# Is it Really Work? Primary School Pupils' Conceptions of Design and Technology as a National Curriculum Subject


## Abstract

In recent years the teaching of design and technology as a National Curriculum subject has received increasing attention in books and journal articles (Black, 1990; Smithers and Robinson, 1994). The bulk of this work has been devoted to issues related to the structure of the curriculum (Ball and Lacey, 1980; Black, 1990; DES, 1989), the rationale for its existence as a subject in its own right (Paechter, 1995) and, to a lesser extent, aspects of pedagogy (Linblad, 1990). Almost no data is available, however, on pupils' perceptions of and reactions to design and technology as part of their everyday school life, particularly at the primary stage.


## Introduction

How do primary school pupils perceive design and technology as a subject? Do they consider design and technology to be a 'proper' subject, worth studying in its own right? How do they conceptualise it in comparison to other curriculum subjects? Do they find it useful, enjoyable, easy or difficult?

It is contended that these and related questions can provide curriculum planners and those teaching design and technology in schools with valuable information about its perceived value in the educational process. Such information may also contribute to the wider debate about the nature and purpose of education. At the same time, insufficient information exists about the ways in which children develop skills, knowledge and attitudes in aspects of their learning less heavily dependent upon verbal ability (Sternberg and Wagner, 1986). It is the assertion of the cognitive psychologist Howard Gardner, for example, that at least seven different forms of intelligence are manifest in everyday life, yet the vast majority of all school work is devoted to just two of these, verbal and numerical intelligence, with almost no attention by comparison being directed to the development of non-verbal, spatial or other aspects of intelligence (Gardner, 1983 and 1993). Even when it comes to the assessment of creativity, existing techniques are devoted almost entirely to verbal and pencil-and-paper tasks (Child, 1993).

It has been argued elsewhere (Williams and Burden, 1997) that a deep understanding of the learning process will only be achieved by considering the dynamic interaction between learners, teachers, tasks and contexts. At the same time, Piagetian and neo-Piagetian approaches to epistemology emphasise the active construction of knowledge by individuals as opposed to learning occurring by means of transferring or transmitting information from one person to another. Accepting both these perspectives leads us to believe that children's *constructions* of what is considered to be 'real work' and 'a proper subject' in school can be helpful at both a micro (individual) and macro (wider educational) level. Research of this nature has already begun with regard to some curriculum areas such as mathematics (Fasher, 1991; Hoyles *et al*, 1994), science (Driver *et al*, 1985) and language learning (Williams and Burden, 1999), but we know of none as yet in design and technology.

The aim of the present study was to begin to explore some of these issues by interviewing sixth grade children attending two primary schools in the south west of England. The research is essentially small scale and of a qualitative nature, grounded within the interpretative paradigm (Denzin and Lincoln, 1994) and wedded to an essentially constructivist perspective (von Glaserfeld, 1995). Our primary intention at this stage was to generate hypotheses for further investigation into children's emerging constructions of the *appropriateness* of what they are taught in school and how this affects their motivation to learn. At the same time we were also concerned to investigate the relative merits, from the children's perspective, of providing opportunities for the development of creative skills and spatial intelligence beyond the more commonly emphasised linguistic, numerical and scientific subject areas.

## Procedure

Two urban primary schools known to be committed to providing high quality teaching across the curriculum each agreed to allow a random selection of 16 (eight boys; eight girls) grade 6 (CA 10–11) pupils to be interviewed about their attitudes towards design and technology lessons. Each pupil was interviewed individually by means of a semi-structured questionnaire for a period of up to 30 minutes. All children were given the opportunity to opt into or out of the interviewing process.

The present paper is devoted to an examination of the responses of the pupils to four questions asked in the interviews which were specifically directed at eliciting their constructions of and reactions to design and technology as a curriculum subject (the full interviews covered a wider range of issues related to learning in school). A summary of the trend of responses will first be given, followed where appropriate by illustrative quotes from individual pupils. Themes will be elicited in accordance with a grounded theory


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approach to data analysis (Strauss and Corbin, 1990), which will be discussed further in the paper's final section.

