

Knowledge Transfer from Designers to Home Crafts Makers: Negotiating Methods to Study Actions in Context

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Abstract

This paper discusses the methodological problems arising in a dissertation research project that investigates potentially productive relationships between professional designers and home based craft makers who have not received formal design training.

Informal observations by the researcher and other designers indicate that, when individuals from these two groups work together, in either professional or social settings, the craft makers' practices may develop in productive ways. We have observed that this can occur and be beneficial in traditional home craft work in Turkey (the main field of the research), post-industrial craft practice in Britain and small-scale industry in both countries.

In this research project, the designer-researcher is a participant observer dealing with non-verbal communication and the exchange of tacit knowledge stemmed from interpersonal relationships between the designer and the participants. In order to carry out a formal investigation of such a relationship a number of methodological issues must be addressed.

To develop a suitable approach we have examined theories with comparable features and explored the methods that would allow a managed programme of engagement between designers and traditional home craft makers to generate data and to process this data.

Since the knowledge transmitted or engendered in this research is tacit, it cannot be accessed purely by using language-based methods such as questionnaires and interviews although these can provide valuable triangulation. How to elicit the tacit knowledge transmission was the most important methodological question that we faced. That is why we reviewed methods for reflecting on the actions to elicit tacit knowledge transfer.

The questions we have explored include an evaluation of Action Research and Participant Observation, the advantages and challenges of observational video for capturing

spontaneous actions and reactions and the ways learning theories might help us to identify and characterise the essentially 'silent' tacit knowledge that is exchanged.

These methodological evaluations indicate the chain of methodological decisions that will be developed in this paper which will also speculate about how methods might develop during the practice in field work.

Since the aim of the project is to identify ways that designers and design researchers might act as enabling agents in developing the creative and professional understanding of well-motivated makers we will also discuss the nature of the methodology of practice that might emerge from this research as well as how we developed the hybrid research methods for this inquiry into knowledge transfer in informal production space.

Keywords

tacit knowledge, design learning, home crafts, informal production

The Research Context

The main question of this research is how to explain the gradual transmission of design knowledge in the works of home craft practitioners when they are exposed to designerly¹ thinking for a certain period. To explore this question methodological negotiations were made to design the research steps of a complex research question which involves capturing and studying actions that can only be understood via tacit knowledge. The ineffiability of tacit knowledge has led the authors to revise methods of research to develop strategies of eliciting reliable evidence by analyzing the making environment imbued with an intuitive understanding of the phenomenon. As a result of this elaboration the authors suggested a tentative methodology to study "concealed", "silent" or "tacit" design learning in context.

To be able to work with tacit knowledge in this specific framework we have drawn on methods developed in recent practice-led research by Bowen (2009), Wood (2006) and Rahman (2010) as well as broader principles of exploiting tacit knowledge in design research previously developed by Rust (2004, 2007, 2009). In particular this work is guided by the

¹ "Designerly" way of thinking has been widely used in design research literature after Bruce Archer coined this term for the first time: "There exists a designerly way of thinking and communicating that is both different from scientific and scholarly ways of thinking and communicating and as powerful as scientific and scholarly methods of enquiry when applied to its own kind of problems" (Archer, 1979). This ontological proposition has been widely cited and studied and it has also been the basis of some of the major works of Cross (2006,2007) and Schön (1983).

theories of Michael Polanyi (1958) who elucidated many of the fundamental concepts of how tacit knowledge is gained and used. This chain of argument of methods can also guide further research in complex situated actions that embody design learning and tacit knowledge transmission.

Introduction

The reason for this inquiry is to observe how home crafts practitioners change their practice and attitude via exposure to design knowledge because the wide practice of home crafts might be a fertile ground to blend contemporary design practice and knowledge with local skills and knowledge particularly in Turkey: the field of the dissertation which is the source of the methodological argument that will be carried out in this article.

Another argument of this dissertation depends on how rapidly craft skills have been disappearing in post-industrial societies. Various research projects in post-industrial societies (especially the US and the UK) focus on ways of preserving hands on skills via contemporary media and concepts.

