Graphic Approaches to Describing Action Research Methodology

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Abstract

This paper advocates the use of graphic images as a device that can help in the organisation of thinking about the procedural aspects of action research. Further, it explores the parallels between design process, action research methodology and the social / societal context in which both occur. The paper has the following structure Fig 1:

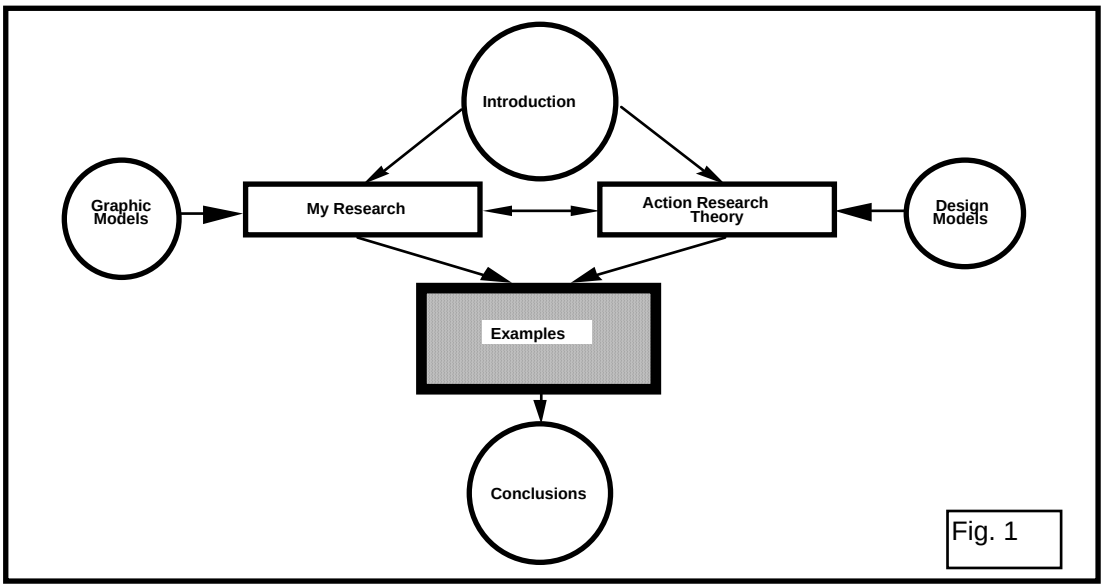

Fig. 1

The paper uses research carried out within an ongoing Ph.D. study entitled ‘Illuminating Primary Design and Technology: An investigation into planning and teaching methods’ as a vehicle for discourse.

Context

Through and Action Research based study of Design and Technology in primary schools I have tried to illuminate the influential characteristics of teacher activity when planning and teaching. Central to the work has been an attempted to interpret the ideology of the national curriculum within a broader societal rationale - why should design and technology be part of the primary curriculum? In grappling with the problems of clarifying the Order and interpreting it into meaningful experiences for children. The focus of my empirical work as been the classroom. The rationale here was clear - to explore my understanding of teaching in the primary classroom I should engage in it.

My work in school began in January 1994. The pattern I established was that of 'research cycles' - my contact with a school during one academic year. I worked with four schools sequentially over three years. As this was a part time study, there was a practical necessity to establish this serial approach. The advantage of working with one school at a time was that insights gained were transferred and used in the next school. This resulted in clarification of the nature of the research and better ways of working. The disadvantage was that the creative leaps made at each incursion into school needed to be documented resulting in a large research archive.

Through inquiry I have explored the interdependence of theory and practice; developing social research methods that enabled classroom teachers to contribute to my thinking

and in the process develop their understandings. The ultimate aim of my work is to enhance my understanding of the subject and methods of teaching it so that I can better carry out my professional role as a teacher educator.

We often think of 'design and technology' as a modern concept, but it has been central to our progress as a species. Many of our physical attributes mitigate against our survival. We walk on two legs and are easily knocked over. We cannot run fast and are not as strong as many other animals. Key to success has been intelligent and creative use of materials, combined with our positive physical qualities - a truly upright stance enabling full, finely co-ordinated, use of our shoulders arms and hands together with binocular vision - to produce design and technology. Its fundemental nature is well established, however, much debate has taken place about the rationale for its inclusion within the curriculum. Two re-occurring and contrasting ideologies about the knowledge base of the subject can be picked out:

- design and technology linked to science;

or

- design and technology allied to a broader concept of design and with craft.

The debate between these two schools of thought - seeing design and technology as facilitating learning in design and craft or using design and technology as a vehicle for learning scientific principles has been fierce and is yet to be fully resolved, the revision of the national curriculum might well see the subject being more biased to one or other

of these views. Yet further debate has taken place about the role of the subject in preparing citizens of the future. Should the focus be on the subject as utilitarian, developing vocational attributes, young adults prepared for work, or should the justification be more humanistic, the subject contributing to the whole self. (see Bowen 1996 or Kimbell 1997 for further exploration of the ideas).

It is within this context that I have been exploring the use of graphic images to aid procedural thinking within my research processes.

Introduction

'Try to draw it'. This simple statement, made by my supervisor when I was struggling to find the words to describe my the processes of my research activity, has proved to be of immense value. Like many in the field of Design and Technology, I would not choose the written word as my first language of communication. Oral descriptions, gestures and, importantly, drawings are much more to my liking. How could making a drawing help me as a researcher and what kind of drawing might I use?

From my reading, parallels between the processes of Action Research and that of designing quickly became obvious. Whitehead (in McNiff, 1988) suggested the following activities for structuring an Action Research project:

'1. The statement of the problem
2. The imagination of a solution
3. The implementation of a solution

4. The evaluation of a solution
5. The modification of practice in the light of evaluation.' (p58-59)

The thinking here was very similar to designing. An example of design process as described by Kimbell (1982) illustrates this point:

'1. clarifying the parameters of the problem;
2. exploring around the problem and examination of possibilities;
3. proposing a tentative solution;
4. making up the solution;
5. trying it out against the initial problem;
6. redesign as necessary.' (p48)

I began to see the development of research methodology as a designerly activity. The Design Council's definition helped:

> 'To design is always to prescribe some form, structure pattern or arrangement for a proposed thing, system or event. A design is always an integrated whole a balanced prescription - a product of judgement and invention as well as knowledge and skill.' (1980: p4)

I was seeking to ascribe 'form, structure and pattern' to my research to make it practicable. A design drawing that described the research process was a possible way forward.

But was this an adequate justification for using drawing as a way of describing my research processes and in what other ways could drawing help?