### Question 1: I understand that you sometimes do design and technology as part of your lessons. Can you tell me something about it?

This question was introduced as a 'warm-up' to give the children the opportunity to talk spontaneously from the start of the interview. The responses tended to be of a descriptive nature, often leading naturally into the following questions. Generally, they took the form of "It's like art, but we make things." "We don't do it very often but it's fun." "It's the only subject where you actually make things." "It's like a hobby I do at home."

The main features arising from the responses to this question were that design and technology was:

- clearly identified as a curriculum subject
- distinct from other subjects
- popular
- infrequent
- involved making things.

### Question 2: Do you enjoy design and technology lessons? Why/why not?

The most striking attitude expressed by almost all the children (87%) was that they enjoyed their design and technology lessons. Interestingly, from a constructivist perspective, however, the reasons for this enjoyment differed quite markedly between individuals, as the following quotations reveal.

What is also apparent here is the negative association that appears to exist in many pupils' minds between 'work' and 'enjoyment'.

> "Well, you can work with your partners and choose friends and decide, or you can work in groups and we don't normally make things apart from in art. It's just fun." (Girl A)

> "It's fun because you get to learn new skills… because you're making things. You do designing. You learn to make things." (Boy A)

> "Well, it's more challenging and it's more fun… and it's a change from doing maths and language." (Girl D)

> "It's fun and I like designing things… there are always different problems that we have to solve working in a team." (Girl B)

> "You have to plan things out and say how you're going to do it." (Girl C)

The element of challenge was seen mainly as relating to this aspect of problem solving, but also in planning things out and developing new skills.

> "(I enjoy it) because I like making things with my hands. I like getting really messy." (Boy B)

> "(I like it) because it's so cool… because it's really good, especially painting and getting mucky. Making things… it's different. Maths is harder; it's easier in this group. Language is cool because you get to read books and comics and make comic strips. Design and technology is even cooler." (Boy D)

Enjoyment here is seen as being related to a number of aspects of design and technology lessons which are not regarded as present in other lessons – making choices, working with friends or in groups, actually making things and just having fun.

A further perspective on enjoyment was provided by another girl.

> "…in maths it's boring … because you just go over the same stuff all over again, but in design and technology we do different stuff every time and make different stuff and it's much better than maths and English." (Girl E)

Here the issue of novelty and creativity has been raised, particularly by drawing the contrast with more regular 'boring' lessons.

The children who were not completely sure whether or not they enjoyed design and technology lessons either worried about getting the shape, designing, drawing right, or found some aspects of the lessons boring.

> "It's OK, but I'm not too keen on it because I couldn't quite get the boxes in shape and everything." (Girl D)

> "It depends on what we do. If it's things I like, like making and modelling stuff, then that's alright. If it's like boring drawing which I've done before, then it's not so good." (Girl E)

### Question 3: Is design and technology the same as other lessons or different in some way? (If different) can you tell me how?

Twenty-nine of the 32 pupils (90%) thought that design and technology lessons were different from other lessons. The most prevalent reason given was that it was the only lesson where you actually get to *make* things.

> "Because with science you don't make anything, and it's the only one where you

> can actually make things, actual things." (Boy B)

> "Well, it's different because we get a chance to do things we hardly get to do." (Boy C)

> "...it's because you get to do, to, like, make things and you're, like, proud of them at the end when you've made something really good." (Boy A)

When pressed on this issue of difference from other lessons, the pupils tended to expand on previous answers relating to enjoyment and working in groups.

> "Because you get to work in a group more and you do making stuff, and you don't really make stuff in maths and English and other lessons." (Girl F)

A contrast to other curriculum subjects was drawn by reference on the one hand to "less writing, more doing", and on the other to the development of skills in the use of tools and materials not normally part of school life, such as craft knives, special boards, paints etc.