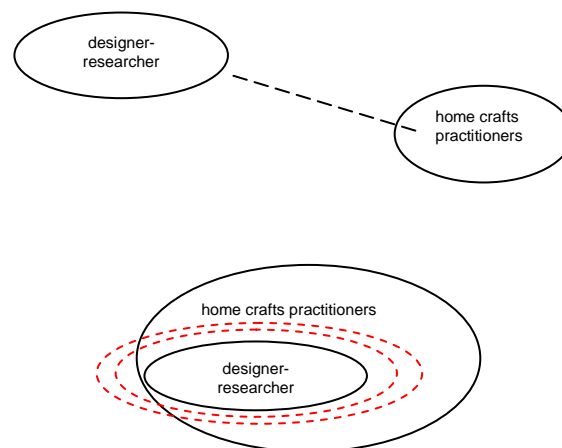


Figure 01. The designer-research joins a group of home crafts practitioners as a participant observer and studies the knowledge transmission that occurs during interactions with practitioners in workshops.

Having seen that these skills have been disappearing after a long history of industrialization in post-industrial societies, the dissertation also aims to build a methodology to understand and transform the minds of the practitioners of these skills and to explain this change with contemporary design theories.

This methodology could specifically be used as the initial step to enter a making environment by designers and design researchers who wish to engage with practitioners with hands on skills, particularly non-designers.

To study the tacit knowledge transfer from a designer to the home crafts practitioners we decided to organize three consecutive workshops where the designer-researcher is a participant observer. Each workshop is analyzed and the outcome of the previous workshop is used as data to structure the next workshop. The repeating analyses between the workshops have two aims: (1) Refinement of the designer-researcher's interventions (2) Elicitation of the transmitted knowledge, in other words measuring learning. The following sections of this article is going to explain how the research design represented in Figure 06 was devised depending on prior design research on tacit knowledge theory and situated learning theory.

Tacit Knowledge Transmission

As mentioned above the aim of the dissertation is to study the possible change in home based makers' practice and attitude when they work with designers for a while. The knowledge transfer that is expected to occur in this project is indirect, informal, unconscious and tacit.

In Personal Knowledge, Polanyi (1958) introduced the first concepts of tacit knowledge: that some part of our knowing occurs in relation to some *"unstated"* interactions among the various arrays of our prior knowledge in many fields. Thus, tacit knowledge embodies what we know but that we are not able to express with words (Polanyi, 1958). A popular example is riding a bike and not being able to explain how. This is highly relevant to crafts, design and all other making skills since we do not know how we make. And even when we make it we might not be able to explain how we made it with words. Yet, craft, design and other making is learned.

According to Polanyi (1966) tacit knowledge exists and is developed when the maker surrenders herself completely to the making. This process is defined as *"indwelling"* by Polanyi (1966) and it is cited by Rust (2004, 2007) as a crucial concept for design research:

"Polanyi was concerned with what he called the tacit dimension" in our knowledge. In particular he wished to give proper value to the process of recognizing, and making a commitment to, ideas and hypotheses, which may result from a rich understanding and

knowledge but cannot be explained by tacit reasoning, in order to carry out the enquiry that will lead to them being more widely understood and accepted” (Rust, 2004: 77)

Polanyi (1966) says that the apprentice unconsciously learns more than what the master thinks he is teaching: *“You follow your master because you trust his manner of doing things even when you cannot analyze and account in detail for its effectiveness. By watching the master and emulating his efforts in the presence of his example, the apprentice unconsciously picks up the rules of the art, including those which are not explicitly known to the master himself.”* (Polanyi, 1966, p. 53)

According to Lave and Wenger, this unconscious change that occurs over time might be called “situated learning”. Lave and Wenger (1991) who are seen as the founders of situated learning theory suggest that learning occurs unconsciously within an action in a cultural context. Thus it is situated. According to Lave *“...learning is ubiquitous in ongoing activity, though it is often unrecognized as such.”* (Lave, 1993) In other words, learning occurs everywhere during ongoing activity although we think that it occurs only in a teacher-student relationship. Since tacit knowledge acquisition is also implicitly embedded in actions, situated learning theory might also be able to guide a methodology to study tacit knowledge acquisition.



