

An assortment box of views: different perceptions of D&T's purpose and structure

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Abstract

Views about the value of Design and Technology (D&T) to students, the economy and society are diverse, occasionally exaggerated, and usually conflicting (for examples see Department of Education, 2013; Design and Technology Association, 2011 and 2015; Hardy, Gyekye, & Wainwright, 2015). For example: is D&T a subject with specialised knowledge? A subject that applies knowledge from other subjects? A vocational subject? A subject to meet the country's economic needs? Or a subject to develop good citizens?

These conflicting views were brought to the fore when the review of the English National Curriculum proclaimed that D&T has an insufficient disciplinary coherence (Department for Education, 2011). Strong, disciplinary coherent subjects have a clear form of knowledge and are favoured by the current UK government. Subjects with disciplinary coherence have strongly defined boundary between itself and other subjects (Bernstein, 2000), and strongly defined knowledge that is 'sacred ... not ordinary or mundane' (Bernstein, 2003, p.73).

In response to this review, and other challenges, the Design and Technology Association (D&TA) has run two campaigns to 'fight' for D&T to be recognised as an important and essential part of the school curriculum (Design and Technology Association, 2011; 2015). But D&TA has not systematically investigated how D&T teachers and their students, the activators and receivers of D&T, perceive the subject's purpose and coherence. This paper uses Bernstein's (2000; 2003) concepts of classification and framing to analyse the perceptions of these two groups. Their assorted views are different to D&TA's campaign messages but as conflicting, and they concur with the curriculum review that D&T does not have a strong disciplinary coherence.

The conclusion suggests how this analysis could inform future D&TA campaigns and suggests that by addressing D&T's specialised knowledge and the contribution D&T makes to students 21st Century Skills is not lost but strengthened.

Key words: Bernstein, classification, design, knowledge, skills, technology education.

Introduction

Views about the value of Design and Technology (D&T) to students, the economy and society are diverse, occasionally exaggerated, and usually conflicting (for examples see Department of Education, 2013; Design and Technology Association, 2013; Hardy, Gyekye, & Wainwright, 2015). The Design and Technology Association (D&TA) has run two campaigns to 'fight' for D&T to be recognised as an important and essential part of the school curriculum (Design and Technology Association, 2011; 2015). Four reasons are given in the recent campaign for D&T's unique contribution to the curriculum: technological understanding, design thinking, evaluation of products and services, and skills for life. But

with several underlying campaign themes the overall message is confusing - is D&T a unique subject? A user of other subjects? A vocational subject? Or a subject to develop good citizens?

Both campaigns have been supported by notable engineers, designers and entrepreneurs and have argued that D&T contributes directly and indirectly to the economy, claiming D&T has 'much to offer across a wide range of career paths in engineering, manufacturing and the creative industries' (D&TA 2015, page 5). Whilst significant, these claims are unsupported by empirical evidence or much input from other stakeholders, such as D&T teachers, parents or students. With such a bias towards the instrumental value of D&T and a focus on influencing government ministers, it seems a missed opportunity not to involve those who can influence the ground support for the subject.

D&TA's arguments are intended to demonstrate that D&T makes a unique contribution to the curriculum, and is therefore an essential component of a broad and balanced curriculum.

Three events provide a context for these campaigns: a review of the National Curriculum in 2011, a rewritten National Curriculum in 2013, and the introduction of the English Baccalaureate (Ebacc) - a new performance measure for schools¹. The curriculum review announced that D&T should only form part of a basic curriculum, in which the content should be informed by local context (Department for Education, 2011) based on the argument that D&T has an insufficient disciplinary coherence. Strong, disciplinary coherent subjects have a clear form of knowledge with facts and principles interpreted by the government as traditional academic subjects, such as maths and science. Disciplinary coherence can be seen as a subject that has a strongly defined boundary between itself and other subjects (Bernstein, 2000), with strongly defined knowledge, which is 'sacred, ... not ordinary or mundane' (Bernstein, 2003, p.73).

These events have provided a space to debate the purpose of schooling and how subjects are defined (Young, 2011a; 2011b). Government ministers have lauded the work of Hirsch (2006) and Willingham (2009) who focus on the value of learning knowledge and facts, specifically 'general, all-purpose knowledge' (Hirsch, 2006, p.12), knowledge that forms part of a general education (Willingham, 2009), which Hirsch claims facilitates social integration and mobility. It would appear government ministers have interpreted 'knowledge' as facts – a 'general knowledge' (Gibbs, 2016; Gove, 2013; Morgan, 2015) not 'powerful knowledge' that is specialist, transformational and rooted in reality (Young & Muller, 2013); powerful knowledge is not everyday knowledge or non-school knowledge. Young's earlier writing on 'powerful knowledge' was acknowledged as influencing the outcome of the previously mentioned curriculum review (Young & Muller, 2013).