Two further perceived benefits of design and technology lessons worth noting were that pupils were allowed to talk whilst they worked together in pairs or groups and that more time was made available to finish projects than in other lessons.

The element of challenge was seen mainly as relating to this aspect of problem solving, but also in planning things out and developing new skills.

> "You have to plan things out and say how you're going to do it." (Girl C)

### Question 4: Is what you do in design and technology real work?

This question produced interestingly varied responses. Fifteen out of 30 respondents (50%) answered affirmatively.

> "It's real work. We have to work hard." (Boy E)

> "You have to knuckle down to it, I think. Yes, I found it really hard to make my nodding toy." (Girl G)

A more elaborated response was given by Boy B.

> "Yes (it is real work) because in art you just draw things; in design and technology you have to, like, use wood and stuff. You still have to measure and that, though, but in maths you just have to write and not design stuff."

For this pupil the work related connection with at least one other curriculum subject was clearly apparent. A further dimension was added to his reasoning, however, by his reference to the *practical applicability* of both the process and what was produced in design and technology.

Five pupils, all girls from the same school, did not consider design and technology lessons were work at all.

> "No, it's not really work because you get to choose what you want to make, kind of thing, and you use different pieces of materials and stuff." (Girl A)

> "It's not exactly real (work). It's like doing what you want and playing around with things and making things." (Girl B)

For another boy who revealed that he liked making things with his hands and "getting really messy". Design and technology was not real work because "...you use different things... it's like cooking because you use different instruments for different things."

Many responses to this question revealed strong positive feelings about the rare opportunity provided by design and technology lessons to become involved in the creative process without being instructed exactly what to do.

### Discussion

Although this was only a small-scale study, it has produced findings which seem well worth further investigation. Firstly, the common agreement that design and technology was particularly enjoyable as a subject in its own right, often in contrast to other curriculum subjects, is well worth confirming. Of particular interest here is whether this expressed enjoyment is a function of how the subject is taught or whether there is something intrinsic to design and technology which fosters enjoyment and motivates pupils to participate. At primary school level the same teachers tend to cover a range of subjects and in the present study both schools had received high Ofsted ratings, so the children's responses were unlikely to have been referring to poor teaching in other subjects.

The act of creation, specifically making things would appear to have been particularly significant for the children in our sample. What exactly is it about the combined process of both design and technology which provides this enjoyment? Is enjoyment the most appropriate term to describe the sense of fulfilment experienced by these children anyway?

We would argue that being directly involved in doing is vital in a sound design and technology education and, for that matter,

essential to any truly educational process. This can be more easily forgotten or overlooked in curriculum subjects which lend themselves more readily to mere information transmission following the mindless call of 'Back to basics!' Design and technology more naturally makes demands on Bruner's three modes of knowing – by action, by image and by symbol (Bruner, 1971). At the same time the deeply natural human process of creating things can be reinforced in a consumer society which may be characterised as more concerned with obtaining objects of immediate desire than respect for artefacts of sustained use (Norman, 1988).

Certainly, an examination of most recent psychological theories and research in the area of motivation (see Williams and Burden, 1997) produces such terms as challenge, developing competence and mastery, goal setting, group interaction and sharing, internal locus of control, and intrinsic enjoyment in an activity for its own sake. All of these factors were spontaneously mentioned in one way or another by the children in our study as representative of aspects of their design and technology lessons, often in sharp contrast to other lessons.

We have been particularly struck by Csikszentmihalyi's concept of flow, which he describes as a state of total absorption which occurs when a person is involved in a challenging activity which is just at the edge of their current feelings of competence and where they are striving to achieve a goal that they have set for themselves which carries great personal significance (Csikszentmihalyi and Csikszentmihalyi, 1988). We would argue that, of all school curriculum subjects, design and technology lends itself most readily to such conditions.