Figure 02 Graph of legitimate peripheral action theorized by Lave and Wenger, 1991.

The primary theory of situated learning defines how new learners learn more as they engage more with the learning context. According to situated learning a novice starts from a peripheral situation and progresses to the center towards the master in time. Figure 02 shows a basic diagram of how learning occurs according to situated learning theory (Lave & Wenger, 1991). In other words, newcomers to a community of practice are first in the periphery. As they keep working in the group they progress by feeling comfortable to take on more risks and experiment.

The vital point of moving towards the center from the periphery (also known as Legitimate Peripheral Action) for this research is that the movement is not *linear* but it is a *helix*. The “helix” movement towards the center- in other words “learning”- determines the duration of the research, the intervals between the workshops and the required analyses between each workshop.

Before each workshop the learner goes back to the previous action and reflects on the “learning”. These are spaces between two circles in a learning helix. In other words, the transition intervals serve as check points where the novice looks back and acknowledges that she actually has made progress. Her perception of her work improves relatively from the previous cycle. Depending on this theory, we decided to structure several regular analyses with certain intervals to elicit the gradual progress in time as opposed to eliciting learning from the entire corpus of documentation.

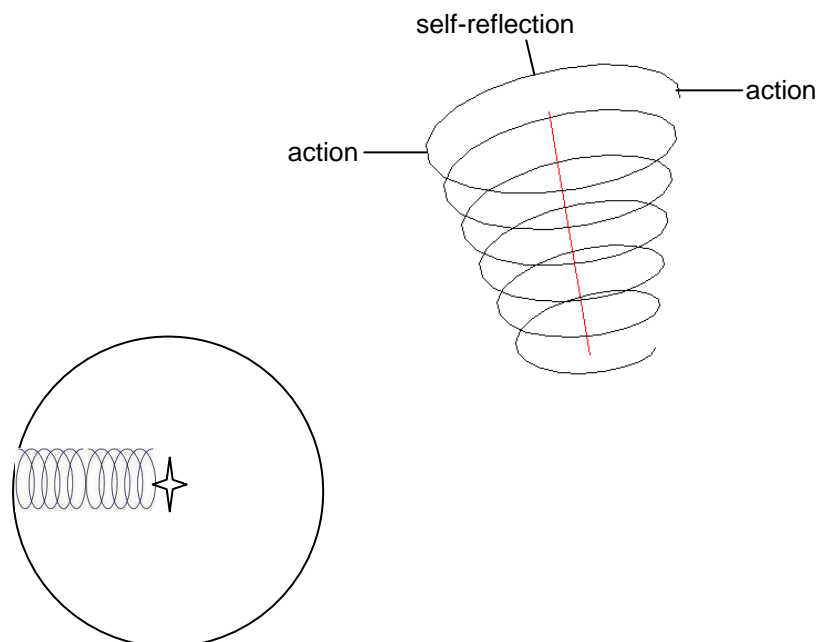


Figure 03. Graph of legitimate peripheral action theorized by Lave & Wenger, 1991. Learning occurs through a helix that moves from the novice to the master.

Capturing and Measuring Tacit Learning

To document the actions during the workshops observational video is going to be used because video captures sound and motion simultaneously and thus provides a rich resource

for later evaluation. Having research data available to go back and re-evaluate is essential in this research because it observes gradual and subtle change. Wood (2006) explains this with an example in her research: When she was reviewing the footage with a master bowl turner Robin, he tried to catch up with the pace of the video footage and thus got frustrated due to lack of time and was not forthcoming. Having realized this Wood paid attention to the important matters that are being skipped and she rewound the footage again and again to provide enough time to open up the issues. Eventually, she noticed that the participants themselves opened up the issues when they were reminded that they could rewind the tape.