The linear nature of words requires ideas to be constructed in the mind when reading. A drawing can transport the complete idea in a single image. DeBono (1972), in explaining why he uses drawing as a thinking medium for children, develops this point:

> ‘Finally a word about drawings. Many people ask me why I seem to prefer drawings to words as a thinking medium for children. There are several reasons. Young children are not always very good at expressing their ideas in words and it would be a pity if their ideas were restricted by insisting they use words. Again, words can sometimes be difficult to understand and interpreting the meaning behind them becomes a matter of guesswork. Drawings, however, are clear and relatively unambiguous. To make a drawing you commit yourself to a definite idea. ... There are some other advantages. With a drawing the whole idea is visible all at once and you can work at it with additions, alterations, modifications, change, etc.’ (p12)

The idea of conveying complexity through a drawing which had the added value of being ‘relatively unambiguous’ appealed. Could I find a drawing method that would express my ideas effectively?

I found that some authors had used drawings to describe the process of Action Research. For example McNiff in interpreting the work of Lewin describes a scheme for action as in Figure 2:

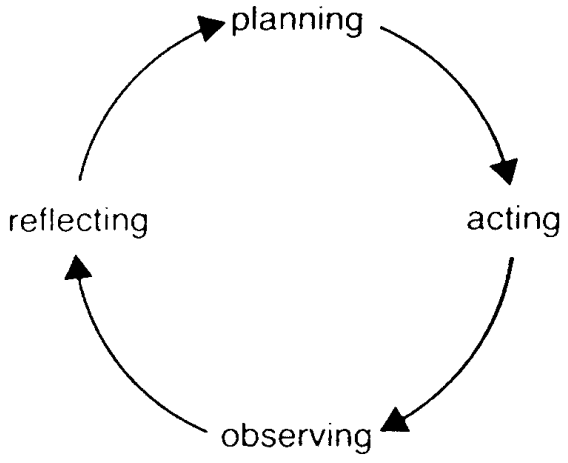

Figure 2
McNiff interpreting Lewin: p22

This reminded me both visually and conceptually of a ‘design loop’ and I was able to track which one - Figure 3:

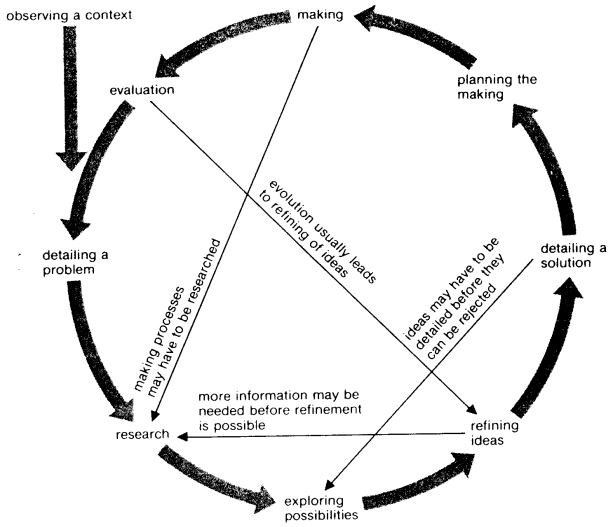

Figure 3
Kimbell/SEC/OU 1986: p10

I saw a relationship between the key stages identified in this model of action research and design models.

As indicated in Kimbell’s model by the internal arrows, design process is not linear. Neither are the processes of Action Research. Both processes refine ideas by developing approximations to an ideal scenario based on reflective judgements. Much of the work I have engaged in has been cyclic, requiring contemplation of practice, resulting in changes to the original ideas being explored.

Other drawn models of Action Research could be seen as descriptions of design process and these were again iterative. Ebbutt describes an idealised model that illustrates both steps and the flow of of ideas - Figure 4:

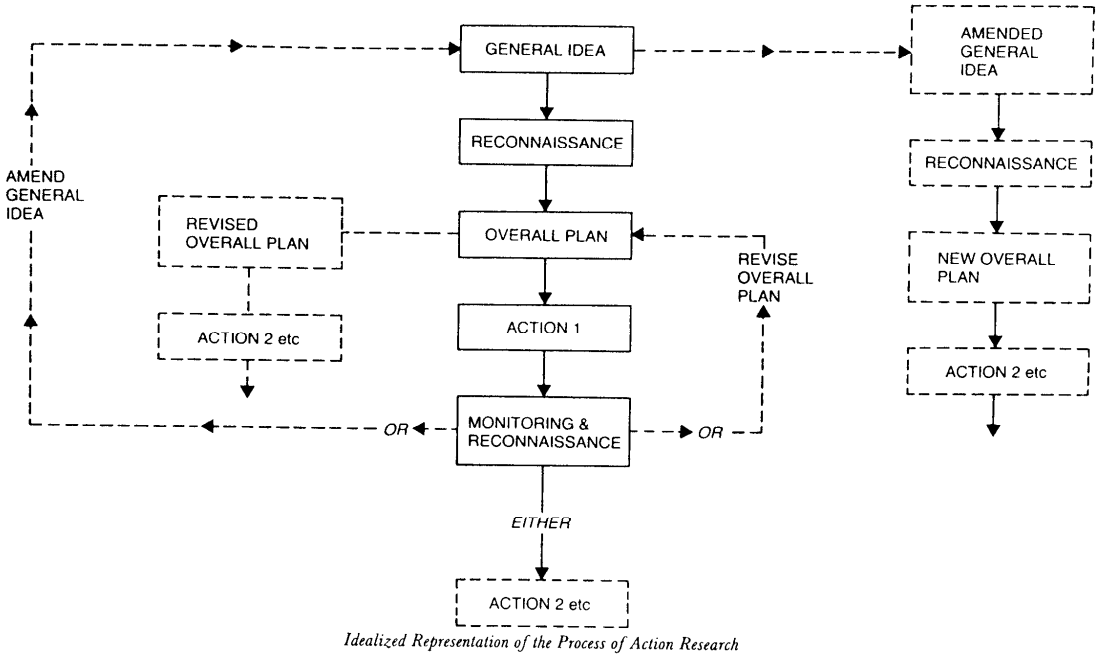

Figure 4
Ebbutt in McNiff 1988: p32

These graphic representations struck a clear accord and reminded me of many of the descriptions of design used by Jones (1970) in his seminal work on design methods. Here he explores techniques for helping designers structure their work. For Figure 5 show a nuber of design strategies.

