The role of materials in implementing design and technology education in South Africa

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Abstract
The paper describes aspects of design and technology workshops that were given at a number of venues in South Africa in 1995 and 1996. It explores the perception of design and technology held by many of the participants at the commencement of the workshops and one consequence of that perception; the pivotal role of the type of materials and components used to resource design and technology projects. Participants' and facilitators' perception of 'high technology' and 'low technology' are contrasted, and the political implications of a purely technical view of design and technology activity are described. The approach adopted by the facilitators for the materials' content of the 1996 workshop at a teacher training college is summarised and the paper concludes with a description of a project not developed in a formal educational institution but which may be indicative of the type of project that has potential for many educational institutions, especially schools, in South Africa and elsewhere.

Background

In March 1995 three tutors from King Alfred's Department of Design and Technology visited South Africa. At each of three centres: Cape Town, Grahamstown and Johannesburg, a two day 'hands-on' workshop for twenty five participants was given, augmented by an evening lecture for a wider audience. The participants of the workshops were either teachers, teacher educators, academics or educational administrators, with the proportion varying at each venue. Irrespective of their background the majority of the participants had very limited experience of design and technology. The purpose of the workshops was to allow participants to gain some direct experience of design and technology. It was intended that the participants would learn something applicable to, and useful for, their own teaching situation, and that by the end of the workshop they would have a number of tangible artefacts that might be used by them to assist the resourcing of their teaching with their pupils and students.

Following an invitation, two of the tutors, the authors of this paper, returned in March 1996 to facilitate a longer workshop for a teacher training College in the Eastern Cape. Unlike the participants at previous venues the participants of this workshop were all teacher educators, and there was a far greater proportion of black participants. At present design and technology does not form a component of the curriculum of any students at the college, but the college was responding to a range of government initiatives and in particular *A Curriculum Model For Education In South Africa*, which proposes technology as one of seven Fields of Study[1]. (The paper does not attempt to locate the rationale and proposed provision of design and technology education in the context of the recent socio-political background to education in South Africa; these are covered elsewhere[2].)

The pivotal role of resources

Very early in our 1995 visit, and reinforced throughout both visits, we came to realise the pivotal role of resources for many South African educators interested in design and technology. This is not an issue simply of having sufficient resources. The major manifestation of the tensions surrounding this pivotal role was communicated through participants' use of, and distinction between, the terms 'high technology' and 'low technology'. These had become value-laden terms and it appeared that they had the potential to influence greatly participants' responses to design and technology activities. We came to see that these terms were founded on, what the authors would consider as, a restricted conception of

technology; a conception that equated the technological solely to the technical. This restricted view encouraged invalid distinctions to be made between design and technology activities, one of which was a hierarchical ordering of design and technology activities based solely on the materials and tools utilised by a pupil or student. We contend that this misconception is still evident in some educational settings in the UK.

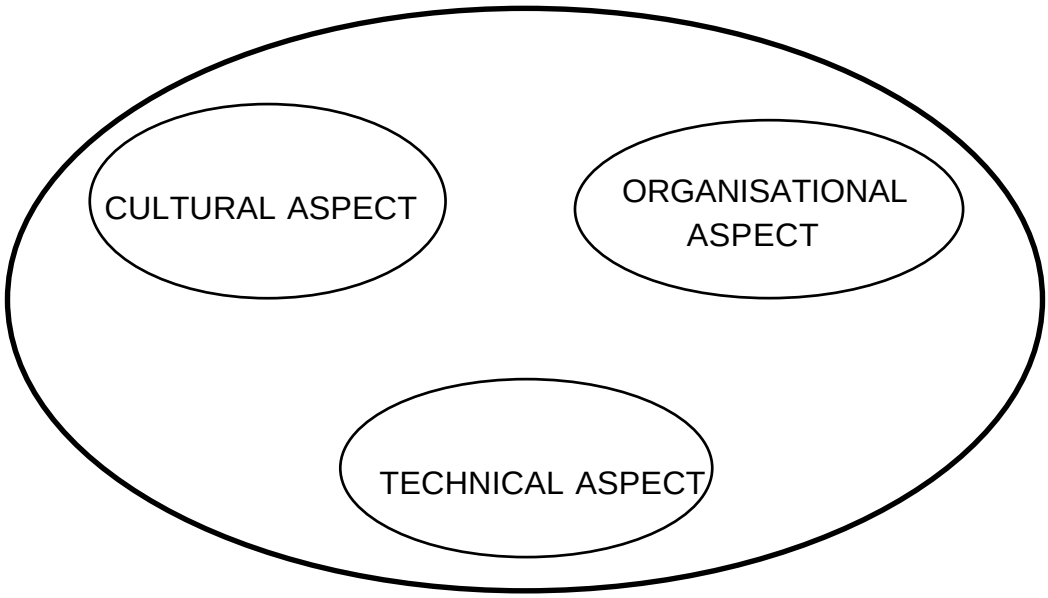
All participants acknowledged the need to make design and technology accessible through the use of easily available materials in a country where for many, especially black students and their teachers, resources have been, and continue to be at present, extremely limited. However, a perception of design and technology that is highly, if not wholly synonymous with a technical domain can allow an interpretation that working with these cheap, recyclable, easily available, materials is low technical, therefore 'low' technology. This leads on to the belief that working in these materials is both patronising and disempowering to those very groups that historically have been patronised and disempowered. In essence, cultural hegemonies and disadvantage are reproduced through technology education rather than questioned and challenged. There was a 'political' dimension to the tools, and in particular the materials, utilised in the workshop projects. In the literature Dingalo[3] discusses the misconceptions that have been prevalent about 'appropriate' materials for design and technology in Botswana, with people linking 'appropriate' with low quality.