Being able to access video footage more than once is also important because it can be processed not only by the researcher but also by the participants. Measuring tacit knowledge transmission is complicated because the participants can not explicitly show what they have learned. This transmission can “partially” be traced from the designer-researcher’s field notes and from her own analysis of observational video footage. That is why it is necessary to access what the participants think of the workshop experience by watching the observational video footage with the participants: in other words, to double check whether they agree on the researcher’s findings. By asking the participants to reflect on their own actions might also help them acknowledge their progress consciously. This causes increase in self-esteem and self-confidence. This is how the participant internalizes the acquired knowledge (Schunk & Zimmerman, 1997). For this reason we planned to watch the observational video footage with the participants and analyze their verbal reports of self-reflection. To sum up, since it is not possible to explicitly identify tacit knowledge acquisition only by the researcher’s interpretation we decided to “double process” observational video to see the interpretation of the participants of their learning experience. This can enable the participants to verbalize their interpretation of the knowledge acquisition process which can be called learning “bridges” (Wood, 2006).

Identifying Learning Bridges

Wood (2006) developed strategies for designing materials to help novices gain craft knowledge. She studies tacit craft knowledge to elicit knowledge that can be explicitly represented for learning resources. One of her findings in her research on transmitting craft knowledge, which is highly tacit, was a threshold where novices start communicating better with the craftsman. In other words, the initial interactions of the novices with the master can be painful and difficult. However, in time they develop a common vocabulary, understanding and communication. Wood (2006) explains the necessity of explicit information to form initial

“bridges” to cover the gap of knowledge between the master and the novice during that early difficult stage:

“The expert might start by demonstrating but, rather than leaving the novice to try and interpret what they see, the expert might provide a commentary, thus attending from his practice to his theory. The expert’s commentary will use explicit concepts in an attempt to bridge the gap, and the novice will need to undertake some form of action in response to this received knowledge, primarily imitating the expert, but in a reflective manner. The expert in turn should observe and reflect on the novice’s response considering revising his interpretation until a consensus of understanding is reached and the gap is bridged.” (Wood, 2006, p. 131)

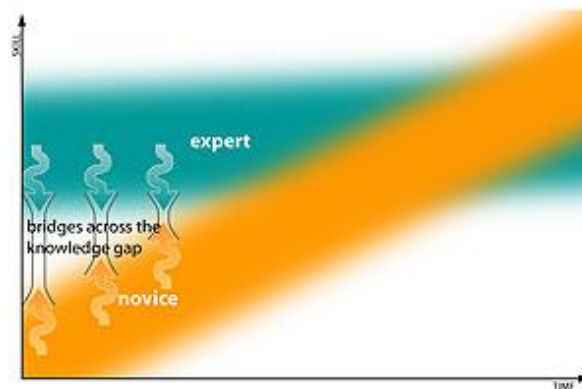


Figure 04. The knowledge gap between craft novice and expert. Wood, N. (2006) *Transmitting Craft Knowledge: Designing Interactive Media to Support Tacit Learning Skills*. Unpublished PhD thesis. Sheffield Hallam University: 147.

The mentioned threshold named as “bridges” during the tacit craft knowledge transmission process has been a compass to find out that there is indeed enough overlap between a designer and a home crafts practitioner to start a tacit learning process (Figure 04). Figure 05 shows where the participants of this research are in relation to the designer-researcher. In other words, home craft practitioners have enough exposure to the basic techniques of their craft and even enough motivation to work with institutions as individual entrepreneurs. As shown in Figure 04 and Figure 05 in the beginning the makers might need some bridges to dwell into the overlap zone which is the locus of this research where they already have some similar skills with the designer to progress rapidly.

Looking at Wood’s theory and situated learning theory, we suggest that via this proposed methodology we can test that bridges are not only built in the initial phase of the master-novice interaction. Other bridges can be formed everytime the novice looks back at her work

and reflects on it: in every turning point of the learning helix shown in Figure 03. For this reason, the analyses phases between in each workshop aim to explicitly define how new learning bridges have been built if not the bridges themselves.