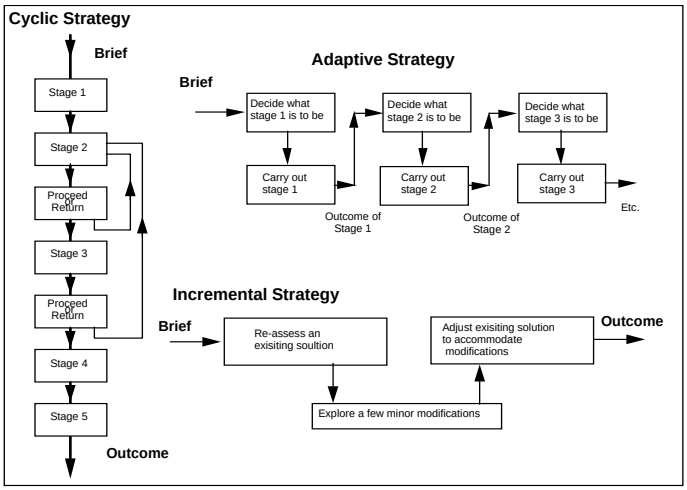

Figure 5
Jones 1970: p76-77

The form of drawing used by authors in both design and action research is often diagrammatic and used to illustrate the flow of process thinking. The function of the diagrams I developed was to aid understanding about the organisation of activity. Perhaps, I thought, a flow diagram should be the graphic form for my drawings

The recognition of the association between the processes of action research and that of designing enabled me to think as a designer in the planning of my research activity. However, these diagrams of action research and design methods both have the same flaw. Each process is very complex and the diagrams are a simplification: possibly an oversimplification. Further, the functional linkage as described above, is only one aspect of their association. A more subtle and deeper form of relationship exists; that of action research and designing both functioning within social / societal contexts.

Design and technology as a primary school subject aims to foster the development the fundamental human characteristics alluded to in the contextual section of this paper. The processes of designing, so central to design and technology, can also be seen as central to society:

> The relationship between good design, in all its forms, and the improvement in the quality of life is obvious, but the factors affecting the relationship need some investigation. For example the work of designers is unlikely to make much impact if it is not appreciated by the community at large. It follows therefore that the community must be aware of good design and possesses sufficient sensibility to choose in a discriminating manner (as consumers for example) and voice its preference (as voters, parents and citizens). If standards are to improve, the community must have some insight into the factors affecting the quality of life, a prominent one of which is design.' (Design Council 1980: P16)

Not to be undervalued in design education the micro-social aspect of designing. Young children need to establish social skills and the ability to function in different kinds of relationships. Design in the primary classroom is a social activity involving groups of individuals contributing from their individuality to a common aim.

> Designing requires discussion, collaboration, and taking account of other people's needs and wants. All these habits heighten a child's appreciation of the material world in which he or she lives and of the people with whom it is shared.' (Design Council 1987: para. 4.3)

I have, in developing children's design abilities, as illustrated here, also been studying the role of design in developing the teacher's ability to teach. Teaching is a dynamic and responsive activity built on the ability to take intutive action, this ability being developed through individual and group reflection on practice. Teachers are in effect designing a learning environment and pursing design process through the the actions of planning the curriculum and teaching. In *Educating the Reflective Practitioner,* Schon (1987) explored the concept of professional practitioners being designers - 'designing,

broadly conceived, is the process fundemental to the excercise of atristry in all professions.' (p41) His view of designers having to 'juggle variables, reconcile conflicting values, and maneuver around constraints - a process which, although some design products may be superior to others, there a no unique right answers.' (P42) accords well with my concept of teaching design and technology and my concept of the teachers' work. Further, the whole process of my research activity can be interprated as designing.

> Beginning with situations that are at least in part uncertain, ill defined, complex and incoherent, ... designers *construct* and impose a coherence of their own. subsequently they discover consequences and implications of their constructions - some unitended - which they appreciate and evaluate. Analysis and critici=sm play critical roles within the larger processess. Their designinging is a web of projected moves and discoverd consequences and implications, sometimes leading to reconstruction of the initial coherence - a refelctive conversation with the materials of a sitiuation.' (Schon 1987: P42)

Within this context drawing has has for me a clear function as a communication tool, both as a means of searching self and conveying information to others.

Carr and Kemmis (1986) describe educational action research in terms of 'A Dialectical View of Rationality' (180) in which the 'dialectical' relationship between educational theory and practice and between the individual and society is explored. This was the object of my activity. I would be carrying out dialectic exploration in the societal contexts of my research schools. Carr and Kemmis (1986) further clarified the notion:

> 'Action research, being concerned with the improvement of educational practices, understandings and situations, is necessarily based on views of truth and action as socially-constructed and historically-imbedded. First, it is itself an historical process of *transforming* practices, understandings and situations - it takes place in and through history. Any action research study or project begins with one pattern of practices and understandings in one situation, and ends with another, in which some practices or elements of them are *continuous* and others are *discontinuous*

(new elements have been added, old ones have been dropped, and transformations have occurred in still others).

... Second, action research involves relating practices and understandings and situations to one another. ... The action researcher, ... is aiming therefore to move more surely into the future by understanding how her or his practices are socially-constructed and historically imbedded... .

Action research is also a deliberately *social process*. ... it engages the action researcher in extending the action research process to involve others in collaborating in all phases of the research process.' (182)

Producing diagrams of the research process I was engaged in helped me to explore the dialectical social and intellectual processes of design and technology as a subject and the dialectical social and intellectual processes of researching. The diagrams enabled me to find a way of iterating my thinking in these interactional social situations and reflect on the societal impact of my research as well as helping in organisational terms. Miles and Huberman (1994) provided further support for the use of graphics to illustrate conceptual frameworks of research activity:

'Conceptual frameworks are best done graphically rather than in text. Having to do the entire framework on a single page obliges you to specify the bins that hold the discrete phenomena, to map the relationships, to divide the variables that are conceptually or functionally distinct and to work with all the information at once.' (p22)

My Research / Graphic Models

The final piece of the jigsaw that enabled me to define an appropriate form for the flow diagram that describes the overall structure of my work was a diagram produced by Eggleston in his work *Developments in Design Education* (1976). He produced a flow diagram describing design process - Figure 6:

