Taking control: Action Research and the Conference theme -
Designing the curriculum – making it work

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1.0 Introduction

This presentation aims to look at how practitioners can use action research as a tool to take control of, develop the design and technology curriculum and make it work. I define action research as small scale, usually collaborative, research by practitioners into their own curriculum and practice. It is usually cyclical and designed with an awareness of the advantages, limitations and procedures of such small scale research.

Action research, however, offers far more than simply small scale research within the confines of individual schools. With the right support it can web out in a synergetic manner and build a rigorous understanding of our subject and pedagogy at a national level through the principles of grounded theory as proposed by Glaser and Strauss (1967). Such a 'ground-up' approach to evidence-based planning can have many benefits beyond the immediately obvious. Practitioners will realise the flexibility they have to explore; they will collaborate more; learn from each other; value each other more; morale should rise and, of course, pupil learning experiences should be more positive.

The presentation will firstly consider the national (UK) context of design and technology education and teachers' reaction to it. I call for support for a far stronger school based research culture designed to web out and feed upwards. I outline a typical action research project trajectory and consider possible specific methodologies including how some of the main limitations of action research can be managed. Finally I look at the importance of publishing via professional and academic journals, such as the D&T Association journals, plus web based e-conferences such as IDATER on-line. If this is done more effectively the webbing of information and discussion acts to build theory, improve practice and can, ultimately, influence national policy.

2.0 Context

The last fifteen to twenty years has seen considerable development in design and technology in the UK.   Initially this was a heady period in which many practitioners explored and experimented. It soon became clear, however, that there needed to be a degree of congruence in design related subjects and, in

parallel, we saw the rise of political control of the curriculum (National Curriculum (NC) 1990). In many respects such centralisation has been positive. For example, in England, there has since been a far clearer message on what the subject means and the types of learning experience pupils will gain from undertaking it. The growth of the Office for Standards in Education (Ofsted) and the inspection regime it developed then led to a period in which many schools moved their focus to a D&T curriculum which 'ticked the boxes' in a manner which they felt earned a good grade from Ofsted. A great deal of energy was spent by practitioners in aligning their curricula with the various (changing) attainment targets. In many schools staff found it easier to simply buy 'off the peg' materials in which all the cross referencing with the NC was done. It was also very apparent to me, working as a teacher trainer in the period, that most of our teaching practice schools started 'fixing' their Design and Technology curricula. They then prevented student teachers from innovating in while in schools, a factor which had previously been seen as a central plank of training and a benefit to schools.

The danger of ossification is obvious. I often see a very restricted form of design, produced by following rigid design models using pre-printed sheets, which tick the 'right boxes'. In many schools the role of the D&T teacher has, frankly, moved towards that of 'teaching technician' rather than practicing professional. Note the term 'practicing'. It is that used by the medical and legal profession in which it emphasises the role of continuing learning and development from practice and reading professional journals. I worry about the profession loosing the ability to innovate and develop the subject: that spirit of enquiry and self-reflective growth I remember in the schools I taught and visited. In addition, a clear effect of moving the locus of control away from practicing professionals is that of rising stress and lowered performance as they perceive themselves to be less in control. This paper is about re-taking control. In that sense it is unashamedly political.

3.0 A changing paradigm: action research and grounded theory
We live in an era of 'evidence based policy making' (Davies 2004, and Policy Hub 2008). I have no problem with such an approach, however, there is always the danger of restricting the evidence base to a few larger, government funded, research projects; a 'top down' approach. Reliance on such an evidence base can lead to a limited perspective, increased centralisation and resistance to change; indeed, an inability to change.

This paper calls for a different paradigm: a far stronger 'ground up' approach to research which can enrich evidence based policy. I am please to note that the D&T Association has moved in this direction. Action research by practitioners of D&T does have a history, for example my own MPhil and PhD work (Denton 1984 & 1992) and papers published as they developed, however such small

scale research is vulnerable to questions of reliability and validity and all too liable to be ignored by policy makers.

