

2 Methodology

“Voltaire said ‘Theology is to religion what poison is to food’, and there are many who would draw the same parallel between methodology and design.”

Nigel Cross *Developments in Design Methodology* 1984

2.1 Introduction



Figure 5: Working with a craft practitioner (top) and with a learner (bottom).

Over the last three years I have become increasingly aware of the similarities between my own practice as a designer and that of the craft practitioners I have been studying. Through working with them to find ways to help them communicate their practice, I have become more aware of my own practice and my own difficulties in communicating it to others. Much as they have had a tendency to resist description of their methods in fear of it over-simplifying their hard-earned skills so I too feel the urge to preserve the “culture of mystique in the creative design activity” (Swann 2002). However, through teasing out an understanding of the knowledge of these crafts practitioners, I have come to a greater understanding of my own craft of designing.

This chapter firstly provides an overview of the methodological approach adopted in this research and its implications for related research in the future. It also provides an overview of some specific research methods used, showing their derivation from my MA research project and their development through practice during the main body of this PhD research. Fundamental to my methodology is practice-led design research and, whilst this process might be viewed as action research, I propose that it has some essential differences due to the dual role played by myself as designer-researcher. Polanyi’s theory of indwelling (1966) is used to explain the working of this dual role and how my choice of participants with whom I had a close relationship

facilitated exploratory empathic indwelling. I propose a development to this which will form the basis of my post-doctoral research: working with an 'expert learner' to facilitate communication of craft practice.

I conclude the chapter by describing some practical techniques I have developed for documenting the research. I show how the combination of 'always on' observational video recording and subsequent writing of event logs has provided an accurate and accessible record of the process I have undertaken.

2.2 Methodological overview

2.2.1 Design research

Methodologically, the practice-led design research I have undertaken has much in common with action research, but for the latter there exist a range of definitions many of which are fundamentally different from my research. The definition provided by Archer (1995) has some accord: "systematic enquiry conducted through the medium of practical action, calculated to devise or test new, or newly imported, information, ideas, forms, procedures and to generate communicable knowledge." However, many protagonists' theories are more firmly based on the original concept developed by Kurt Lewin in the 1950s centred on an 'action research spiral' involving cycles of planning, action and fact-finding about the results of the action (Smith 2001). Whilst these elements are clearly identifiable in the research I have undertaken, they have not occurred as a sequence of separate and logically undertaken steps, rather the boundaries have been blurred and at times elements have been undertaken simultaneously.

Henrik Gedenryd in his study of cognition questioned the validity of such linear or looping models. He surveyed a wide range of design methodologies and concluded they universally followed the sort of linear or iterative pattern portrayed by action research, he referred to them as rational action models and showed them to involve distinct phases of analysis, synthesis and evaluation (1998 p57). However, he also reviewed literature relating to a wide range of design practices and concluded there was no clear division between analysis and synthesis, the two being part of the same activity, and the designer, rather than following a linear or cyclical process, would follow a meandering path including many dead-ends before arriving at his final conclusion (ibid p62).

Rittel & Webber (1984) called the type of problems faced by the designer wicked problems: "they defy efforts to delineate their boundaries and to identify their causes, and thus to expose their problematic nature." In such a situation defining the problem presents as much of a challenge as finding a solution and the designer's response is to work on both simultaneously in "an argumentative

process in the course of which an image of the problem and of the solution emerges gradually among the participants, as a product of incessant judgement, subjected to critical argument.” (ibid p138). Gedenryd (1998 p76) described this as a pragmatic theory of design based on the designer choosing his own boundaries: artificial constraints which allowed the designer to control and examine the problem but, being self-imposed, were completely flexible. Schön (1983 p63) referred to this as performing ‘frame experiments’ and described how through close coupling of problem setting and problem solving the designer was able to simultaneously use and test their knowledge.

Considered in the light of Polanyi’s theory of tacit knowing, this use-test duality (Gedenryd 1998 p91) could be seen as a kind of indwelling: “we are attending from the theory to things seen in its light and are aware of the theory, while thus using it, in terms of the spectacle that it serves to explain” (Polanyi 1966 p17). Performing such an action relies on the tacit knowing of the designer, where the underlying theory is only known through the act of using it. In terms of practice-led research this could be seen as problematic as such interiorised knowledge is recognised as difficult to articulate and the very act of attending to such interiorised knowledge can destroy its meaning, resulting in difficulties recording and communicating the research. However, Polanyi proposed that whilst the initial process of attending to it can often be destructive, subsequent re-interiorisation can bring about deeper understanding, “the detailing of particulars which by itself would destroy meaning serves as a guide to their subsequent integration and thus establishes a more secure and more accurate meaning of them” (ibid p19). The requirements for a doctoral thesis to document and communicate the research process have ensured that throughout the research my interiorised knowledge has been ‘broken open’ for inspection and subsequently re-interiorised².