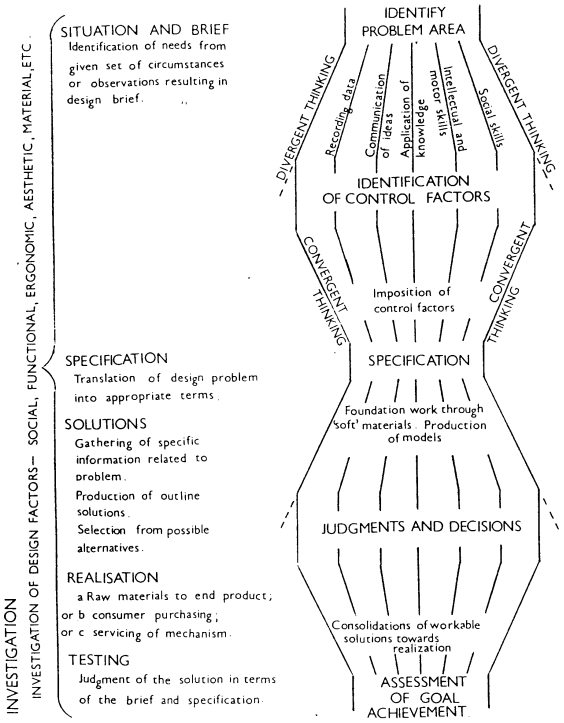

Figure 6
Eggleston 1976: P21

This notion of a flow of ideas through the key points of the process provided the last link in enabling my drawing. Figure 7 describes the flow of my research. It is a developed drawing, one that has been through a number of iterations to achieve its current form. It has provided the steer that kept my work on track and has, in the process, itself become modified.

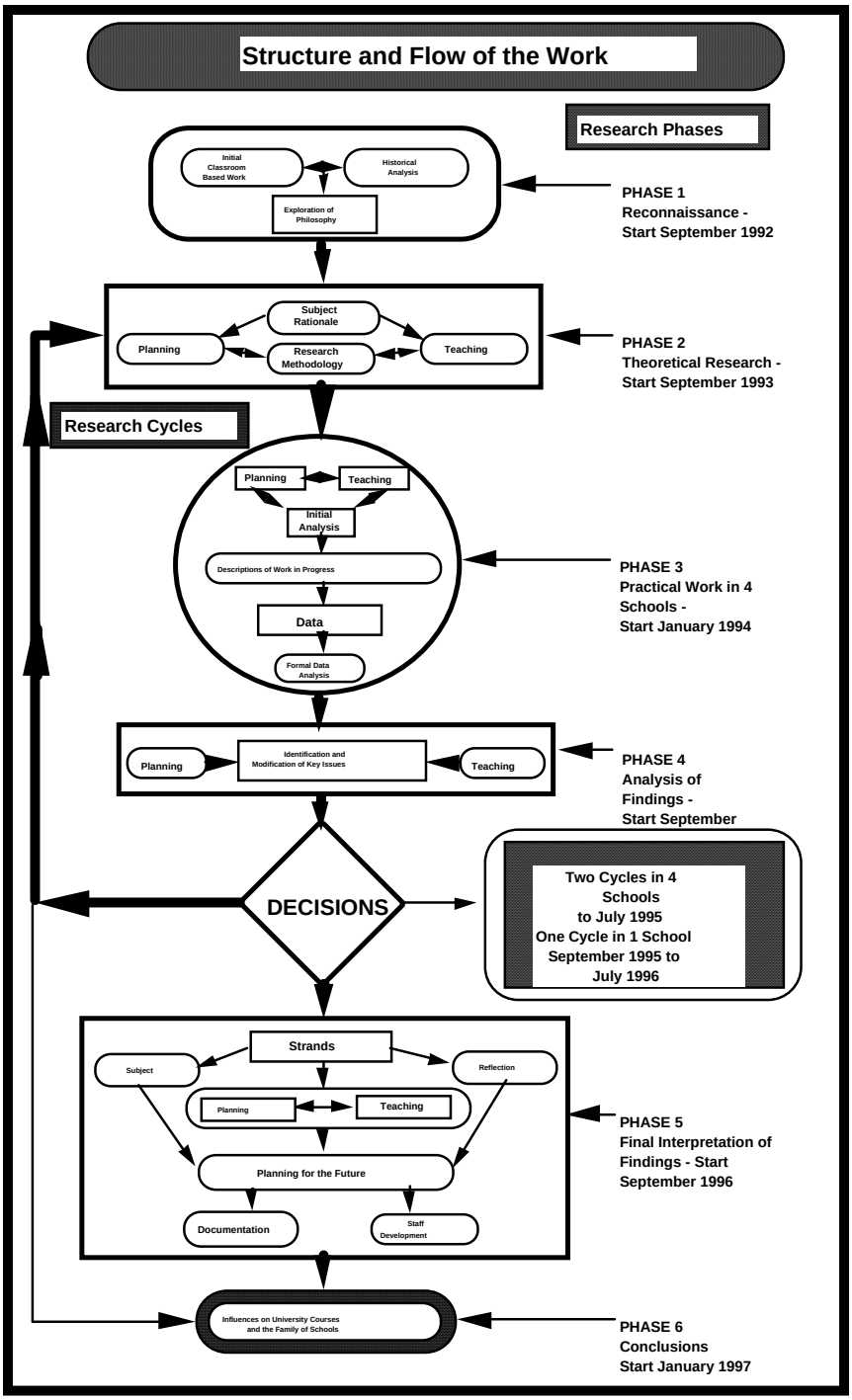

Figure 7

This drawing describes the structure of my research and the flow of activities within it. It is summary of the methodology and a visual representation of the progression of my

activities. It is also illustrative of the relationships between the empirical dimension of the work (Phase 3), the conceptual framework that I was working within (Phase 2) the analysis of outcomes (Phase 5) and the ultimate impact of the work on broader aspects of society through my role as a teacher educator (Phase 6). It has a clear recursive element which illustrates the cycling of ideas through the central phases of my work Figure 8.