Glaser and Strauss (1967) pointed out that theory can be built (grounded) on data generated by research rather than derived from the hypothetico/deductive approaches of the physical sciences. Practitioner action research can be the primary generator of such data. While each piece of practitioner research is small scale it can web out and promote further question. Other practitioners may replicate research and in this way we start to understand what can be generalised beyond the individual classroom. With the number of D&T departments across the UK we could develop an extremely valuable data base of research from which theory can be grounded and developed.

The key is an active and effective web of communications. Practitioners need to be able to ask questions, try ideas out and report findings back to the profession. This needs to be easy to do. We need to hold repositories of research data which should be accessible. We needs to know more about what constitutes sound research and be able to judge. The potential for this has grown considerably with organisations such as The D&T Association, their journals and conferences such as this. In addition we have web based forums such as IDATER on-line and freely accessible repositories for research papers and theses such as that at Loughborough University (http://dspace.lboro.ac.uk/dspace/) which provides free access to papers produced by academic staff at Loughborough, the archives of the IDATER conferences from 1988 to 2001 (397 research papers) and archives of the D&T Association Journal, thanks to some hard work from Dr Eddie Norman.

If we can achieve a strong enough network and exchange of ideas it should, in turn, promote more thinking, experimentation and reporting. An analogy is that of the world wide web (www). Designed originally as a system of communications and data repository for a small group of scientists it grew in an exponential manner. Essentially, the more that is on the web, the more useful it can be and the more it gets used. The key is that, like the web the research web needs to be easily accessible and the people using it need to be 'street-wise'.

Such a research web need not be one entity or one ownership. There can be a number of drivers. The D&T Association is clearly providing a forum with conferences, exhibitions, web site and hard copy including a refereed research journal. It also intends to open a web based research hub. Universities such as Loughborough can provide discussion and refereed publishing opportunities such as IDATER online via the Design Education Research Group (http://www.lboro.ac.uk/departments/cd/research/groups/ed/index.htm). This site also accesses current and recent PhD projects enabling practitioners to explore and build links. Universities such as Loughborough can also offer expertise in action research and tutors for those who wish to take their action research to further degrees such as MPhil and PhD. In this way the rigour of such action

research can be strengthened and the capability to do such work within the practitioner community enhanced. Above all D&T departments and practitioners can provide information of what they are doing and show links to other sites. A vigorous network of reporting and discussion can make its presence felt at policy making levels: the practitioner/researcher can, therefore, influence policy making at a D&T Association and national level.

4.0 Action Research

Action research has a history born in the frustration of professionals with research in social contexts which attempted to adopt the principles of the classical scientific paradigm of research. The aim would be to hold all variables constant, manipulate just one and observe the effect; the laws of cause and effect can then be applied. Attempts to apply such a paradigm to any social context meant researchers needed to focus on such a specific, limited, variable that the value practitioners perceived in the research was minimal even assuming the other variables could be held constant or randomised via large samples. In addition the terminology used to communicate such research was often arcane and impenetrable to non-researchers.

Lewin (1948) and Stenhouse (1968) pioneered approaches to research which worked at practitioner level and focused on meaningful exploration and results. Cohen and Manion (1994:186) provided a classic definition of action research: *a small scale intervention in the functioning of the real world and a close examination of the effects of such an intervention*. The approach has been criticised for lack of rigour but this is unreasonable: it can be rigorous, just as work in the scientific paradigm can lack rigour if not designed and conducted properly. The important point is that the scientific principles of reliability and validity do not apply in the same way.

The term action research is often linked to that of practitioner research; emphasising the context in which it is usually applied. It is interesting that Kemmis and McTaggart (1988) emphasise a cooperative role in action research; that it is a form of self-reflective enquiry in which there is collaboration through critically examined action. This is a helpful point and is reflected in the work of Thomas (2008) where he worked with his D&T departmental staff team in exploring issues relating to disaffected pupils and how they appeared to respond more positively in the D&T department than others. Here the team acted at several levels: they provided data, they could check other data, support Thomas in reflective analysis and, at the same time, this activity was promoting staff cohesion and reflective teaching across the department.