So, whilst the elements of planning, acting, observing and reflecting described by protagonists of action research have all at times been

² At the end of this chapter (p21) I discuss key research methods developed to document the process and facilitate the breaking open of this interiorised knowledge.

present, the process I have undertaken has been far from linear or iterative, but rather one of varying degrees. At times 'practice' has been more dominant and at times 'research' has been more dominant but at all times I have been both practitioner and researcher and this dual role has been achieved through indwelling. The difference between the two types of research is represented in the diagrams below, with action research on the left and practice-led design research on the right:

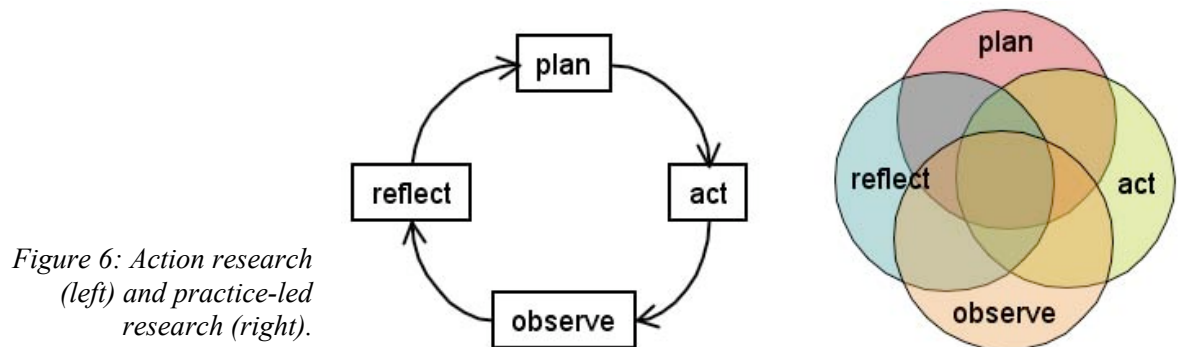


Figure 6: Action research (left) and practice-led research (right).

2.2.2 The designer-researcher

To advance understanding of the dual designer-researcher role, I reflect here on its origins in the part of my MA research that provided a test-bed for the methods used in this research. I shall describe how basing a learning resource on my own learning quickly provided seemingly accurate interpretation of the skill, but also provided complications during testing as I was both expert and designer-researcher. As a result during this research I chose not to learn the skills I studied, but selected experts and novices from close associates to facilitate the shift in indwelling this necessitated.

In explanation of this there is a need to differentiate between two kinds of indwelling described by Polanyi (1966 p30). Whilst he did not name them individually, for clarity I will refer to them as personal and empathic indwelling. Personal indwelling is the most commonly recognised kind, consisting of dwelling in one's own practice, in Polanyi's words, "the performer co-ordinates his moves by dwelling in them as parts of his body". Empathic indwelling is dwelling in someone else's practice with a view to developing one's own practice: "the watcher tries to correlate these moves by interiorising them". Polanyi

illustrates the point by describing how a chess player will re-enact a master's game to gain a feeling for the skill. So, by not learning the skills studied, the focus of indwelling in this research moved from the personal indwelling seen in my MA research to empathic indwelling and thus clarified my role as designer-researcher as described below.

Firstly, I shall provide a brief overview of my MA research (Wood 2003) in which I developed a framework for structuring an interactive resource to support learning of craft skills³. The final, practical part of the project involved testing the proposed framework through dissemination of a simple craft skill: making a wooden slide whistle. This is a simple musical instrument consisting of a long tube with a mouthpiece to blow into at one end and a plunger to vary the note at the other end. One can be made in a couple of minutes from a straight, freshly cut twig using no more than a penknife.



Figure 7: A wooden 'slide' whistle.

