Practice Based Research: A Guide

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Summary

This document characterises practice-related research for the general reader and research student.

There are two types of ***practice related*** research: practice-***based*** and practice-***led***:

1. If a creative artefact is the *basis* of the contribution to knowledge, the research is practice-***based***.
2. If the research *leads* primarily to new understandings about practice, it is practice-***led.***

Practice-based Research is an original investigation undertaken in order to gain new knowledge partly by means of practice and the outcomes of that practice. In a doctoral thesis, claims of originality and contribution to knowledge may be demonstrated through creative outcomes in the form of designs, music, digital media, performances and exhibitions. Whilst the significance and context of the claims are described in words, a full understanding can only be obtained with direct reference to the outcomes.

Practice-led Research is concerned with the nature of practice and leads to new knowledge that has operational significance for that practice. In a doctoral thesis, the results of practice-led research may be fully described in text form without the inclusion of a creative work. The primary focus of the research is to advance knowledge about practice, or to advance knowledge within practice. Such research includes practice as an integral part of its method and often falls within the general area of action research.

The primary focus of this document is on practice-***based*** research but there is much that is relevant to practice-***led*** research also. It begins with a discussion of the basic concepts in the context of a doctoral research programme followed by a brief historical overview of the field. The generic structure of a practice-based doctoral thesis is then outlined with a short description of the expected content of each chapter. Further sections include a discussion of the nature of knowledge in the context of doctoral research, a set of frequently asked questions, some definitions of key terms, a bibliography and web sources.

Document Overview

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Practice and Research

Research that takes the nature of practice as its central focus is called 'practice-based' or 'practice-led' research. It is carried out by practitioners, such as artists, designers, curators, writers, musicians, teachers and others, often, but not necessarily, within doctoral research programmes. This kind of research has given rise to new concepts and methods in the generation of original knowledge.

It is important to make a clear distinction between practice-based research and pure practice. Many practitioners would say they do 'research' as a necessary part of their everyday practice. As the published records of the creative practitioners demonstrate, searching for new understandings and seeking out new techniques for realising ideas is a substantial part of everyday practice. However, this kind of research is, for the most part, directed towards the individual's particular goals of the time rather than seeking to add to our shared store of knowledge in a more general sense. Scrivener argues that the critical difference is that practice-based research aims to generate culturally novel apprehensions that are not just novel to the creator or individual observers of an artefact; and it is this that distinguishes the researcher from the practitioner (Scrivener, 2002).

Another important distinction between personal practitioner research and doctoral practice-based research is the form that the knowledge generated takes. The practice-based doctoral research outcome that is shared with a wider community arises from a structured process that is defined in university examination regulations.

In order to achieve advances in knowledge of the kind referred to above, the everyday research process common to professional practice has to be defined and executed in a manner that is commonly agreed. The research component of the practice-based research is, in most respects, similar to any definition of research, a key element of which is the transferability of the understandings reached as a result of the research process.

In the UK, the Arts and Humanities Research Board (now Council) (AHRB, 2000) defined research primarily in terms of research processes rather than outputs. This definition is built around three key features of any doctoral research proposal:

1. It must define a series of research questions or problems that will be addressed in the course of the research. It must also define its objectives in terms of seeking to enhance knowledge and understanding relating to the questions or problems to be addressed.

2. It must specify a research context for the questions or problems to be addressed. It must specify why it is important that these particular questions or problems should be addressed, what other research is being or has been conducted in this area and what particular contribution this project will make to the advancement of creativity, insights, knowledge and understanding in this area.

3. It must specify the research methods for addressing and answering the research questions or problems. In the course of the research project, how to seek to answer the questions, or advance available knowledge and understanding of the problems must be shown. It should also explain the rationale for the chosen research methods and why they provide the most appropriate means by which to answer the research questions.

Creative output can be produced, or practice undertaken, as an integral part of the research process. However, the outcomes of practice must be accompanied by documentation of the research process, as well as some form of textual analysis or explanation to support its position and to demonstrate critical reflection. A thesis arising from a practice-based research process, such as the one given above, is expected to both show evidence of original scholarship and to contain material that can be published or exhibited.