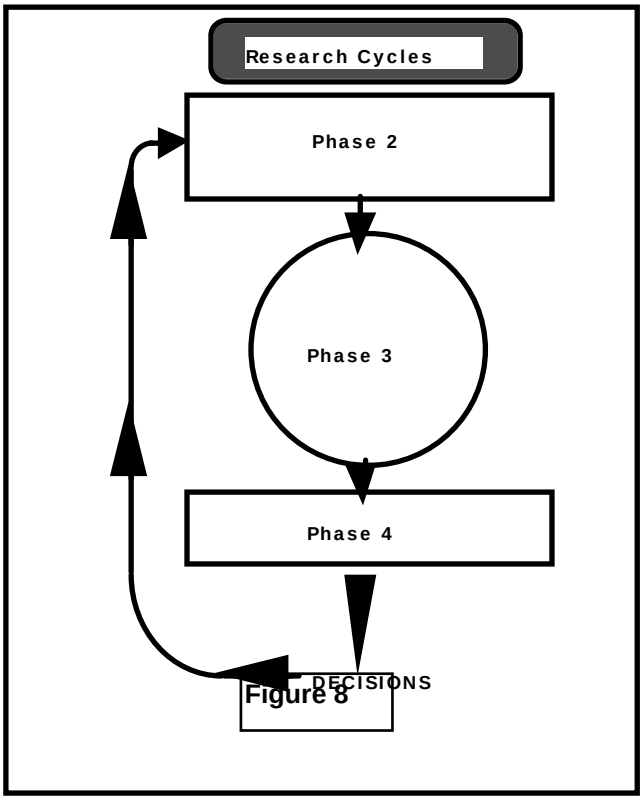

Figure 8

The production of my drawings was carried out within a drawing package (McDraw Pro). I use this much as other people might use a wordprocessor. The original concept for the drawing appears in my mind, sometimes I make a rough drawing using paper and a pencil, but the detail of the drawing is worked out on screen. This method also has the advantage of fast and easy modification, again much as a wordprocessor with text.

The expression of ideas from within the head to outside the head and the effects of this on design thinking have been extensively explored through the Assessment of Performance Unit (APU) project exploring assessment in design and technology (APU 1991). They use a diagram to expose their thinking. (Figure 9)

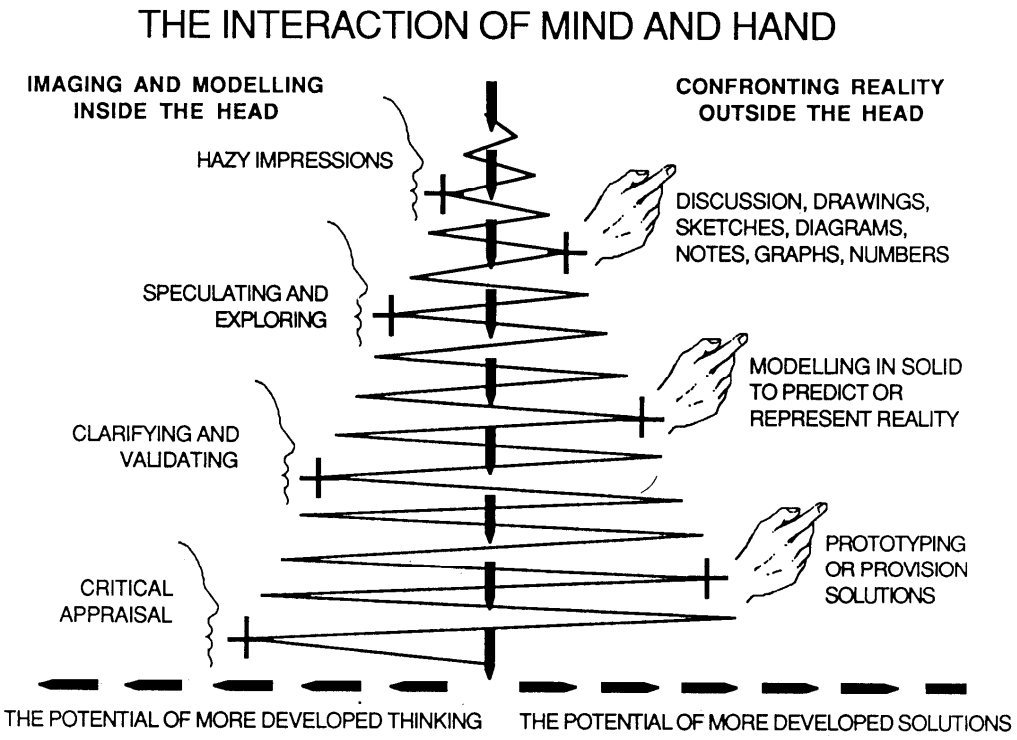

Figure 9
APU: 1991: p12

The purpose of this drawing is to communicate to others. This is different to much of my drawing. As with many design drawings the primary purpose of my drawings is to communicate with myself. The use I have made of drawing as communication with self

creates a tension. In this paper I need to communicate the ideas contained within my drawings to others.

The components of Figure 7 have themselves been expanded into the sub-sections of the research and further drawings developed from it. This has allowed visual descriptions of:

i. the processes within action steps;
ii. the analysis of data;
iii. the write up.

Examples

Process of the Research

Engagement in action research involves the preparation of 'Action Steps'. My action steps focused on teaching whilst being observed by class teachers; the class teacher taking over the role of observer - a reversal of common research practice. I needed to gather data that would allow me to make judgements about the effectiveness of planning and teaching methodology, the class teacher was the key professional within the classroom - her knowledge of design and technology may be limited but her knowledge of primary teaching and her class was invaluable. Consequently, I developed data collection methods that took advantage of this expertise.

Figure 10 explores the flow of activity within an action step and indicates where data was collected. It identifies the key features of my classroom-based work and, again, the relationship of the research method with design method is clear. Jones (1970) in exploring the fundamentals of designing describes a three stage process - analysis: 'breaking the problem into pieces', synthesis: putting the pieces back together in a new

way' and evaluation: testing to discover the consequences of putting the new arrangement into practice'. These three stages are evident in the structure of my action steps. I have indicated these on the diagram. These notes were not part of my original drawing.