I initially learned the skill by working alongside an expert who demonstrated the making process and explained his understanding of the issues involved before giving advice as I went through the making process several times myself. I then gained a greater understanding of the skill by working on my own making many more whistles, problem solving through trial-and-error. I concluded this phase by experimenting with deliberately modifying whistles in a variety of ways to discover why some whistled better than others and how they could be altered for the better. Throughout this process I made a detailed record by making notes and photographing my work using a digital camera.

To interpret this in the light of Polanyi's theories, the process started with a period of empathic indwelling whilst working with the expert but this was relatively brief in comparison to the subsequent period of

³ This framework was also used in the current research, see p43.

personal indwelling whilst I repeated the making on my own, internalising the skills. The final phase saw the internalised skills being 'broken open' through the exploratory phase of making and destroying, and the recording of the process.

These records formed the basis of a paper-based prototype learning resource, structured according to the proposed framework I wished to test. A preliminary evaluation was carried out, firstly through discussion with the expert and then by using it as a basis for teaching a novice, which led to some useful modifications. I then had a video taken of myself making a whistle and used this and the photographs taken previously to produce a working, interactive version of the learning resource using Macromedia Director (Figure 8). This was evaluated with other novice learners and concluded with recommendations for future developments of the resource.



Figure 8: Sample from the interactive whistle making resource.

Whilst the evaluation of the interactive resource produced a useful outcome for the MA research, in retrospect I was not entirely satisfied with it. My aim had been to test the interactive resource and I had regarded my role as a designer-researcher working with some self-directed learners. However, the learners' aims had been to learn the skill and in this context they perceived my role as that of an expert in that skill. So, on encountering difficulties their natural tendency had been to short-cut by asking myself for help rather than using the resource, which was a predictable and manageable problem and could be overcome by operating the resource on behalf of the learner⁴. However difficulty arose when the learners asked for further assistance with the interpretation and it became difficult to judge whether this was a genuine failure of the learning resource or the learner showing a preference for asking myself because it seemed easier. I found it very difficult not to teach by drawing upon my own expertise as I struggled between my roles as designer-researcher and craft expert.

Basing the research around my own learning had quickly produced seemingly accurate interpretation of the craft skill, but the testing resulted in a complex situation that I found difficult to unpick: it was difficult for me to understand my own actions, let alone those of the

⁴ as described by Rettig (1994) in his article describing use of low-fidelity prototypes in software development.

novices I was observing. In addition, to minimise intrusion on the novices with whom I was not well acquainted I had decided to rely on note taking to record the process rather than videoing. At the time, writing up my MA thesis immediately after the event, I could draw as much as I needed from it by using my notes to aid memory, but subsequently it has not been easy to review it in the light of new knowledge. As a result firstly I took the conscious decision not to learn the skills I was studying and secondly to develop a non-intrusive video recording method which is described on p21.

By stepping outside the learning process in this research, I have had to seek to achieve empathic indwelling in the actions of the expert to produce interpretation *without* going through the process of imitating to internalise the skills and then breaking them open. Similarly I have needed to achieve empathic indwelling in the actions of the novices to understand their responses to the learning resource without first being a novice myself. So, for my first experimental project described in Chapter 3, it was appropriate that I worked with a craft practitioner with whom I was closely acquainted: my husband Robin Wood, who had a general understanding of my aims and was prepared to be co-operative with the experimental nature of the research and allow learners and myself open access to himself and his workshop.

Similarly, the novices I worked with were self-selected from close acquaintances of both Robin and myself, which resulted in relatively straightforward communication during the practical sessions. Whilst this was clearly not a random sample, it offered numerous advantages. Firstly they were enthusiastic, having volunteered because they were keen to acquire the skill, and they were easily accessible as they lived locally and had flexible jobs so were in the habit of calling in regularly. In addition they were all around the age, and had taken the sort of lifestyle choices, as the people who are currently turning to the traditional crafts for a career (Heritage Lottery Fund Report 2002)⁵. As they were all known to each other, it would have been interesting to explore the potential social aspect of their learning. Unfortunately time

⁵ see Introduction p6

⁶ "Transmitting Craft Knowledge: eliciting and passing on the skills of craft masters with the help of interactive media" AHRC award number AH/D001838/1 awarded 17/5/06.

did not allow it during the scope of this project, but this is planned for my post-doctoral research project⁶.