Thomas, however, was not simply acting under normal professional reflection. The research was more systematic and rigorous which Kemmis and McTaggart (1992) use to differentiate research from curriculum development and professional reflection. Thomas' work started with professional reflection but then moved into a more rigorous phase in relation to completing a PhD. Kemmis

and McTaggart also point out that in action research the emphasis is usually one of improving practice rather than solving problems. An example of this is Thorsteinsson where, as a teacher trainer in Iceland, his work on developing the new Icelandic subject Innovation Education (IE) he moved from what was essentially curriculum development into a research phase. The motivation was the desire to really understand the curriculum development and associated pedagogy he was involved in. The essential difference in practice was that the normal professional reflection associated with curriculum development was taken to a more rigorous level, using triangulated data collection methods and publication to gain peer review. In addition by registering for a PhD he gained academic support and feedback.

Action research is usually an iterative cycle which has no end point as such. Each cycle will generate more questions and opportunities. It is often described as a wheel, but a helix would be better with advancing understanding represented by the axis of the helix. The basic cycle is often described in four phases: reflection, planning, acting and observing.
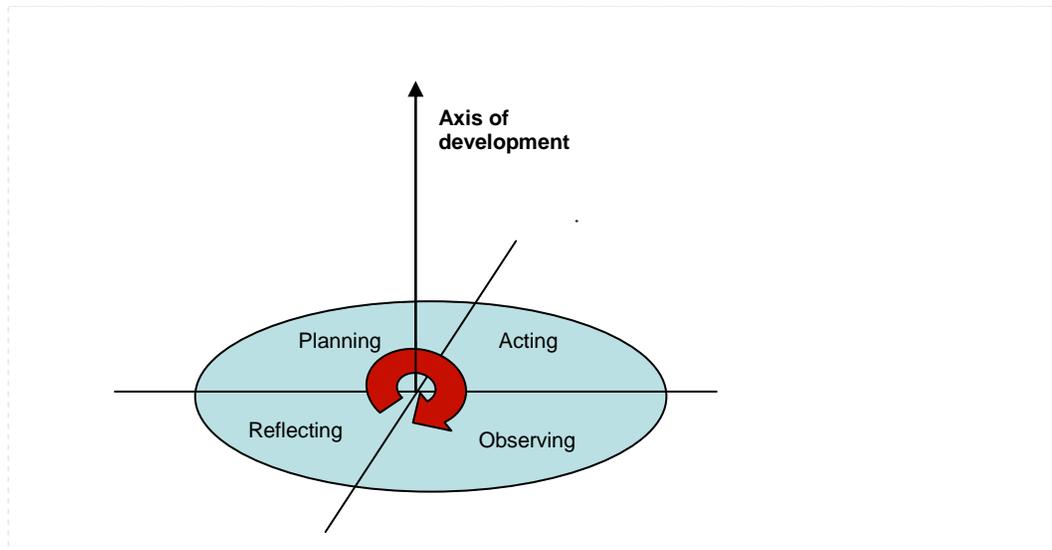

Figure 1. *The Action research cycle.*

The practitioner / researcher can, of course, start at any point. My own PhD is based on seven years of multiple research cycles in which case studies were used to develop and confirm data and then to explore specific developments in similar contexts. The work was based on using simulated commercial environments and team based design to help pupils and students learn to design in commercial contexts. The work developed from reflection on 'the day job' and slowly moved into a research phase as I read and practiced research techniques in order to build the rigour required for PhD. An important part of that was a

series of refereed journal and conference papers to inform others and gain feedback as the process moved forward.

5.0 Rigour

The distinction between valuable curriculum development, the normal role of the practitioner, and action research is, therefore, that 'research is systematic, empirical and self correcting – open to scrutiny' (Cohen et al 2000:5).   In action research there is often one practitioner researcher who is also personally very closely involved in the work/people under scrutiny. This makes it difficult to achieve the necessary detachment and objectivity of observation or analysis. Nevertheless rigour is important. There are various techniques which can be used to develop rigour.

