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Research Question Cluster Two:

- *In what ways does working with families, local communities and businesses (i.e. in real, out of school contexts) on D&T projects help to raise aspirations of hard-to-reach pupils such as those from three generations of unemployed?*
- *How can D&T learning foster intellectual and personal development among pupils in such communities? How can D&T encourage a strong sense of responsibility?*
- *How can the study of D&T enhance conditions and life chances of young people?*
- *In what ways do pupil-centred projects ('they look for trouble' – Bill Nichol) give pupils the opportunity to address real problems in their lives?*
- *How far does this give them the chance to gain satisfaction / build self-esteem / become more effective (self-efficacious) in relationship to the world in which they live?*

Introduction

If, as the Manifesto for Design and Technology Education (DATA, 2011) contends, the subject of Design and Technology is to show that it can actively and productively engage 'all students' in real learning that enables them to contribute in meaningful ways to thriving communities then the profession will need to be fully aware of the picture of which it is a part. This means being both nationally and locally informed and having some understanding of the major problems of unemployment and lack of community engagement. It also means practising D&T education with integrity, by which we mean in a way that enhances, rather than lessens, what the subject has to contribute to the education of all students. We stress this point because this cluster of questions, incorrectly engaged-with, would not only be painting a deficit model of the role of schooling, but it would also demean Design and Technology's own integrity if it were the subject predominantly charged with addressing such questions. Put another way, we would expect the questions to be equally and rigorously put to all school subjects, indeed, to schools as a whole. That said, there is no doubt that Design and Technology would be a strong player in meeting this range of educational concerns.

Unemployment and the ‘workless household’

The number of ‘workless households’ in the UK (where no one had ever worked) in the second quarter of 2011 was almost 370,000, more than double the 1997 figure of 184,000 equating to 1.8% of all households (ONS, 2011a). However these households also include those where all of the adults are aged between 16 and 24 years and in full time education. Excluding these ‘student households’ from the figures leaves the 2011 total of households that have never worked as 297,000. A regional breakdown of location ranges from 14.1% in the South-East (18.6% in London) to 24.9% in the North-East of England (ONS, 2011a). These are daunting figures and it should be noted that the root problem lies in matters well beyond the remit or power of education professionals.

The figures tend to follow general trends in the wider population and world economic markets. The proportion of unemployed 16-24 year-olds declined after 1992-1993 after being around 20% for several years, levelling out from 2001 and increasing slightly between 2005 and 2007 before the significant rise during 2008-2009 where it now sits at 37.5% in 2011 (ONS, 2011b). There has been significant research done on the different groups that are disadvantaged within the labour market and a recent article (Barrett, 2010) indicates that around three out of five people aged under the state pension age are in a disadvantaged group when considering their labour market prospects. The group that has shown the least narrowing of employment rate over the last fifteen years are those with low or no qualifications even though the percentage here has decreased (Barrett, 2010). Therefore, failure to gain an ‘adequate’ level of education, even at 16 years of age, increases the probability of not entering the workforce at any level.

Why are students disengaged?

While there appears to be some caution regarding the evidential link between behaviour and achievement (Algozzine, Wang and Violette, 2011) the seminal socio-cultural work by Patterson (1976) suggests that a failing child is both the ‘victim and architect’ (p. 268) of a system that is failing to provide the instructional environment that engages the mind and sublimates the behaviour. The children perceive themselves as failing to learn the material at school and so engage in behaviour that removes them from the instruction periods that may, at best, offer some remediation of failure but at worst continue to reinforce the perception. McIntosh (2005) offers an explanation of this ‘coercive cycle of educational failure’ (pg. 1) where the child spirals into a repetitive fail, reprimand, fail cycle that cannot be addressed without major intervention. With increasing pressure on schools to meet achievement targets it is perhaps easier to exclude these students than try to address their complex problems. Good teachers don’t give up easily but systemic indifference means they don’t get the support they need to continue remediation.

