* | | |
| Humans as users of technology | ■ | ■ |
| Technological determinism | ■ | ■ |
| Critical understanding of the impact of products | ■ | ■ |
| *Employment* | | |
| Skills to use in future D&T-related careers | ■ | ■ |
| Provides information, advice and guidance (IAG) about D&T-related careers | | ■ |

**Analysis**

*Creativity*
There were predominantly two ways creativity was talked about – *learning to think creatively* as a generic skill and *being creative when designing*. Both valued the opportunity to be creativite in relation to D&T activity, whereas only the D&TA campaigns mention creative thinking.

The students thought D&T gave them opportunity to be creative when they are designing. The students valued being creative when designing as an individualistic activity. Linked to this the students also talked about having the freedom to make their own design decisions:

| | |
|---|---|
| Female student 1: | It's creative. |
| Male student 1: | Yeah it is creative. |
| Facilitator: | What do you mean by being creative? |
| Male student 1: | You can be creative on whatever you want to make and it's your own choice. |
| Male student 2: | Design it yourself. |
| Female student 1: | You can do what you want |

In what appears a similar vein, D&TA (2015) stated:

> designing and making activity demands both creative speculation and logical decision making to arrive at valid, and better, solutions.

However, the students talk about 'opportunity' and D&TA 'demands', suggesting D&TA are looking at the outcome of the design activity, whereas it is the intrinsic nature of being creative that interests the students. In other words, the students value creativity for its own sake, not the end purpose of being creative. Also noteworthy is D&TA's reference to contrasting ways of thinking, lateral and logical. However, the quote's implicit emphasis is problem-solving not creativity.

*Technological awareness*
This theme included three ideas about technological awareness. For example, the 2015 D&TA campaign claims '[D&T] prepares young people to continue the development and *control* of technological advances'. This suggests there is a symbiotic relationship between humans and technology - technology damages humans and so humans must take control of the technology now (*humans as users of technology* and *technological determinism*). The students do not comment on their learning in D&T about needing to control technology, instead they approach it from a different angle:

> Well I remember in the olden days you used to learn everything, cooking, sewing, DIY skills. If that wasn't available today I think that we'd become too dependent on technology and other things like that instead of doing it yourself. So, I think it provides skills and things for the future.

Whilst this comment raises a smile, it is interesting because here the student is not saying they are learning about technological developments but because they learn craft skills in D&T they are challenging the idea all technological developments are beneficial (*technological determinism*).

Another aspect of technology the students and the campaigns considered important was students learning to *critique the impact of products* on themselves, the environment and society. Understandably the students gave specific examples:

> We learn that making one T-shirt takes 2000 gallons of water so that's obviously a lot and water's a big problem nowadays.

And

> You'll think where this material's from, how they're made, et cetera. … It shows us how hard the workers work to make those materials.

These comments show the students were learning about the impact of making products on the environment and the people who made them. This relates to the D&TA campaign's (2015) assertion:

> Through modern and developing technologies we exert an ever-greater influence on our surroundings by making improvements to housing, transport, communications and the everyday objects we use, at work and in leisure. D&T helps to develop the knowledge, skills and understanding which makes this possible.

Whilst broad, the heart of this idea is an aspect of D&T featured in every version of the National Curriculum, but not the most recent version (Department of Education, 2013b). Unlike the first value in this theme, this one focuses on products, the materials used and how it will be disposed of at the end of its life – its life cycle. D&TA and the students are claiming being taught about the impact of a product's design and function, its life cycle, which will be useful for students later in life when choosing items for their home for example.

*Employment*
This theme had the largest number of comments from both participants, valuing how D&T *provides pupils with IAG* and *skills for future D&T-related careers*.