It became apparent at a very early stage of the 1995 visit that this issue needed to be addressed in order to achieve the intentions of the workshops. We found the definition proposed by Pacey in his book *The Culture Of Technology*[4] to be very useful. Pacey describes how he believes that the practice of technology has three simultaneous aspects:

- TECHNICAL: knowledge and skills which are used in conjunction with materials to design products;
- ORGANISATIONAL: economics and sociology of the conduct of technology and the use of its outcomes;
- CULTURAL: the values that underlie the choice of problems and needs to address and the criteria used to evaluate the outcomes of that address;

and he encapsulates this idea in a diagram.

Pacey produces a wide ranging analysis for the adverse effects of the restricted view of



technology as solely the technical and he argues for an integrated approach to these three aspects of technology practice. We used a classroom example to illuminate this restricted view. Two pupils are engaged on design and technology in a school, one is using yoghurt pots, rolled newspapers and a craft knife, whilst the other is building a printed circuit board and is using an oscilloscope. The interpretation of many people is that the first pupil, working with discarded (and thus recyclable) components and a hand tool must be engaged on design and technology that is at a lower level than the second pupil; it is an example of 'low technology'. Using Pacey's diagram we showed that although the first pupil may be working with simpler technical means, it does not follow that she/he is necessarily working at a simpler level with regard to the organisational or cultural aspects. When these other two aspects are considered it may be that she/he may be identifying, appraising and acting on economic, social and value issues that are of the most complex kind. The technical must not be confused with the technological.

Approach to and content of the 1996 workshop

The aim of this section is to indicate how some balance was sought in the materials content of the 1996 workshop projects in order to optimise participants' exposure to a range of materials that could be used in design and technology activity; an exposure that would allow accessibility to easily available materials but without a consequent fear of the reproduction of cultural disadvantage. The overall guiding principles to the 1996 workshop were:

- although the projects had been derived initially from UK contexts, what needed to be guarded against was the perpetuation in the minds of the participants that these projects were necessarily the right and only way to approach design and technology for their own situation: these projects were simply starting points for the participants own professional development;
- to be active and participatory throughout;
- there should be a mixture of the type of materials and components used in the projects, neither wholly very low cost/low technical complexity, nor wholly higher cost/higher technical complexity.

The workshop commenced with participants communicating their name, and any other information of their choice, through some form of visual device. This was followed by a short project, *Make a Mint*, that served both as an ice-breaker for the participants and as an introduction to the nature and purposes of design and technology in general education irrespective of age phase. The material resources required were a range of mints, light coloured card, glue and fixings, and a varied selection of clear and coloured plastic sheet. This was followed by a much longer, individual, project, that required participants to identify a character from a story familiar to South African pupils and design and make a vehicle sympathetic to that character. The material resources required were spar wood, electric motor, empty drink can, hardboard wheels, steel rod, dowel, clothes pegs, switch, card of various thickness and colour. Once completed their vehicle had to cross a kloof, a ravine or deep watercourse, which necessitated the building of something to span space. The material resources required were solely newspapers and tape. The final project returned to the theme of communication explored initially. Participants had to identify a message that they wished to convey, an audience for that message and then to design and make the means to communicate this information through a visual device that incorporated at least one light emitting diode. The material resources required were card and foam board, wire, resistor and LED, battery and switch. The projects were also used to explore the degree to which they allowed a pupil to identify human needs and purposes, grounded in cultural values, or if they were examples of a criticism cited against some design and technology work, that of *decontextualised* problem-solving.