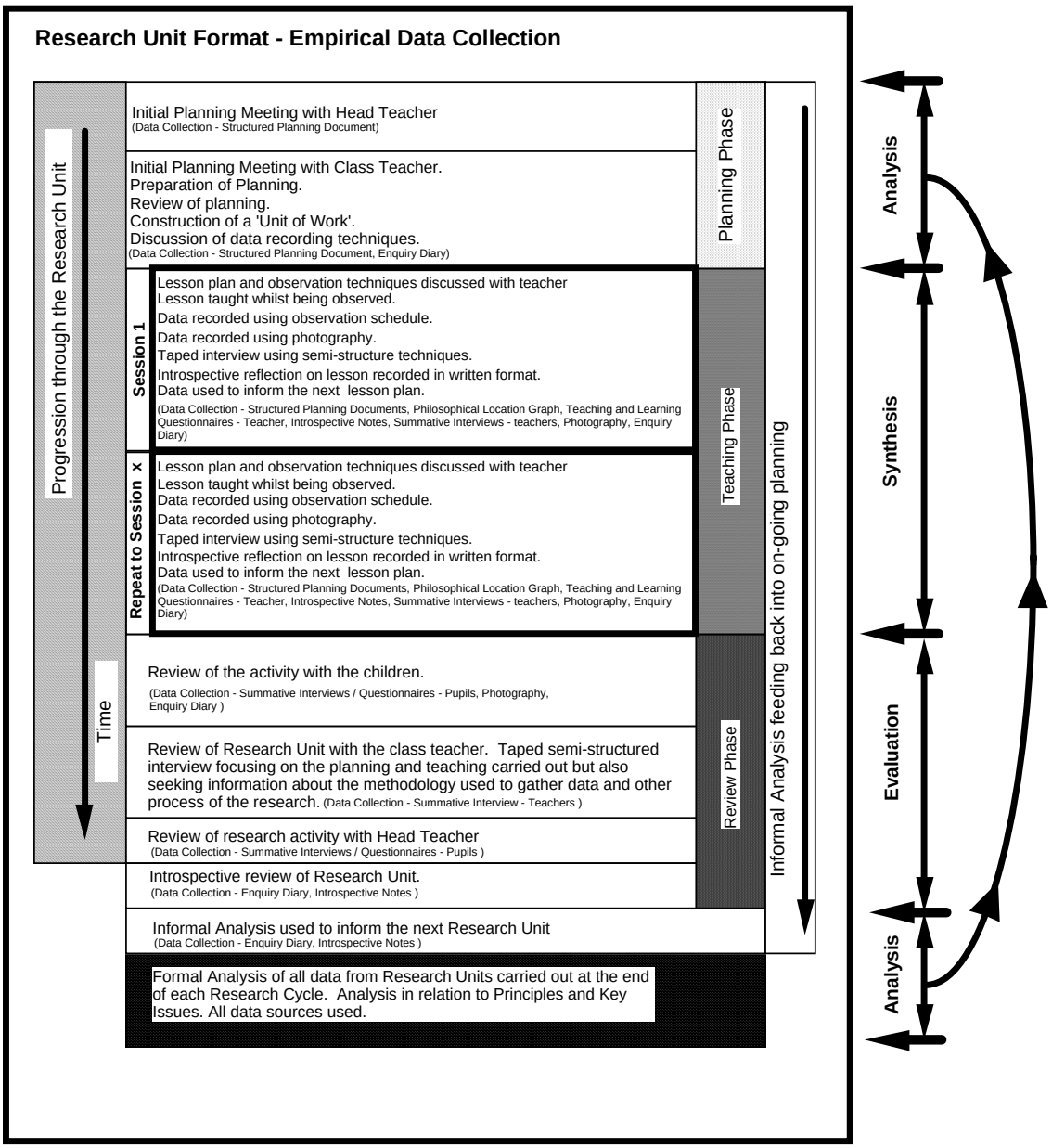

Figure 10

The Analysis of Data

Drawings have been valuable in the translation of data into understandable argument. My research resulted in large volumes of soft data. Data generated during the action steps were analysed by reference to original 'espoused theory'. That is, statements of principle about the nature of design and technology and its teaching were turned into questions and answers sought in the data [1] This resulted in challenges to initial theories and the identification of issues associated with them. For example, at the outset of the work, I believed that group work was the most useful form of classroom organisation for teaching design and technology. I would now say that much of the subject is best taught in a whole class format. This line of argument has been teased out from numerous recorded incidents. These changed perceptions became a second form of espoused theory. The two forms of espoused theory - Form One: those notions that had be affirmed by action steps, and Form Two: new perceptions - became the focus for exploration in the next cycle of the work. During first two school-based cycles, the number of issues arising from the work grew very quickly. To progress I needed to impose some pattern. I adopted an approach to the data that sought to track the trails of key issues. These coalesced into three major areas:

- The nature of the subject;
- The role of the teachers;
- The processes of the research.

I used the term 'strand' to describe these. Each strand has a number of sub-strands forming lines of argument. Strands both resulted from the work and described it. To arrive at this structure, an analytical procedure was used in which some issues were disregarded as being not central to the work in hand and others reformulated into new structures. The strands are presented here as clear lines of argument, in reality their interactions are much more complex. Figure 11 explains this activity. (Note: the purpose of this drawing is communicate with others!). My thesis will explore in some detail the interactions indicated by the circles in this diagram.

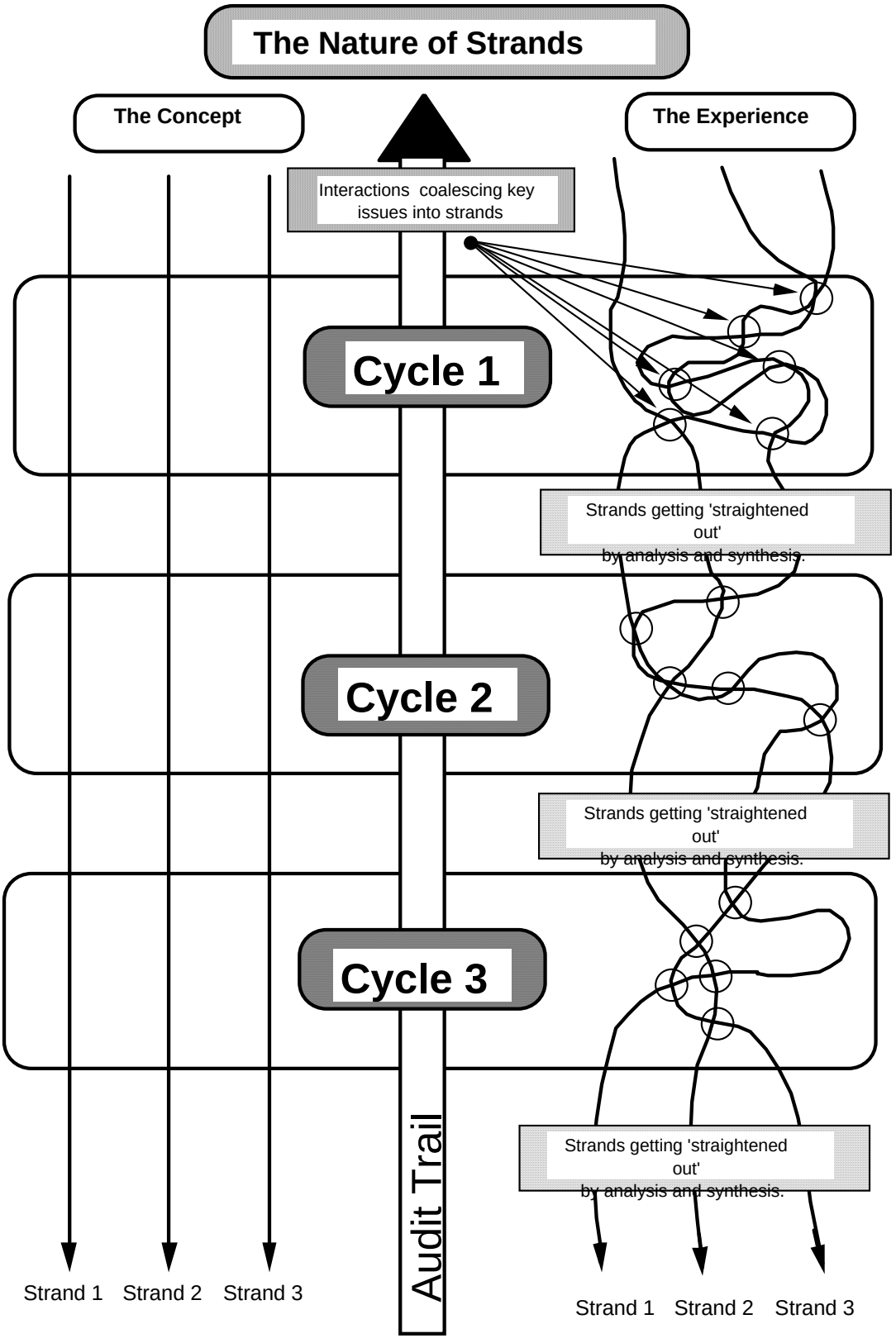
The Nature of Strands
The Concept
The Experience
Interactions coalescing key issues into strands
Cycle 1
Strands getting 'straightened out' by analysis and synthesis.
Cycle 2
Strands getting 'straightened out' by analysis and synthesis.
Cycle 3
Strands getting 'straightened out' by analysis and synthesis.
Audit Trail
Strand 1
Strand 2
Strand 3
Strand 1
Strand 2
Strand 3