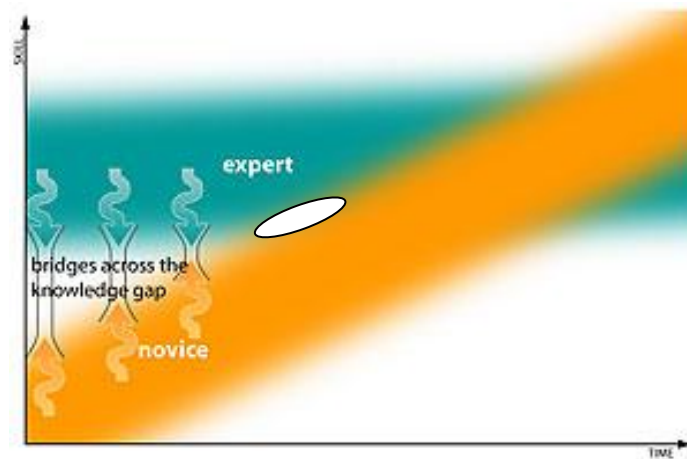


Figure 05. Locating this research on the theory of the knowledge gap between craft novice and expert. Wood, N. (2006) *Transmitting Craft Knowledge: Designing Interactive Media to Support Tacit Learning Skills*. Unpublished PhD thesis. Sheffield Hallam University: 147.

External Evaluation: From “distal” to “proximal”

The ways in which new learning bridges are built can be evident in the objects made in the workshops besides the interactions of the designer-researcher and the participant. The objects might also embody evidence of tacit knowledge that has been acquired from the designer-researcher by the participants. Analyzing what the participant might have learnt can be called looking (or *indwelling*) from “distal” to “proximal” in Polanyi’s words (Polanyi, 1958).

According to Polanyi (1958) tacit knowledge functions as an interrelation of two parts called “*proximal*” and “*distal*”. A simple example to explain this can be how a carpenter knows his hammer by its action on the nail and knows his muscles by the movement of the nail in wood (Polanyi 1958). In other words we cannot know of the hammer’s use without the nail. To grasp the knowledge of the hammer we have to attend to the nail.

When looking from the proximal to distal, the proximal processing makes a leap towards the distal artifact as in the hammer-nail example. The relationship of the artifact to the process cannot be explained explicitly because it is tacit, yet can be validated through descriptive procedures. An example of this can be found in Bowen’s (2009) process in his PhD thesis where he employed a tacit knowing relationship to “*process*” his experience of working with

stakeholders (participants) by creating new design ideas. Bowen (2009) explains this processing as achieved through a tacit knowing relationship that has been creating by "indwelling":

"In the case of my development of a critical artifact methodology, I suggest the comprehensive entity is the development of product ideas (as affected by the stakeholder activities). So, I can "process" my experiences of the stakeholder engagement activities by dwelling in them; by attending from these experiences (as the proximal term) to the designing of further conceptual designs (as the distal term)." (Bowen, 2009, p. 173).

This proposition might work both ways. The other suggestion can be looking from the "distal" to the "proximal". In other words the artifacts (distal) can "*illuminate*" the reasons and aspirations (proximal) for which they were made.

Thus, in this research unlike Bowen's (2009) methodology the proximal and the distal are reversed as mentioned above: we will look at the artifact (distal) and track its motivation to be made (proximal). To achieve this, we are going to ask an external committee of experts with prior design research and practice background to evaluate the final work of the participants with reference to the initial work of the participants. This descriptive and comparative evaluation of objects will give us evidence about how the participants made progress.

The mentioned methodological decisions based on tacit knowledge theory and situated learning theory helped us shape the tentative methodology shown in Figure 06 to address our research question. Since we aim to observe tacit knowledge transmission we used situated learning theory because situated learning theory defines a structure for unconscious learning processes. This structure is a helix movement of learning from the periphery (novice) to the center (master). It is highly probably that the tacit knowledge is also acquired in a helix movement as it highly corresponds to the definition of situated learning: "*ubiquitous in an ongoing activity*" (Lave, 1993).

According to situated learning, the participant makes self-reflection on what she has learned in the initial step before moving on to the next step. That is why, the analyses steps have been placed at these points: between each workshop. In these intervals, the time between two consecutive workshops, the outcome of the previous workshop is analyzed in two steps. The first one is watching the video footage with the participants to hear their interpretations of their learning experience. The second one based on the two components of tacit knowledge:

tracing tacit knowledge transmission from “distal” to “proximal”. In other words external committee will be asked to evaluate the final work of the participants in comparison to their initial work (work documented before the workshop). Both steps aim to explicitly describe how learning bridges have been established.