Social factors, including unemployment, drug use and fractured family structures influence the attendance of students at school and the provision of a study space at home. Repetitive failure of students can lead to exclusions: for fixed periods or permanently. Permanent exclusions from schools contributed to 8,680 pupils being kept out of primary, secondary and special education in 2006/7. In the same period there were 425,600 fixed period exclusions with the most common reason being persistent disruptive behaviour (31% of all permanent and 23% fixed period exclusions) (ONS, 2009). The second most common reason for permanent exclusion was assault against a pupil (16%). Twenty-seven percent of permanent exclusions were for reasons including verbal abuse, threatening behaviour against a pupil, damage, theft or bullying. The statistics on bullying are high with 66% of students experiencing some level of bullying in the last three years although as a reason for exclusion it contributed least to exclusions from school either permanently or for fixed periods (ONS, 2009). Correlation between excluded students and unemployment was not possible but would provide interesting statistics.

The Manifesto for Design and Technology Education (DATA, 2011) acknowledges the struggle many children have with formal education without extrapolating the reasons. It suggests that these children can 'excel in situations where they have to think for themselves and bring about practical solutions to real problems. This can be a huge boost to their confidence affecting their whole attitude to school learning' (pg.15). Much needs consideration here if teachers are to deliver in useful ways on this front. While confidence-building will undoubtedly occur within and for D&T practice, the question of any cross-curricular transfer remains unresearched. Undoubtedly the matter of whole-school policy, ethos and leadership are crucial in deciding what is realistically possible at the interface between major societal (and, therefore, political) issues and best classroom practice. Whether it is the major matters of unemployment and student disaffection/disengagement or students' perceptions of failure that is of concern, care needs to be taken in balancing the analysis of the issues, the availability of evidence and the appropriate pedagogical strategies.

If schools are responsible, in some ways, for contributing students' perception of failure then they are also responsible for addressing those perceptions. A key focus for demonstrating how Design and Technology can contribute to engaging students who are likely to be excluded or who see no value in formal education is discussing what happens when D&T is practised and what practices have the strongest chance at re-engaging students at risk.

D&T practice and this question cluster

Design and Technology offers significant opportunities for students of all ages to engage in project-based activity that encourages the creation of innovative solutions to real-life situations or problems. The diversity of projects available is indicative of the variety of foci embedded within the subject

including such areas as food technology, resistant materials and textile technology. Hemmingway notes quite succinctly in the Manifesto for Design and Technology Education (2011) that ‘Design and Technology provides pupils with unique opportunities to learn and apply creative, practical and thinking skills to real, everyday problems.’ (pg.18)

Addressing the concept of engagement, in projects within Design and Technology, highlights the idea of capability that accompanies successful interactions with investigations. This idea of capability was discussed by Kimbell and Perry (2001) who saw it as a ‘combination of understanding, skill, insight, imagination and motivation that enables creative development’ (pg.7). Capability in technology offers the opportunity for mediation ‘between human desires and dissatisfactions on one hand and technical constraints and possibilities on the other’ (Kimbell & Perry 2001, pg.7). It is this focus on ‘desire’ and ‘dissatisfaction’ that best offers the opportunity for re-engaging those students who have already been disaffected by formal education or who are at threat of being so.

If Design and Technology capability exists where ‘pupils are able to make critical appraisals of the personal, social, economic and environmental implications of artefacts and systems’ (DES/WO 1988) then we need to provide opportunities for them to conduct such appraisals within their own environment with focal points and lenses of their own designs. Participation should be active rather than passive (Kimbell & Perry 2001) and Design and Technology is best placed to provide positive experiences for students to be the architect of their own educational experience (Patterson, 1976) based on issues that matter for them in their lives and communities. In order to guide such investigations, the profession needs to be aware of the issues that confront students who are disengaging and the defences (music, fashion, systems) they use to define themselves in a community that proposes support and care but that appears to be rejecting them.