When talking about learning specific skills to use in future D&T-related careers, students' comments implied how they could economically benefit from studying D&T, and mentioned specific D&T-related careers, such as designers, engineers and manual labourers. Students from each group attributed this value to D&T, referring to engineering, design and construction related careers. A male student from St John's comments:

> [D&T] helps you with making and then say if you're doing woodwork and stuff that can help you with construction and stuff, which is useful if you like doing construction

Although construction could be interpreted as the activity of constructing something, here the student is talking about 'construction' as a career. He may be influenced by his context because the St John's D&T department offered post-14 vocational courses, including construction. Another St John's male student could see the value in studying D&T for his later career choice:

> I either want to be a surgeon or an engineer when I grow up and so resistant materials would be useful for the engineer job.

Likewise, the 2015 D&TA campaign claimed 'D&T has much to offer across a wide range of career paths in engineering, manufacturing and the creative industries' and D&T will be the 'start-point of graduate, technician or craft level careers in the creative, engineering and manufacturing sectors'.

Within the student groups there was some gender distinction in the careers mentioned. Only male students referred to male-stereotypical careers such as construction and engineering; whereas one female student talked about becoming a textile designer when she left school, the other female students talked more generically about D&T related careers. The D&TA campaigns could have been used to challenge these perceptions and whilst they do not attribute the career paths mentioned to one gender or another, there are more 'male' careers (such as engineering) mentioned than 'female' ones (such as fashion design); this subconscious emphasis of male-dominated careers could perpetuate the idea D&T and engineering are not for girls. Given the evidence from expectancy-value theory (Eccles and Wigfield, 2002) that students' goals and motivations, which includes their career plans, influence the attainment value the students ascribe to a subject and consequently the achievement-related choices they make in relation to that subject, the subtle messages about the careers D&T is for need to be carefully considered if D&TA and D&T teachers wish to project the subject as suitable for girls and boys.

Students also talked about being introduced to possible careers in D&T lessons. This embodies the idea of children receiving careers advice during D&T lessons - a form of subject based IAG infused into the lesson not overtly as a learning objective. Comments refer to school mimicking

D&T-related career routes, such as a designer or joiner, giving students a flavour of what's out in industry:

> It creates a career option because when you start doing D&T you learn if you would like to do this professionally or not.

For this student, it represents a work-related aim of education, where school helps children create a life-plan based around a career and employment (White, 1997). The D&TA campaigns did not refer to this view of D&T, but given the campaigns were not targeting students but stakeholders interested in D&T's potential economic contribution this is unsurprising. Subject associations, such as D&TA, play a dual role for their members and policy makers (Knight, 1996) when they represent the views of members to policy makers whilst representing a cohesive view of the subject to its members.

**Discussion and Conclusion**

This research focussed on three themes encompassing eight values (Table 1). Initially it would appear the two groups concur on five of these, but closer analysis and interpretation shows there to be subtle nuances in the way the two groups talk about them. This probably results from their different cultural and social setting, plus their views of the purpose of education, which affects their goals and motivations in relation to D&T.

The main differences between them related to the time-context of their values. D&TA focussed on how D&T would benefit the individual in the future. For instance, learning in D&T how to *think creatively* will be useful later in life and gaining a *critical understanding of the impact of products* means they will be able to take actions to promote quality of life … and protect the environment'. Whilst the students were interested in this aspect, the here and now was more important, how they would benefit from studying D&T today. For example, *making and creating* was something they valued doing in lessons today, as was the opportunity to *be creative when designing*.

These differences present challenges for D&T teachers. D&TA wishes to influence what they teach in the classroom and the two campaigns were their attempt to do this (teachers were encourage to 'sign up' and support the campaign on the D&TA website). If the teachers' values align with D&TA's it is reasonable to suppose their lessons will reflect D&TA's values. However, the teachers want to engage their students, and they might choose to respond to the students' nearness rather than D&TA's distance.

If the teachers want to address both stakeholders' values they will need to combine the longer-term focus of the D&TA campaigns, which looked at how D&T might benefit individuals in the future, with the student's instrumental and intrinsic values.

Note: Do not quote from this paper without the express permission of the author.