Figure 11

The complex nature of arriving at strands through the three cycles of the school based work, by applying espoused theory as originally conceived and as modified by the processes of the research is also best described by a drawing - Figure 12.

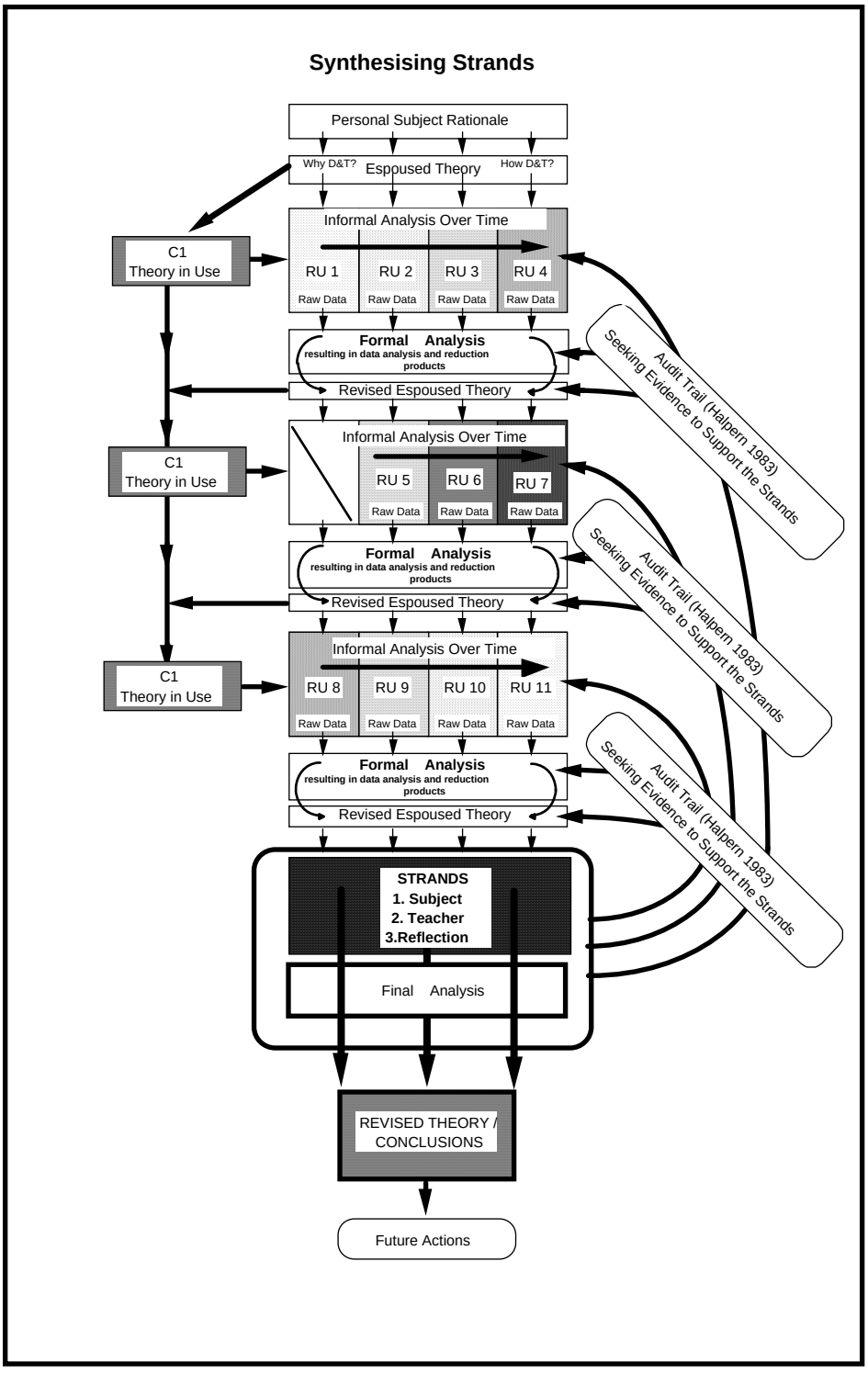

Figure 12

Some explanation of the coding used in this drawing may aid clarification:

C (Cycle)1, etc. - School based research cycles. Each cycle lasted one year

RU (Research Unit)1, etc. - A Research Unit is the work carried out within one school

This diagram was fundamental to structuring the write up of my thesis. To clarify the nature of the ideas in Figure 12 I have removed the detail and produced Figure 13. My original ideas was to describe the work chronologically, this is described by the curved line. However, I eventually decided to use the strands as organising themes and illustrate the flow the strands through the Cycles: the vertical straight lines.