Bernstein's code theory

Bernstein developed a code theory to question how knowledge is distributed through the curriculum describing control, status, and pedagogy (Bernstein, 2000; 2003). This theory can be used to explore relationships between different subjects in terms of the boundaries between their content. For coding types of boundary strength he used the concepts of classification and framing.

Classification 'refers to the degree of boundary maintenance between contents' (2003, p.80); Bernstein used the term contents rather than subjects. So classification can refer to the strength of boundaries between subjects. Where there are clear distinctions between the subjects there is strong classification, where classification is weak the distinction between content is blurred. Classification describes the relationship between the content, not what the content contains (Bernstein 2003).

Framing is about the degree of power and control teachers and students possess, of which there are two rules for regulating the framing that can vary independently (2000). The first rule relates to social order and forms of hierarchical relationships. Second is the rule of discursive order, which refers to the degree of control teacher and student possess over the 'selection, sequence, pacing and criteria of the knowledge' (Bernstein 2000, p.13) – pedagogical. In this rule the framing can refer to the 'strength of the boundary between educational knowledge and everyday community knowledge of teacher and taught' (Bernstein 2003, p.81) and a weak boundary exists when there is little distinction between these in the classroom.

Bernstein's theory extended to types of curricula; a collection curriculum has clear boundaries between curriculum subjects, an integrated curriculum has weak boundaries and the subjects have an 'open relationship' (Bernstein, 2003, p.79). Subjects with high status tend to have strong boundaries, belonging to a collection curriculum in which the knowledge is 'sacred, it is not ordinary or mundane' (2003, p.73). Earlier discussions about powerful knowledge, the curriculum review recommendations and the emphasis on strongly bound subjects in the Ebacc indicate a current policy preference for a collection curriculum.

Bernstein's vertical/horizontal discourse theory about the classification of knowledge defines sacred knowledge as esoteric and specialist, whereas mundane is knowledge that is common-sense knowledge acquired outside an institution through the family or community.

There are other views of curriculum content but here I want to briefly mention two other forms: vocational knowledge and skills. Skills can be defined as those that are useful in any or many work places (such as team working and problem solving) or skills to look after ourselves, for example how to cook or put up shelves at home – the D&TA campaign labels these as 'skills for life'.

This article uses these concepts to determine whether the participants classify D&T as a subject that has weak or strong disciplinary coherence.

Method

The research aim was to show that the view of D&T of the activators and receivers of D&T is also unclear and therefore has weak classification.

The views the participants held about the contribution D&T made to a general education were collected using interviews in two English schools (School 1 and 2) with students and two D&T teachers from each school. The interviews took place between March and May 2014, after the curriculum review and between the two D&TA campaigns.

The data were coded using a thematic approach (Saldaña, 2012), which summarised the participants' responses into codes that revealed the values they attributed to D&T (cf. Hardy, 2015). These values were grouped into three themes:

1. Responses that relate to the uniqueness of D&T as determined through analysis of the purpose of D&T as written about in official curriculum documentation since 1988 recent campaigns to save the subject and the vocational content that (could) lead to D&T related careers;
2. Responses about competency or skills, and
3. Responses that relate to other subjects and their content.

Findings

The total number of responses from both groups across the three themes was distributed as follows: 84 D&T specific (48%), 77 competency and skills (44%), and 15 other subjects (9%) (Table 1).

Table 1: Responses to all themes

	Total number of responses	D&T		Competency & skills		Other subjects	
		Total	% responses	Total	% responses	Total	% responses
Students	67	29	43%	34	51%	4	6%
D&T teachers	109	55	50%	43	39%	11	10%
Total	176	84	48%	77	44%	15	9%

Unique identity of D&T

The 84 responses coded as referring to the unique contribution of D&T were divided into two sub-themes: D&T related careers and businesses – 'Vocational curriculum', and D&T knowledge – 'D&T National Curriculum' (table 2).

Table 2: Responses related to D&T theme

	Total number of responses	Vocational curriculum		D&T National Curriculum	
		Total	% responses	Total	% responses
Students	29	18	62%	11	38%
D&T teachers	55	10	18%	45	82%
Total	84	28	33%	56	67%

Vocational curriculum was associated with the vocational and economic purpose of D&T.