**References**

Archer, L., DeWitt, J., Osborne, J., Dillon, J., Willis, B., & Wong, B. (2013). 'Not girly, not sexy, not glamorous': Primary school girls' and parents' constructions of science aspirations. *Pedagogy, Culture & Society, 21*(1), 171-194. doi:10.1080/14681366.2012.748676

Association of Advisers in Design and Technical Studies. (1980). *Craft design and technology: A curriculum statement*. London: The Curriculum Working Party.

Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M., & Rumble, M. (2012). Defining twenty-first century skills. *Assessment and teaching of 21st century skills* (pp. 17-66) Springer.

Board of Education. (1913). *Report of the consultative committee on the practical work in secondary schools (the Acland report)*. London: HMSO.

Cropley, A. J. (2001). *Creativity in education and learning: A guide for teachers and educators*. London: Kogan Page.

De Bono, E. (1971). *The use of lateral thinking*. Harmondsworth: Penguin.

Department for Education and Science and the Welsh Office. (1988). *National curriculum design and technology working group interim report.* (). London: DES.

Department for Education and Skills. (2004). In Qualifications and Curriculum Authority (Ed.), *The national curriculum: Handbook for secondary teachers in England (revised)* (2nd ed.). London: Qualifications and Curriculum Authority.

Department for Education, and Employment. (1999). In Qualifications and Curriculum Authority (Ed.), *Design and technology: The national curriculum for England*. London: Department for Education and Employment.

Department of Education. (2013a). *The national curriculum in England Framework document (February 2013).* London: Department of Education.

Department of Education. (2013b). *The national curriculum in England Framework document (July 2013)*. London: Department of Education.

Department of Education and Science. (1990). *Technology in the national curriculum.* (). London: HMSO.

Design and Technology Association. (2011). *'We believe in design and technology' what do you believe in? the design and technology association manifesto for design and technology education*. Wellesbourne, Warwickshire: Design and Technology Association.

Design and Technology Association. (2015). Designed and made in Britain...? Retrieved from http://bit.ly/1n1vm9J

Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology, 53*(1), 109-132.

Fisher, R. (2005). *Teaching children to think* (2nd ed.). Cheltenham: Stanley Thornes.

Gillard, D. (2011). Education in England: A brief history. Retrieved from http://www.educationengland.org.uk/history/

Gosden, P. (1984). National policy and the rehabilitation of the practical: The context. In D. Layton (Ed.), *The alternative road: The rehabilitation of the practical* (pp. 7-20). Leeds: University of Leeds.

Hardy, A. (2015). Why has the number of teenagers taking design and technology GCSE dropped? Retrieved from https://theconversation.com/why-has-the-number-of-teenagers-taking-design-and-technology-gcse-dropped-46361

Hardy, A. (2016). An assortment box of views: Different perceptions of D&T's purpose and structure. *PATT2016 - Technology Education for 21st Century Skills Conference,* Utrecht.

Heggie, V. (2011). Domestic and domesticating education in the late Victorian city. *History of Education, 40*(3), 273-290.

Kelly, A. V., Kimbell, R., Patterson, V. J., Saxton, J., & Stables, K. (1991). *Design and technological activity: A framework for assessment*. London: HMSO.

Kimbell, R., & Stables, K. (2008). *Researching design learning: Issues and findings from two decades of research and development*. London: Springer.

Knight, P. (1996). Subject associations: The cases of secondary phase geography and home economics, 1976–94. *History of Education, 25*(3), 269-284.

Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of Management Review, 22*(4), 853-886.

Qualifications and Curriculum Authority. (2007). Design and technology: Programmes of study for key stage 3 and attainment targets. *The national curriculum: Statutory requirements for key stages 3 and 4* (pp. 50-59). London: Qualifications and Curriculum Authority.

Sennett, R., (2008). *The craftsman*. London: Allen Lane.

White, J. (1997). *Education and the end of work: A new philosophy of work and learning*. London: Cassel.

Williams, P. J. (2007). Stakeholders in technology education. In M. J. de Vries, R. Custer & J. R. Dakers (Eds.), *Analyzing best practices in technology education* (pp. 179-190). Rotterdam: Sense Publishers.