By using a small group of learners for the bowl turning research rather than learning the skill myself I was able to perceive my designer-researcher role with greater clarity and be more confident in my development of the learning resource. Recruiting these participants and the craft practitioner from close acquaintances assisted empathic indwelling during the first tentative, experimental stage of this project. However, this presented shortcomings in terms of being able to apply the methodology to other craft skills as such relationships could not be assumed. So, in the second part of the practical work, recording a clog maker and his apprentice (see Chapter 4), my aim was to refine techniques developed with the bowl turners, this time working with a practitioner and a craft less known to myself.

The observation-based approach adopted with the clog makers was a technique that could be more generally applied, although subsequent appraisal revealed I was relying on my own specialised knowledge in validating the elicited knowledge (see section 4.3, p92). As described below, the presence of the apprentice proved useful in preparing the expert for articulating his knowledge and, whilst in the circumstances I was unable to work directly with him, this indicated a way in which I wish to develop these methods.

2.3 Documenting the research

To manage the dual designer-researcher role it was important to have an accurate recording process that allowed consideration from different perspectives and in the light of new knowledge as it emerged.

However, for the research setting to be realistic, the recording process must not distract those under observation from their practice and equally must not require too much attention from myself.

When I reviewed the documentation of practical work undertaken during my MA research, including use of handwritten notes, photography, audio and video recording, I concluded that video recording could most closely meet these requirements through reinforcing the strengths and managing the problems. The major strength of video recording was being able to capture a very rich record, including those events whose significance only became apparent later. However, the “always on” policy led to generation of a large number of tapes that needed to be catalogued and referenced and this was managed through a simple event logging procedure. In future research this could be managed more effectively with video analysis software that was in its infancy at the start of this project.



Figure 9: Canon MV5i video camera.



Figure 10: G-clamp mini tripod.

2.3.1 Observational video

To minimise intrusion on those being observed I used a Canon MV5i digital video camera, chosen for its small size (10cm x 9cm x 5cm), and I avoided using additional lighting or external microphones unless I felt it was absolutely necessary. As observational video for research purposes, the pictures and sound did not need to be transmission quality, just sufficiently good for comprehension and transcription.

I also aimed to minimise my interaction with the camera during the recordings, whenever possible setting up and testing everything before the sessions started, but with experience I developed the ability to quickly assess conditions and set up the equipment with minimal disturbance. I left the camera running at all times, only switching it off when the workshop was empty. I favoured recording from a fixed point, using a wide-angle lens where necessary and a discreet G-clamp

mini tripod if there was a suitable fixing. When this was not an option I used a good quality tripod that would remain stable when being jostled in a busy workshop, could easily be panned to follow the action and offered a quick-release option for hand-held recording. Whilst I always kept a charged battery in the camera to allow freedom of movement during hand-held shots, for fixed-point recording an external power supply was used if available to avoid battery changes. The only unavoidable attention the camera needed was changing the tapes, but at least the timing of this was predictable and the operation could be swiftly undertaken if I kept a spare blank tape in my pocket with the cellophane wrapper already removed.

The bowl turning learners in the first practical project seemed to acclimatise rapidly to the camera's presence and those who I left to work alone would switch the camera off themselves when they went for a break and back on when they returned. The clog makers in the second practical project mostly ignored the camera and would swear loudly, stand right in front of the lens or fall over the tripod in a completely unselfconscious manner. The times when they acknowledged its presence were largely positive: the expert would deliberately come in front of the camera to explain points he considered it was important for me to record or he would ask if I wanted to come closer to get a better picture.

So, this 'minimalist' approach to observational video recording had the benefit of minimising intrusion on the participants, and causing very little distraction to myself. Having developed confidence in my equipment and my ability to set it up, I could immerse myself in the sessions with the secure knowledge that everything would be available for subsequent review.

2.3.2 Event logging

Whilst the 'always on' policy with the camera ensured that nothing was lost, it did generate a large number of tapes that needed systematic processing and cataloguing to enable their ongoing use. After capturing them onto computer to facilitate non-linear access, I wrote event logs for each session. These acted both as a means of promoting

immediate reflection and to provide a summary of dialogue and action to assist with later appraisal.

Firstly I named, dated and numbered each tape as soon as possible after it came out of the camera, then captured them in their entirety onto computer and burned two copies to DVD, one as a working copy and the other as a backup, with the originals forming an ever-growing archive. Initially I compressed them using the standard DVD format (mpeg2), which offers the advantage of including chapter information and indices, but the movie industry demands this encryption prevents stills or short clips being taken from them, so I changed to using QuickTime. For the broader scope of the research, I used both stills and clips from the observational video in the development of the learning resource⁷ as well as when disseminating the research to a wider audience. QuickTime enabled fast, easy access to the material without needing to re-capture it from the source tape.