Past case studies highlighting engagement with real issues

Significant activities have taken place across the world that have sought to engage and re-engage children in learning in challenging circumstances. While they may not provide the template for re-engagement in the UK, they offer evidence that ‘from little things, big things grow’ (Kelly and Carmody, 1991). One Laptop per Child (OLPC) was founded by Nicholas Negroponte after he experienced, in 2002, the benefits gained by children in a remote Cambodian village from the access to digital technology. He sought to empower children in developing countries by providing access to a connected laptop which led to the development of the XO laptop. This mission followed Sugata Mitra’s 1999 ‘hole in the wall’ social experiment in a New Delhi slum which revealed children’s ability to teach themselves quite advanced computing (and literacy) skills using computer technology even though they had only the most rudimentary education.

Another form of case study from which to take inspiration regarding the efficacy of Design and Technology to contribute to real solutions to life problems is the story of William Kamkwamba, the boy who harnessed the wind. In 2001, when his parents could no longer afford to send him to school, William aged 14 started borrowing books from a small community library. One of these showed windmills harnessing energy so William built one to power his family home. From that small, individual project, William went on to design other life-enhancing projects that drew the attention of academics and the authorities. William's story is inspirational and demonstrates that solving real life problems can engage people in developing skills and knowledge that can be transferred to other areas of life. Engaging the advice of local community welfare agencies and support networks will provide the background to many of the social issues that students, in different boroughs and regions, are facing. These contacts can provide the information and contacts necessary to enable teachers and schools to design programs of work that would have stronger chances of re-engaging students.

Problem-based learning as a pedagogical strategy to engage

The Association notes Design and Technology teachers' capacity to '...help pupils to make sense of, and give relevance to, learning that takes place elsewhere in the curriculum, drawing on wider skills and knowledge and providing the opportunity to apply it first hand to solving real life problems' (DATA, 2011:33). Problem-based learning (PBL), a highly developed pedagogical strategy in the world of adult learning, can be a vehicle by which teachers can guide students to work with real life problems, questions and issues. Which particular problems might relate to students who are at risk of disengaging could be enlightening but it would be foolhardy to propose projects that failed to meet the real needs of students and their communities or failed to ignite a passion that was sufficient to evoke interest in learning. It is also necessary, if we are serious about Design and Technology, to be aware of the designers/designs that relate to the population of disengaged students. It probably is not the Dysons or Conrans who inspire them. The creatives behind the King Apparel brand of clothing promote their relationships with the Grime scene and Dubstep which creates a music/fashion blend attractive to younger people and helps define their idea of design. Young people live this design world not only as a means of expression but as a way of defining who they are and what 'group' they belong to. There may be interesting research possibilities to tease out which senses and aspects of 'design' connect with students. There are fascinating areas of interplay between persons and other phenomena. While students are exposed to (vulnerable to) markets, the vicissitudes of about which they need an education, there is also the background (Keirl, 2009) into which many (designed) technologies fade to become part of the everyday. Possibilities emerge here for PBL but they are of a different kind to more orthodox understandings of what constitute a D&T educational problem.

Karaman and Celik, (2008) suggest that prospective teachers benefit from undertaking PBL as part of their own course of learning and they highlight the importance of providing effective guidance on a range of issues including skilling, technical issues, time management and how to prepare and support students undertaking PBL. Proper preparation and resourcing remain a concern for initiatives such as PBL and OFSTED's 2009 Report provides evidence of the reduction in continuing professional development for teachers and the erosion of initial teacher education provision so these issues need to be addressed as a matter of urgency. Giving a student the opportunity to undertake a personalised study is not enough: they need the building blocks (skills, knowledge) necessary to do the task.