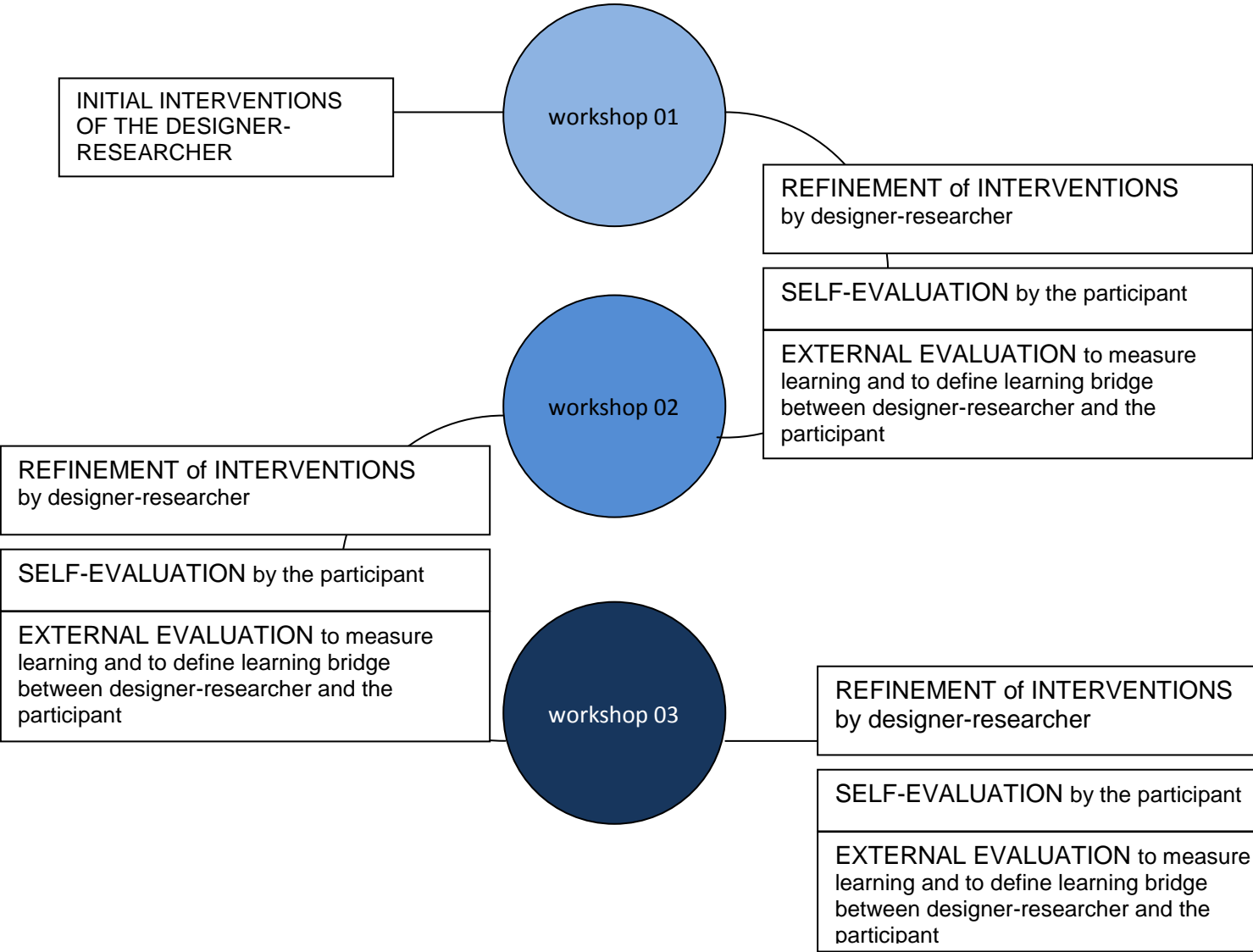


Figure 06. Research design to study how design knowledge is transmitted when a designer works with a group of home crafts practitioners.