Firstly the practitioner researcher needs to be aware of the role of self and the principle of reflexivity: that is an awareness that the researcher has an effect on the activity being observed and on the way data is collected and analysed. We see things through our own experience and others may not see the same event in the same way.

Secondly researchers must acknowledge the limits and limitations of their work. Deep reading of research methodology texts such as Cohen et al (2000) is essential. Working with a mentor / tutor who is detached from the research and has research training and experience is particularly valuable. The can be used as a sounding board at all stages of the research. This, of course, is a principle role of university academic staff and one reason for conducting action research under registration for a higher degree; either MPhil or PhD. In addition to a tutor a steering group can be valuable, especially if they understand the context and also include school senior management who can also 'enable' time and funds to support the work.

Rigour is also supported by 'thick description'; essentially a careful and detailed description of the context, and methods used. It would also include a detailed biography of the researcher/s so the reader can judge how this may influence results. Thick description puts data clearly in its social setting and reinforces its context, limits and limitations. In addition, rigour is supported by respondent validation; enabling, for example, an interviewee to check notes from the interview to ensure the meaning is as intended.

Rigour can also be strengthened by triangulation. This term comes from navigation where it refers to the use of multiple bearing taken to improve confidence in the result. In research we have numerous methods of triangulation. We may use multiple observers on one context and compare what they report. We may triangulate in time, ie see whether the same observation is repeated at a later instance. We may use multiple methods – for example observation could be triangulated against interviews. Thomas (2008), for

example used a series of case studies which enabled triangulation in time, multiple observers, interviews (individual and group) and questionnaires. With sets of data such as this it is possible to identify areas of congruence and, just as importantly, non-congruence. This enables a clearer, more reliable, rigorous picture of the workings of the context under scrutiny.

6.0 Ethics

Action research in schools involves real people; pupils, staff and parents. All are vulnerable and any researcher must be aware of this and address ethical considerations in planning phases. Thomas and Denton (2006) presented a paper on ethical action research in design and technology to the 2006 D&T Association research conference. This is also available on the CD for the D&T Association 2008 conference. The checklist from this paper is repeated below:

	Before the research begins:	Done?
1.	Raise awareness of ethical issues – background reading – legal implications – The Data protection Act, 1998, Children Act 1989	
2.	Think through the aims of your research – What do you hope to achieve? What does the school stand to gain? Can the aims of your research be clearly communicated to a range of audiences – staff / pupils / parents?	
3	Be open, talk through the plans for your research – discuss plans with colleagues	
4.	Gain formal permission from head teacher and governors – to interview children / staff / parents, administer questionnaires	
5.	Prepare simple written research outlines for the various audiences – give the aims of the research, the possible outcomes, possible publication of findings. Dispatch	
6.	Communicate aims of the research with pupils, offer confidentiality as far as possible (child protection issues), offer the right to withdraw as far as possible, apply "reasonableness" to both – guard against over sensitising	
	During the research	
7.	Be aware of your professional obligation as a teacher to your pupils – mindful of gender / ethnic implications	
8.	Be aware of the possible implications of one to one interviewing of pupils, using electronic recording equipment to carry out observations or interviews	
9.	Be aware of your own perspective on subjectivity. Temper your research using a Delphi group / your research supervisor to read over your work. Use respondent validation – feed back, to validate data collected	
10.	Be prepared to make changes as a result of feedback. Maintain a dialogue with all participants; be mindful of the conflict between their perspectives and the aims of the research.	
11.	Be prepared to renegotiate due to change in direction of research as the research develops	
12.	Reflect on all your work as it grows and consider the consequences of what ever action you decide to take	

Table 1. *Ethical checklist for practitioner research in schools*
(Thomas and Denton. 2006)

7.0 Phases

Action research was described above as based on a cycle of four phases: observation, reflection, planning and action operating in a helical development. In practice the researcher typically follows the following sequences suggested by Conen et al (2003:235) .