‘... it could help in the future if I want to become something like a designer.’ (School 2 student);

‘It creates a career option because when you start doing DT you learn if you would like to do this professionally or not.’ (School 2 student);

The other category focused on designing, making and critiquing, features of every version of the D&T National Curriculum since 1990 with 56/84 (67%) responses, which was 32% (56/176) of the total responses.

‘...rather than rushing into your practical you can design it and think it through rather than just doing it and then realising half way through it's not working’ (School 2 student).

‘You have to be really creative when you're doing your designs.’ (School 1 student).

Competency and skills

The title for this theme belies the diversity of the participants’ responses. Within this theme students are being trained to become competent in skills, tasks and practices (Bernstein 2003), some of which are generic skills such as problem solving skills and others that may derive from a sacred knowledge (for example heat induction) but have been reproduced by teachers as a task for students to learn for use at home (cooking a hot meal).

In this theme the 77 responses were subdivided into three groups, one about ways of learning (7/77), and the other two share ideas from the D&TA Campaign and overarching aims of the English National Curriculum (Department of Education, 2013) – (1) being an educated citizen (11/77) and (2) skills for life (59/77) (table 3).

Table 3: Responses to competency and skills theme

	Total number of responses	Ways of learning		Being a citizen		Skills for life	
		Total	% response	Total	% response	Total	% response
Students	34	0	0%	1	3%	33	97%
D&T teachers	43	7	16%	10	23%	26	60%
Total	77	7	9%	11	14%	59	77%

Unsurprisingly only teachers commented on types of learning in D&T but the responses were not unique to D&T. For example School 2 teacher 2’s view that in D&T ‘they’re not only using different parts of their brain but also parts of their bodies as well’ could also refer to physical education and similar activities outside school.

In the theme ‘being a citizen’ participants talked about how D&T enables children to understand about other people and the impact of products and technology on themselves, others and the environment. None of these can claim to be unique to D&T, or even that they require a school education:

'[our teaching] makes people aware of saying right well I'm not going to put that can into that bin, I'm going to make it recycle and we recycle. So it's having a huge impact on the environment' (School 2 teacher 2)

'Even down to going shopping and understanding the psychology of trying to get the product across to people. So we've done a bit of psychology on how they get the students or the customers to be drawn into an inanimate object that is trying to sell itself' (School 1 teacher)

'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.' (School 2 student)

The largest number of responses was in 'skills for life' (see table 4), a wide-ranging theme that included:

- students learning skills to look after themselves that meant they could do DIY, cook and sew (31/59, 54%);
- transferrable (generic) skills that employers are looking for, sometimes called 'soft skills' (22/59, 37%) and
- personal development, such as resilience and confidence (5/59, 8%).

Table 4: Division of skills for life theme

	Total number of responses	Skills to look after yourself		Transferrable skills		Personal development	
		Total	% responses	Total	% responses	Total	% responses
Students	33	22	67%	6	18%	5	15%
D&T teachers	26	10	38%	16	62%	0	0%
Total	59	32	54%	22	37%	5	8%

Other subjects

The two sub-groups in this section are about knowledge used in D&T that is from other subjects (8/15) and learning about materials (7/15), which draws on scientific knowledge (table 5).

Table 5: Responses to other subjects theme

	Total number of responses	Learning about materials		Links to other subjects	
		Total	% responses	Total	% responses
Students	4	0	0%	4	100%
D&T teachers	11	8	73%	3	27%
Total	15	8	53%	7	47%

'learning about new materials, how they work' (School 1 teacher 2)

'We use maths a lot, but we use it in a real way, so it's not scary, it's practical'
(School 1 teacher 1)

'...like when you're doing graphics you have to draw first and then you do a drawing section, well that will help you in art for example, because then you don't have to learn in art...' (School 2 student)

Analysis and Discussion

As stated earlier Bernstein's classification and framing concepts are being used here to determine whether the participants classify D&T as a subject that has weak or strong disciplinary coherence, and weak or strong boundaries between specialist D&T knowledge and mundane knowledge. The interpretation of specialist D&T knowledge is lenient for analysis purposes; the author does not claim that learning about D&T related careers should be defined using Bernstein's definition of specialist knowledge or Young and Muller's (2013) view of 'powerful knowledge'.