Beyond Action Research

To study how a designer influences makers AR is essential for embodying action and reflection together during relationships. That is why AR is widely used in practice-based design research because AR focuses on incremental change (Pedgley 2007, Durling 2009). Although the methodology proposed above to study the mentioned specific research question highly resembles to AR it has some important differences. For this reason it is important to discuss why AR is almost but not exactly the methodology of this research. Although it illuminates the ideological roots of this methodology, it does not exactly correspond to the necessities of this research again mainly because the tacit nature of design are being explored.

In AR the researcher studies groups before, during and after an “action”, in other words “while doing things” to generate “change” and “understanding” consecutively: “...*It is thus an emergent process, which takes shape as understanding increases.*” (Sanoff, 2007, p. 214). According to McTaggart (2003) “*Fundamental to action research is the idea that the social world can only be understood by trying to change it.*” (cited in Brydon-Miller, Greenwood, & Maguire, 2003, p.15)

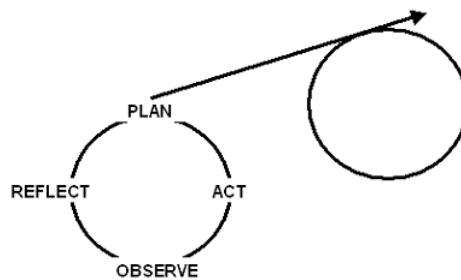


Figure 07. Steps of AR. Zuber-Skerritt, O.(1993). Improving Learning and Teaching Through Action Learning and Action Research. *Higher Education Research and Development*, 12(2), 45-58.

Although highly relevant, the method of this research is not exactly AR. While “following the problems” in a systemic cycle with respective logical steps shown in Figure 07, the subtle findings during the action might be missed because the elements shown in the cycle in Figure 07 (observe, reflect, plan, and act) have an integrated nature particularly in designing and in researching design (Swann, 2002). In this study it is not possible to identify these elements consecutively in cycles with certain logic because these processes are tacitly developed.

In her research on transmitting craft knowledge Wood (2006) indicates the same experience: “...Whilst these elements are clearly identifiable in the research 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.” (Wood, 2006: 14) Then, it might be discussed that some design researchers consciously use a non-identical twin of AR not to miss the tacit knowledge that is coming out during the action, like a good cameraman who might have to kneel down yet looking through the same frame.

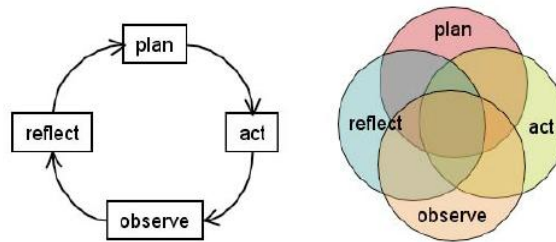


Figure 08. a. Action research b. Wood's (2006) interpretation of action research in practice lead research. Wood, N. (2006) *Transmitting Craft Knowledge: Designing Interactive Media to Support Tacit Learning Skills*. Unpublished PhD thesis. Sheffield Hallam University: 16.

Unlike action research, participant observation (PO) does not necessarily have logic of repeating steps of thinking and acting. Vice versa it is a method that tolerates blurry borders of planning, acting and reflecting to access entangled phenomena that cannot be accessed otherwise by other methods.

Participant observation is also appropriate for an iterative process where the researcher can go back to the event log (the notebook where the researcher writes down field notes) as frequently as she wants either alone or with the participants to revise it. This enables the researcher to pull the participants into the research. For this reason, the designer-researcher will work towards a specific methodology based on PO in consecutive workshops with intervals. This will constitute the field work.

Conclusion

This tentative methodology requires a relatively continuous long term study. First of all it is vital for the researcher to be present in every workshop, work with the participants and analyze workshops until a repeating pattern of the hypothesis is recognized. This is going to indicate when the research should be terminated.