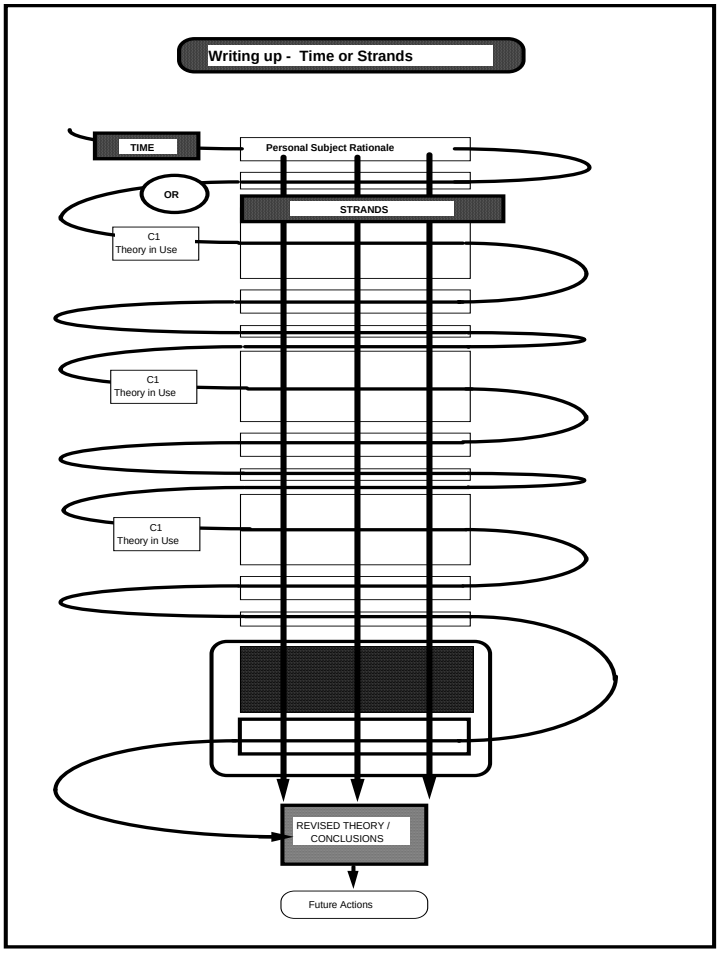

Figure 13

The Write Up

My work is now at this stage. Again drawing has helped. The structure of a chapter can be captured in a drawing. For example, Figure 14 describes the first chapter of my work - the 'Introduction'. The chapter is contextual. It 'sets the scene' for the Thesis and explores the challenge and the joy of both teaching and researching in the field of primary school design and technology

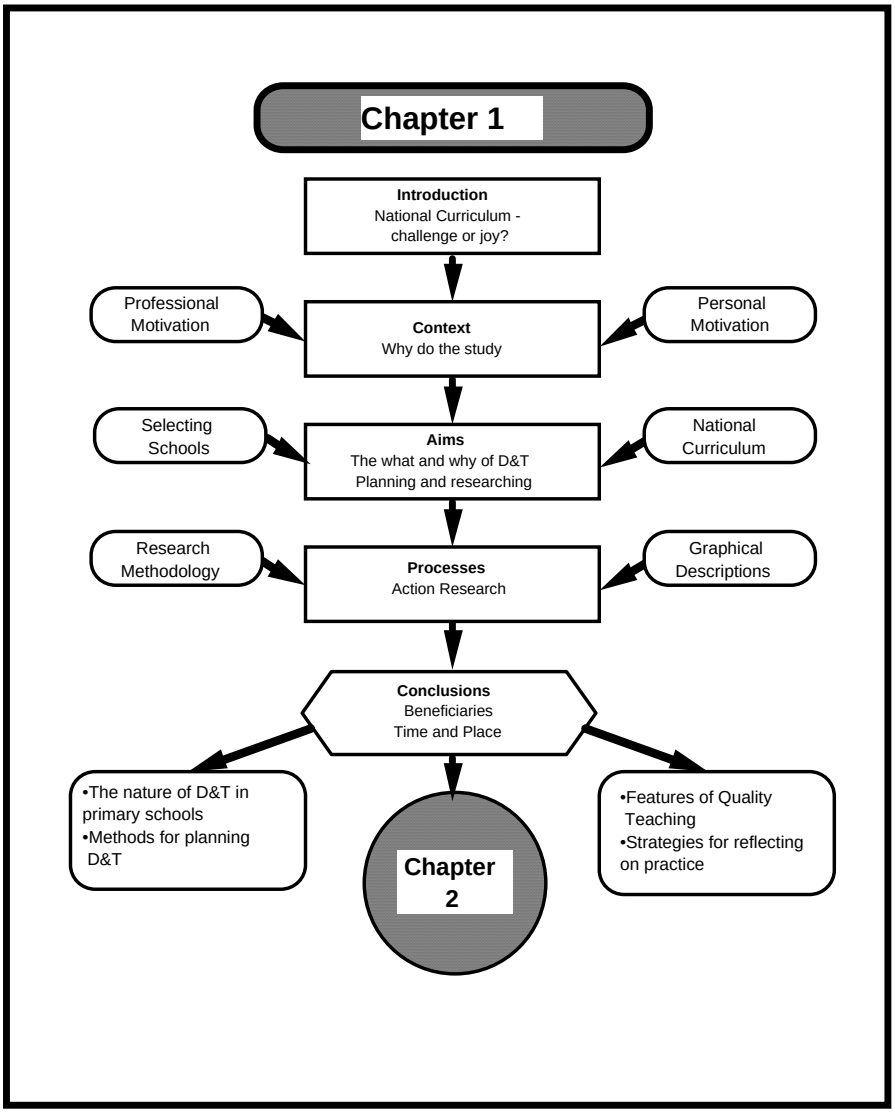

Figure 14

Developing this drawing helped me to frame my ideas and provided a reference when struggling to describe them. As in the research summary, iteration between the ideas being described in words and the ideas described by drawing, stimulated me to think about the nature of my work and its structure.

Concluding Reflection

My advocacy for an approach to the procedural aspects of Action Research that uses drawing-based system to describe conceptual frameworks stems from my preference for drawing as a mode of communication. I suspect that many colleagues in my subject have a similar view. Like design, each Action Research activity is unique. Both are contextually orientated and require consideration of the social context of interactions and the broader societal influences both on and from the work. Each explores ideas that lead towards a goal. Each tests out ideas within a context and makes value judgements based on personal and situational understandings. The product is different. Design usually results in a physical product; Action Research, enlightenment. However, the processes are subtly linked through their focus meeting human needs - the process of action research can be seen as designerly activity. As in designing, drawing has a useful role to play.

Notes

1. Two techniques were used to analyse the data Reflexive Critique, (Winter 1989) and Critical Incident Analysis, (Tripp 1993).

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