Practice-Based and Practice-Led Research

Although practice-based research has become widespread, it has yet to be characterised in a way that has become agreed across the various fields of research where it is in use. To complicate matters further, the terms 'practice-based' and 'practice-led' are often used interchangeably. In reality, there are two main types of research that have a central practice element and that distinction is summarised here as follows:

- If a creative artefact is the *basis* of the contribution to knowledge, the research is practice-***based***.
- If the research *leads* primarily to new understandings about practice, it is practice-***led.***

Practice-Based Research

Practice-based Research is an original investigation undertaken in order to gain new knowledge partly by means of practice and the outcomes of that practice. Claims of originality and contribution to knowledge may be demonstrated through creative outcomes which may include artefacts such as images, music, designs, models, digital media or other outcomes such as performances and exhibitions Whilst the significance and context of the claims are described in words, a full understanding can only be obtained with direct reference to those outcomes. A practice-based PhD is distinguishable from a conventional PhD because creative outcomes from the research process may be included in the submission for examination and the claim for an original contribution to the field are held to be demonstrated through the original creative work.

Practice-based doctoral submissions must include a substantial contextualisation of the creative work. This critical appraisal or analysis not only clarifies the basis of the claim for the originality and location of the original work, it also provides the basis for a judgement as to whether general scholarly requirements are met. This could be defined as judgement of the submission as a contribution to knowledge in the field, showing doctoral level powers of analysis and mastery of existing contextual knowledge, in a form that is accessible to and auditable by knowledgeable peers.

Practice Led Research

Practice-led Research is concerned with the nature of practice and leads to new knowledge that has operational significance for that practice. The main focus of the research is to advance knowledge about practice, or to advance knowledge within practice. In a doctoral thesis, the results of practice-led research may be fully described in text form without the inclusion of a creative outcome. The primary focus of the research is to advance knowledge about practice, or to advance knowledge within practice. Such research includes practice as an integral part of its method and often falls within the general area of action research. The doctoral theses that emerge from this type of practice related research are not the same as those that include artefacts and works as part of the submission.

Domain Differences in Practice-based and Practice-led Research

The use of the term ***practice-based research*** has become widespread but it has yet to be characterised in detail in a way that is agreed across the various fields of research where it is in use. There are differences in conceptual and applied uses of the term between those fields where it is most often found: design, health, creative arts, and education. There are, in fact, differences in the type of research in respect of whether it is practice-based or led.

In design research, for example, where the nature of practice is a major research topic and is often conducted by research specialists rather than design practitioners, the emphasis is on achieving new knowledge about the nature of practice and how to improve it, rather than creating and reflecting on new artefacts. By contrast, in the visual arts, the emphasis is on creative process and the works that are generated from that process: the artefact plays a vital part in the new understandings about practice that arise.

It is important to note that the term ***practice-based research*** rather than ***practice-led research*** is used the area of health research. Here it may include any of the following, but not limited to: literature reviews including systematic examination of intervention and outcome measures, program evaluation clinical trials, evaluation or revision of health care protocols, policies and procedures, pilot projects and peer-reviewed studies.

Historical Background

Practice-based PhDs began in Australia in 1984, when the University of Wollongong and the University of Technology, Sydney (UTS) introduced Doctorates in Creative Writing. Graeme Harper obtained the first such degree in Australia from UTS. He is currently at the University of Plymouth in England, where he is very active in promoting practice-based research. Two current UTS professors, Theo van Leeuwen and Ernest Edmonds, were active earlier in such UK developments.

The first Polytechnic was formed in London in1880. When the concept was used for the significant expansion of such institutions in 1968, the goal was to add a service element to the mainstream of higher education. The knowledge that the Polytechnics taught and developed was to emphasis value in practice. Higher education was no longer to be seen as the centre of new understanding, of knowledge that described the world, but as the centre of new ways of doing things, of knowledge that improved our ability to act in the world.

When the Council for National Academic Awards (CNAA) drew up its regulations for the higher degrees to be awarded from Polytechnics, they included a critical clause, "The written thesis may be supplemented by material in other than written form". This enabled a student to include an artefact, or the record of an artefact, as an integral part of their PhD submission. For example, when Susan Tebby submitted her PhD, "Patterns of Organisation in Constructed Art", (Tebby, 1983), she put up an exhibition and included a full set of 35mm slides of its contents bound with the thesis. The examination was based on the artworks and the written thesis together. Practice-based PhDs today are most simply identified by the inclusion of such artefacts within the submission.