Prior research most of which are practice-led dissertations have elicited, worked with and analyzed the tacit dimension of design knowledge due to their immanent connection to practice: “designing” and “making”. These researchers have been challenged by the difficulty of communicating their research because it is not possible to know how one makes. Yet it is possible to process the research through an argumentative analysis with detailed and clear procedures that document the entire process (Biggs, 2002; Durling, Friedman, & Gutherson 2002 ;Rust, 2004; Niedderer, 2007; Pedgley 2007). Prior research that document, analyze and synthesize tacit design knowledge also shows that the “tacit dimension” highly determines the methodology of the research as in this case.

In this article, we tried to explain how we reasoned our methodological decisions to address a certain research question by the interrelations of learning theory, tacit knowledge theory and how these theories have been applied in prior design research. This methodology has been proposed to capture, measure and define tacit knowledge transmission during an action in a making environment. This chain of decisions can help design researchers who would like to study actions in context. The main argument of this article can be an example of how conventional research methods such as observational video and AR have been re-visited to address design-specific issues such as the tacit dimension of design.

References

- Biggs, M. (2002). The Role of the Artefact in Art and Design Research. *International Journal of Design Sciences and Technology*, 10(2),19-24.
- Bowen, S.J. (2009). *A Critical Artefact Methodology: Using Provocative Conceptual Designs to Foster Human-centred Innovation*, Unpublished PhD Thesis. Sheffield Hallam University, Sheffield, UK.
- Brydon-Miller, M., Greenwood, D., & Maguire, P., 2003. Why Action Research?. *Action Research*, 1(1), 1-9.
- Durling, D. (2009), Lecture Notes by Cigdem Kaya in New Forms of Doctorate: An ESRC Seminar Organised by Lansdown Centre for Electronic Arts, Middlesex University, held at London Knowledge, Tuesday 19th May 2009, London, UK.
- Durling, D., Friedman, K., & Gutherson, P. (2002). Editorial: Debating the Practice-Based PhD. *International Journal of Design Sciences and Technology*, 10(2), 7-18.
- Lave, J. (1993). The Practice of Learning. In S. Chaiklin. & J. Lave. (Eds.), *Understanding Practice: Perspectives on Activity and Context* (pp. 3-32). Cambridge: Cambridge University Press.
- Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge: University of Cambridge Press.

- Niedderer, K. (2007). Mapping The Meaning of Knowledge in Design Research. *Design Research Quarterly*, 2(2), 1-13.
- Pedgley, O. (2007). Capturing and Analyzing Own Design Activity. *Design Studies*, 28(5), 463-483.
- Polanyi, M. (1962). *Personal Knowledge*. (2nd ed.). Routledge & Keagan Paul. London. (1st edition 1958).
- Rahman, R. (2010). Embodying Understanding of Users' Culturally Determined Factors in the Design Process. Unpublished PhD Thesis. Sheffield Hallam University, UK.
- Rust, C. (2009). Wicked Problems: Useful or Just Interesting?. Lecture, Creativity Center, Brighton University, UK. Retrieved April 2009 from <http://chrisrust.wordpress.com/category/issues/wicked-problems/>
- Rust, C. (2007). Unstated Contributions: How Artistic Inquiry Can Inform Interdisciplinary Research. *International Journal of Design*, 1(3), 69-76.
- Rust, C. (2004). Design Enquiry: Tacit Knowledge and Invention in Science. *Design Issues*, 20(4), 76-84.
- Sanoff, H. (2007). Editorial: Special Issue on Participatory Design. *Design Studies*, 28(3), 213-215.
- Schunk, D., & Zimmerman, B.J. (1997) Self Origins of Self-Regulatory Competence. *Educational Psychology*, 32(4), 195-208.
- Swann, C. (2002). Action Research and the Practice of Design. *Design Issues*, 18 (1), 49-61.
- Wood, N. (2006). *Transmitting Craft Knowledge: Designing Interactive Media to Support Tacit Learning Skills*. Unpublished PhD Thesis. Sheffield Hallam University. Sheffield, UK.
- Zuber-Skerritt, O. (1993). Improving Learning and Teaching Through Action Learning and Action Research. *Higher Education Research and Development*, 12(2), 45-58.