7.1 Typically an action research project will start with a cycle in which the aim is to **frame the research**; to understand what is to be examined and the context. This usually takes two forms: starting to read the literature available on the area under consideration and a focussing study. For example Thorsteinsson set up a series of Innovation Education lessons where pupils used a new virtual reality learning environment (VRLE). Data was obtained in the form of observation notes from the teacher and researcher independently, interviews with pupils (individual and as a group), video of classroom activity and the record of activity within the VRLE. These data sources enabled triangulation across observers, methods and time. This framing phase will probably involve at least one revolution of the 4 phases of the action research cycle in figure 1., above.

7.2 Once the project is framed in a manageable manner it is important to adopt a **clear working title**. This acts as a focussing instrument and should be referred to frequently. Collaboration with other parties at this point can be particularly valuable. As a *working* title it may be necessary to tune it as the research proceeds, though this should only be done after careful consideration and reference back to a steering group or supervisor.

7.3. The third phase is to engage in a more **sustained review of the literature** in the field of study and in research methods appropriate to action research. Comparable studies are particularly valuable. In practice this phase never stops, but a sufficiency is achieved to move into the next phase whilst reading continues.

7.4 The fourth phase involves redefining the working title and **setting research questions (RQs)**. This can be set out in the form of a cascade of increasing detail and focus.

7.5 The fifth phase concerns careful **selection of appropriate data collection methods**. These should be related to each RQ. Ideally each question should be capable of being answered by data from at least two different methods, so ensuring a degree of triangulation. A table of RQs against data collection methods can be very useful.

7.6 The sixth phase involves the **design of an evaluation regime** to ensure an effective on-going review of the work. A steering committee or tutor can be valuable.

7.7 The seventh phase would be the **implementation of the project** itself. This should always be preceded by trial runs to ensure that the data collection and evaluation procedures work and observers and interview schedules are effective. Researchers need practice.

7.8. Finally the **data is explored and analysed**. In schools based action research this is often qualitative data. This can be handled either by using computer based packages such as Atlas/ti and Nudist or by conventional techniques. Much action research is still done effectively conventionally. Either way the root is careful organisation. Radnor (2002:68) pointed out the importance of *"Helping to order the data so that it is possible for the researcher to consider them clearly. It advises a consistent, thoughtful ordering (not a mechanistic one), so as to encourage rigour without rigidity".* Radnor (Ibid: 71)identifies six steps:

- Topic ordering
- Constructing categories
- Reading for content
- Completing coded sheets
- Generating coded transcripts
- Analysis to interpreting the data

8.0 Methods
Action research is not a method but a strategy. Practitioners can use data collection methods eclectically. As action research is usually context bound case study methodologies are often employed. Embedded within would typically be observation (possibly including video/audio recording), interviews (individual, group, structured, semi structured), questionnaires. Researchers can also make use of documentary evidence which may be to hand such as reports, test/examination results, design work etc. It is possible to generate data from simple test tasks, for example looking at pupil drawing quality in computer drawing packages using different input devices.

Each of these areas requires considerable exploration in the third and fifth phases, above. This paper cannot go into detail other than to say that each area has a number of subsets each with advantages, limits and limitations which need to be understood and acknowledged by the practitioner if rigour is to be maintained. An essential element is to practice using these instruments prior to the actual data gathering session.

9.0 Conclusions
The presentation has sought to show how the development of the National Curriculum and Ofsted have had both positive and negative effects. This centralisation has led to reactions in schools which were not intended and which are tending to ossify the subject and its pedagogy. The central reasons why D&T was part of the National Curriculum still hold, but if it is to deliver its promise we need to take action which works from the ground up, rather than imposed from on high.

Practitioner action research, combined with an effective web for discussion can provide a dynamic and yet grounded set of research data for all practitioners and which is robust enough to inform National policy.

In addition to this the process of boosting action research could provide a chain reaction which will re-invigorate the profession and improve the learning experience for our pupils and students.

To paraphrase Chairman Mao Zedong:

Let a thousand flowers bloom…………………

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