I then watched the DVDs in their entirety and wrote event logs for each⁸. These consisted of simple 2-column tables created in Microsoft Word: one for the time code from the DVD, the other for a description of the event. The descriptions summarised both activities and speech, aiming at a clear and concise narrative of the proceedings rather than a complete record. Whilst this was still a time-consuming process it had two outcomes, the first an immediate review of the session that would inform the next stage of the research, the second was to facilitate subsequent review of the material.

By writing the event logs immediately after the recordings had taken place, I was able to review them from the dual perspective of designer-researcher. They served both as a reminder of events that had taken place and allowed me to observe myself in action. Whilst some of the outcomes were explicit, such as decisions about camera angles or specific lines of questioning, many were tacit and I only became aware of them later, such as the conflicting opinions of the

⁷ see section 3.3.3 p49

⁸ sample event logs are provided in Appendix II - references in the text to specific instances in event logs take the form [HS2.3 t0.32]: HS = participant's initials; 2.3 = session 2, tape 3; t0.32 = time code 32 minutes

practitioners on the properties of timber described in section 4.3, p92.

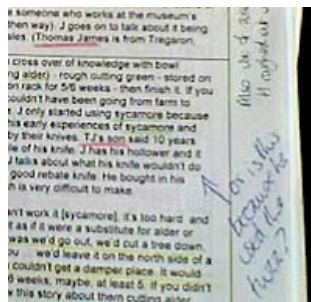


Figure 11: Annotated event log detail.

Hence, the longer-term use of the event logs was as a referencing system to enable review of the material, which amounted to over 36 hours of videotape. The event logs were read as a narrative to refresh my memory of what had happened during each session and, as observed by Suchman and Trigg (1991), they also greatly helped the search for specific remembered occurrences that could then be located on DVD and reviewed again. At this point the logs could be elaborated and dialogue transcribed verbatim to allow deeper consideration. They could be searched for specific key words or highlighted to show specific instances: my paper versions of the event logs are now a dog-eared riot of highlighter pen, multicoloured underlinings and margin notes, and I also have various electronic versions similarly highlighted.

As Buur *et al* (2000) propose, "video recordings ... are no longer hard data but rather the first attempts to create stories that frame the design problem and impose order on the complexity of everyday life" and event logs are a vital part of the recordings, with the act of writing them promoting reflection and the resultant document providing an overview of events.

2.3.3 Future development

At the instigation of this research project I had surveyed the available video analysis software and concluded that there was nothing that offered significant advantage over the QuickTime/Microsoft Word process described above which I had developed during my MA research. Most software focussed on dialogue analysis and did not appear well suited for the heavy emphasis on non-verbal activity inherent in my observational video. Three years later, the use of video recording in research is commonplace and there are several competing brands of software that offer a broader range of analysis tools (e.g. Atlas Ti, Transana). Having had an initial look at these I feel they could speed up the event logging process and the event logs they produce could be easier to examine from different perspectives. A critical examination of such software will form an early part of my post-doctoral research.

2.4 Conclusion

The methodology I have developed during this research has been that of practice-led design research, a pragmatic approach made rigorous through systematic documentation. In the practical work with craft practitioners, I have undertaken several 'frame experiments': seeking to simultaneously frame and solve the problem of recording and interpreting their practice in an exploratory manner. I have documented the work through extensive video recording and used the process of writing event logs both as a means to stimulate immediate reflection and to enable ongoing use of the material.

This has resulted in three specific outcomes which are presented in this thesis. Through the practical work I have firstly developed techniques for transmitting craft knowledge based on the principles previously developed in my MA research. Secondly, I have developed techniques for eliciting craft knowledge which are interwoven with the process of developing the transmission resource. Thirdly, I have developed a framework for understanding the learning of craft skills drawing on established theory and validated through reappraisal of the practical work.

In the following chapters I describe the practical work I have undertaken, firstly with a bowl turner (Chapter 3) and secondly with a clog maker (Chapter 4), showing the development of techniques for eliciting and transmitting craft knowledge. I review this in Chapter 5 in the light of relevant theorists and outline the framework I have developed for understanding the learning of craft skills.