The world of work is increasingly collaborative which may influence both the way student projects are structured (Johnson et al., 2011) and the way teachers collaborate to provide multi-disciplinary tasks that enable students at risk of disengagement to work independently or collaboratively to address a real problem or issue in their community. Seltzer and Bentley (1999) discuss how interdisciplinary knowledge requires an understanding of the 'interface' between areas of knowledge and how to apply these in different areas. Teachers have the capacity to guide students in the transference of knowledge but it may be necessary that the teachers, themselves, work collaboratively in order to strengthen school understanding of what contributes to this 'interface' of knowledge. The investigation of any real life problem or issue also requires teachers and students to consider the ethical issues of the technology or system under the microscope. Keirl (1998) discussed how the consequences at each stage of the intention-design-manifestation-application of technology should be evaluated. This fundamental requirement would necessitate a whole new set of higher order thinking skills that may not have been developed if students have disengaged. But, it is a challenge: not an insurmountable problem.

Most important of all are the reasons why students are not engaging in formal education and how these reasons influence the design of any remedial action to keep them actively involved as architects of their own learning journey. The real life issues that students select to investigate, just like William Kamkwamba, may involve smaller issues rather ones predetermined by the education authority or community in general. For example, recent statements about feeding a family of four on £50.00 per week highlight the possibilities of conducting a food technology project grounded in systems theory and embracing food production, provision, marketing, consumption and waste management in specific communities. Such immediate and real-life issues rather supersede global issues such as climate change for families who struggle to manage on meagre resources.

Summary remarks

Many (Petrina, 2000; Apple, 2001; Hargreaves, 2003; Keirl, 2006; 2007) have discussed the political nature of curriculum and Design and Technology curriculum. How subjects can be used to address

social ills brought about by government inaction on equity issues continues to feed debate. If ‘Design and Technology is the only subject to truly test and enhance the core skills of teamwork, delegation, project management and idea generation’ as offered by Joseph Shaffery (DATA, 2011:29) then there may be considerable perturbation if it is no longer accessible to students in English schools.

Countering this, we reiterate our introductory caution that the full burden of the issues implicit in this question cluster should not be borne by Design and Technology alone. Interestingly, however, in a climate of reductionist assessment being used to divide and rank students and schools using testing in a *few* subjects, the holism of Design and Technology practice *and* assessment (viz: TERU/e-scape) is affirmation of the subject’s validity in facing the questions validly and reliably. In the Big Society Design and Technology itself surely has a cogent, if not quite yet, coherent case for educational inclusion.

One of the secondary students quoted in the Manifesto states that the ‘freedom within the subject makes it much more accessible than many and promotes independent learning. Compared to other subjects where you are mainly spoon-fed information and skills, Design and Technology is more hands-on.’ (DATA, 2011:23). The key words of accessibility and independence are important if students are to re-engage in learning and in behaviour that involves them as ‘learning-architects’.

Many curriculum constraints remain as inhibitors to purposeful action on these questions. While resources are oft-cited as being short in the educational context, there is a sense that their very shortage might be a stimulus in related PBL projects – resourcefulness and initiative being desirable student qualities. The division of the curriculum into subjects remains unhelpful and systemic flexibility is needed to facilitate the kinds of learning and pedagogy that would address the questions. Thus, the school ethos and mission is critical to creating an environment of success in the face of challenges - whether personal, educational or social. Here, the research field of student resilience might be informative. Further, teacher disposition matters and this may be a readily accessible trait or it may be something that requires nurturing – whether through initial teacher education or CPD.

We close with two ‘A’ words which we believe offer further avenues of enquiry, food for thought, or could inform further research. The first is *agency*. An exploration of the several senses of ‘agency’ would, we believe, prove fruitful. The second word is *authentic* and we would suggest that there is also considerable ground for exploration here. We nominate the term in place of the oft-used ‘real’ (as tiresomely used in ‘real-world’; ‘real-life’; etc) because it goes further in terms of emotion, humanity, purpose, community and rigour than does *real*. Agency and authenticity can come together fruitfully in Design and Technology curriculum practice both in the face of this question cluster but also in enhancing the integrity of Design and Technology as a legitimate school subject. The fact is that agency and authenticity are valid terms for all actors identified in the question cluster.

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