The boundary between the uniqueness of D&T and other subjects appears from the data in table 1 to be clear-cut with a responses 84 attributed to the uniqueness of D&T and 15 to other subjects (85%/15% split), implying strong classification. On the surface the data shows a strong disciplinary coherence, but closer examination reveals it is a limited discipline according to these participants. Over half of the 56 responses about D&T knowledge referred to students learning to critique products and their impact on the world's environment, which is only one aspect of the D&T National Curriculum content. Whilst the participant numbers and data are too small to generalise it does raise the question how the teachers and students recognise D&T as a strongly bounded subject with such a bias towards product analysis and evaluation, implying these participants have a narrow perspective of D&T's content and contribution.

The data in table 1 shows that for these participants D&T is a weakly bound subject in relation to mundane knowledge; this is similar between the two groups. They both place greater emphasis on D&T enabling students to gain knowledge for which D&T is not required. In other words this knowledge can either be learnt at home or in clubs and events outside school. There is a weak boundary between the D&T specialist knowledge and competency in a range of skills and tasks. Therefore the framing is weak but there is a strong horizontal discourse (Bernstein, 1999). But there are occasions when competency becomes specialist D&T knowledge:

'School 2 teacher 1: I guess every design - well I would have thought every design has its purpose. So you've got to think about how a product is going to be used [*competency*].

Facilitator: Does that come from D&T? Or is that something that D&T contributes?

School 2 teacher 1: Yeah, I think it does because I think if they're looking at items and how they can be modified and changed and developed and ripped apart and

made again in a different way [*specialist knowledge*]. Yeah, I think it does come from designing and D&T.' (School 2 teacher 1)

Comparing the values ascribed by the two participant groups exposes some expected anomalies. Given the students' age (13-14 years old) and schooling stage (the year they select which subjects to specialise in for their exams) it is not surprising they focus more on the instrumental values of D&T, such as employment (62% students compared to 18% teachers) and skills for life (97% to 60%). But the emphasis teachers place on D&T helping children become a good citizen (10/43 responses), particularly in comparison to the students' responses (1/34) is surprising. Again these differences indicate a weak framing but this time in relation to the second rule and selection of the knowledge, which Kelly (2009) differentiates between the planned and received curriculum – just because a teacher intended students to learn about people's differences does not mean this is what the students did learn.

The teachers' responses (18%) do not reflect D&TA's most recent campaign that emphasises the contribution D&T makes to the economy by supplying people with STEM expertise. There are other differences between the teachers and the campaigns, and even though this is a small group and the data were collected two years ago leaves me to question how in tune with the teacher's views the campaign is today? D&TA might argue that their campaign is not aimed at teachers but if they do not consider the values teachers ascribe to D&T their campaigns might not have the hoped for classroom impact.

The students' responses are also at odds with the campaign agenda. Almost a third of their responses are about skills to help them look after themselves, with many specifically mentioning learning how to cook, an area that is no longer part of the D&T curriculum or qualification. It is the author's view that it is the students who need persuading to see the value of D&T as it is written in the National Curriculum and promoted by D&TA, and as future parents of the next generation of students will have the greatest influence on their values and curriculum choices (Eccles & Wigfield, 2002; Harackiewicz, Rozek, Hulleman, & Hyde, 2012).

Conclusion

It must be acknowledged this is only a small study and unusually attempts to use curriculum theory to analyse the perceptions of teachers and students. However even with such a small group it can be seen there is an assortment of views of the purpose and value of D&T, which has implications for any attempt to influence the views of those both inside and outside classroom.

These teachers and students held a narrow perspective on what is the 'sacred' and specialised D&T knowledge, and emphasised how students learnt to become competent in skills, practices and tasks in D&T. With the current government's focus on specialised knowledge this leaves D&T at risk of continued exclusion from a general education for all students. The D&TA campaigns have not addressed either the subject's disciplinary coherence or specialised knowledge, but focussed on several messages that do not clearly address the government's agenda. A suggestion is for D&TA to look at the government's standpoint on knowledge if planning future campaigns fighting for D&T's place in a general

education for all students. Even if D&TA want to emphasise the 21st Century skills gained by students in D&T they need to address the centrality of knowledge (Rotherham & Willingham, 2009).

This study is part of a PhD study and follows on from the pilot study reported at previous conferences (Hardy, Gyekye, & Wainwright, 2015; Hardy, 2013) and journal paper (Hardy, 2015).

Note

1. The Ebacc measure the number of students in a school that achieve a good grade in five 'core academic subjects' (Department for Education, 2016), maths, English, a science, history or geography, and a language.

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