Of potentially even greater practical significance is the finding that for a considerable number of pupils' conceptions of 'real work' and enjoyment are antithetical. If this is found to be indeed the case on a much wider level, it could help to explain why so many students either 'switch off' from formal learning by the early secondary school years or tend to dismiss pleasurable subjects as somehow insignificant. As Burden and Nichols (1999) found in a different context, 'proper' subjects at secondary level tend to be construed as those with a formal syllabus where marks or grades are employed on a regular basis to assess progress, and where discussion and group work is kept to a minimum.

Paechter (1995) points out that one form of micro-political struggle in schools occurs over curriculum definition, which is mirrored by the fact that different subjects (and the teachers who teach them) have widely different status. It is indisputable that design and technology as a subject carries limited status even when, as in primary schools, it is likely to be taught as one of several subjects by individual teachers. As such, the kinds of activities associated with enjoyable design and technology lessons may also be devalued and, by the time of secondary transfer, may come to be seen as 'not the proper business of schooling'. This in turn is likely to lead to a restructuring of the design and technology syllabus in a particular direction which may subvert those very activities which provide its greatest strength. In Paechter's words, "A saddening thought is that it is the very openness of design and technology which leaves it susceptible to subcultural retreat" (Paechter, 1995:85).

The danger of over-generalisation from the data presented here is revealed by the fact that the satisfaction obtained by these pupils was expressed in very individualised ways and sometimes for very different reasons. A constructivist perspective can be particularly illuminating here, we feel. Each one of the 32 children interviewed had constructed a very different set of schema and of associated meanings to make sense of design and technology within their own personal and social contexts. The following description by one girl of how she had responded to the set task of making a nodding toy based upon a fictitious creature called a 'borogrove' (Carroll, 1867), illustrates many aspects of learning as a process of individual and social construction. Whilst this process may have been similar to that undertaken by other children set the same task, the girl's solution to the problem was both highly individual and firmly based within her own socio-cultural background, thereby producing a learning outcome which was unique unto itself.

> "Well, I went home and told my mum and dad that I had been set a project that's a borogrove and I went round the garden and in the house as well, and I found – I was just messing about – and found a fir cone … and then we got this little wooden ball that I found, because I thought I could use that. Then I got this wooden bit of log, and then my dad's into bonsai, so he's got loads of wire, so I asked him if I could have a bit for the legs. And then I started drawing it out."

Question: So how did you know what to collect?

> "I didn't. It just came into my head. I just went walking around the garden and the house to see what I could find. Then I

started drawing to get ideas. And then I did another one (drawing) and thought that might work. And then I said to myself that would work, so I got a piece of wire – I got dad to cut some wire together – and put it round. And then I put some wire round a fir cone and for the legs, and then I got a little tool and made a hole in this wood. And then I glued the legs to the wood. And then I couldn't think of what I could do to make the head hold. And then I found this thin piece of wire that's in my flower making kit when I was little, and found a pencil and decided to wrap some wire around the pencil. And then, then I stuck it to the wooden head and then attached it to the fir cone and saw if it nodded. And it worked. So I put eyes and a beak on the borogrove and bought (sic) it to school."

Question: Were you pleased with it?

"Well I thought it was good and my friends thought it was good."

## Conclusions

What is illustrated here and in many other responses by the children in our study to simple questions is that children really are functioning as scientists in their own right in the ways that they construct solutions to the problems with which they have been set (Salmon, 1995). Vygostky saw a particular form of instruction and learning in school as providing the kind of cultural experiences in which the higher psychological processes such as voluntary attention and logical memory are formed (Kozulin, 1999). At the same time, their everyday experiences, with their rich immediacy of meanings, underpin much of their thinking. Design and technology offers a unique opportunity to teachers to provide this kind of educational experience which appears not as yet to have been fully realised. Further research into the nature of the process by which design and technological skills are developed both individually and within a social context is clearly warranted.

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