A project not developed in a formal educational institution: the 'Hats Project'

The aim of this section is to describe a project not developed in a formal educational institution and to evaluate it against Pacey's three components of technology practice, and other criteria.

In many areas of South Africa light plastic waste is a problem. Vast amounts of indestructible plastic in the form of bottles, packaging and especially supermarket carrier bags litter the

landscape. In KwaZulu Natal, in our search for the inevitable presents to take home we came upon Zulu women selling hats and mats. Their visual qualities initially arrested our attention and on closer examination we found that they were constructed from used plastic bags. The plastic bags are folded and cut in such a way as to form a continuous strip which can then be plaited, woven or crocheted. This was an attempt to use waste material, at no cost, to produce goods for tourists. We were given the name of the founder of the project, Jenny Kirkland, and we made arrangements to interview her. The project is called So-Afreco and its purpose is to create and sell sought after consumer goods, whilst simultaneously recycling plastic waste, cleaning up the environment and using the creative talents and enthusiasm of unemployed and destitute African women to improve the quality of their lives.

In 1993 Jenny was given a stunning beachmat crocheted from used plastic bags. The mat was in constant demand and family and friends were eager to obtain similar products. In 1995 Jenny was encouraged to make a start with five women from the impoverished Obejeni area in KwaZulu Natal, and to begin production on a trial basis." The results were outstanding," she said. " The women rejoiced; 42 hats and mats were produced and sold in the first three weeks". Obejeni women have accepted this self-help scheme with great enthusiasm and the project has grown from strength to strength. The women spend an average of 12 hours on a hat and use about 25 plastic bags, whilst a mat takes about 20 hours and uses 100 bags. They are able to work words into their work and typical Zulu designs. So far the project has empowered 67 Obejeni women to the amount of 18,000 Rand (£3,000). With every purchase they will levy their income at 10% which goes towards an adult literacy programme and a mobile eye clinic. The women are being taught to run their own business and therefore improve their lives. Jenny believes it to be to be the only business of its kind in South Africa. Doris Gamede, a hat maker, said "I cannot tell you how happy I am to receive money for my work. Making the hats and mats is hard work but this is the first time I am able to feed my children properly. I have no husband and my children would often go hungry. Now I am able to provide for my children". The project has been so successful that the local countryside is fast running out of plastic bags!

> This is one area that the so-called Third World countries are leading the way - because of material scarcities, recycling is an accepted way of life and has been for generations. Papanek[5]

Pacey's *technical* aspect, the range of knowledge and skills used in conjunction with materials, is low in the 'Hats Project' but his cultural and organisational aspects are extremely high: it is an exemplar of a 'low' technical but 'high' technology practice. It is a project that may have potential in its own right or to illuminate this difference.

In general, there has been a restricted concern in both the literature and policy documents with the criteria for the inclusion of content in a design and technology curriculum. Perry[6] proposes a framework through a comparison of two parallel contexts, the world stage and the curriculum stage. He sees that there is a need to recognise the relationship between the technological policy a society adopts and the technology its pupils and students should experience in schools, and this leads him to propose eight criteria for choosing content to adopt in technology education including:

1 accessibility to children;
2 capabilities in contemporary technologies in their society;
3 understanding of contemporary issues; [...]
7 sustainability and manageability; [...]

Ankiewicz[2] states that the ultimate criteria for the evaluation of the effect and relevance of technology education is

> the degree of critical thinking it generates and how much participation it mobilizes , how it relates to other disciplines, to the communities and literacies of learners and to the larger conditions of society.

For many others, one of the most important educational aims of design and technology is to develop and promote independence in pupils; independence in their learning in schools and beyond, and independence in their lives as citizens of their society. We

believe that projects similar to the 'Hats Project' have the potential to meet a high proportion of these criteria.

Summary

The paper outlines the authors' perceptions, derived from facilitating a number of design and technology workshops, of the pivotal role of the type of materials and components used to resource design and technology activities in South Africa, and the approach adopted for the content of a 1996 workshop is summarised. The paper concludes with a description of a project, developed outside of an education institution, that, evaluated against a broader range of criteria for choosing a project, may be indicative of the type of appropriate design and technology project for many educational institutions, and not just those in South Africa.

The overarching purpose of this paper is not to imply that design and technology educators in South Africa 'have a lot to learn from the UK experience', but rather to use the emergence of design and technology education in another country to highlight some of the contemporary tensions inherent in design and technology education, and to be willing to learn from them.

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