In Australia, the Australian Research Council has been funding research in creative practice and has entered a partnership with the Australian Council in which collaborative art/science projects are funded jointly. Similarly, in the UK, the Arts and Humanities Research Council, in its definition of research, states that "Creative output can be produced, or practice undertaken, as an integral part of a research process".

The crucial point is that in certain disciplines knowledge can be partly advanced by means of practice. The idea that has developed was that a research student, for example, would take, as the subject of research the practice of their own discipline. The research programme would consist of a continual reflection upon that practice and on the resulting informing of practice. The examination would be based upon both the results of the practice and on a thesis concerning the reflections upon the process undertaken. Thus artefacts, for example a set of objects that had been designed and constructed, would form part of the candidate's submission for the degree. The candidate would be expected to satisfy the examiners in all of the ways that are normal in a doctorate, such as demonstrating that they are well acquainted with the general field of knowledge in which their subject relates. It would be required that the thesis, as lodged in the Library, would include a permanent record of any artefacts submitted towards the examination. In this way, the practice-based PhD can be understood within the traditional context of the purely written PhD without any major revolution in education being required.

Studies have been made of practice-based research supervision that help to illuminate the process. For example, in order to chart the experiences of such students, qualitative interviews were undertaken with 50 research students at various UK universities. A paper based on those interviews examines one dimension of how students adapt to this kind of study, focusing on their conceptions of identity (Hockey, 2003)

The PhD and Knowledge

The PhD is defined in terms of knowledge, e.g. "The degree is awarded to candidates who, through original investigation, make a distinct and significant contribution to knowledge." (UTS, 2006). That new knowledge is expected to have two characteristics: it is shared and it can be verified or challenged. So a PhD describes knowledge that is new (in the world), can be shared with others and can be tested in some way. Accepting that much of what we know is known tentatively rather than absolutely, the properties of being sharable and challengeable are more important than the absolute certain truth of the new knowledge.

Preliminaries

There are a few knowledge issues that are worth mentioning but are not, in fact, relevant in our context. In each case, of-course, the issues could be the subject of a PhD in Philosophy itself.

- Tacit knowledge

That we have achieved new implicit or tacit knowledge is clearly not relevant because, by definition, it is not shared.

- Subjective or private knowing

Any position that argues that knowledge is private to an individual argues that knowledge cannot be shared and so rules against the possibility of research in the PhD sense.

- Pure argumentation

The new knowledge can be that B follows from A. In other words, it is shown that, presuming (but not claiming) that A is true, then B must be true also. Such an argument does not appeal to any facts about the world but relies entirely on the strength of its argument. This is not a matter of rhetoric, it has to be a matter of logic. In mathematics, for example, such PhDs are common. The crucial issue is to show that the system of reasoning used and the assumptions A do not contain or imply a contradiction. That can be quite hard. Reaching into the philosophical foundations, however, is a serious matter, not least because of Gödel's theorem (Gödel, 1931). In any case, a PhD based upon pure argumentation cannot be practice-based.

Knowledge

A classic text is A. J. Ayer's "The Problem of Knowledge". He argues, pragmatically, that we needed to find a "right to be sure" to support a belief in order to call it knowledge (Ayer,1956). It is a matter of debate how strong the backing needs to be for a believer to have the right to be sure that their belief is true. However, The setting of a standard requiring the impossibility of error should be resisted. His view was that one has the right to "be sure" even where error is possible.

A huge influence has been Karl Popper's view of a "right to be sure" expressed in his description of scientific enquiry (Popper, 1959). His key point is that we cannot know any general truth about the world for sure. Many, Bertrand Russell for example Russell, 1912), have pointed out that we can only observe a finite number of events and that, for all we know, the next observation will contradict any theory we have based on the earlier ones. Thus Popper argued that the pursuit of new knowledge was based on attempting to falsify our current hypotheses or beliefs. The longer we go on failing to falsify them the more we can claim the right to be sure about them. Once falsified, we need to find a new or modified theory. The main thing is to be open to, and even invite, criticism and attempts to disprove our theories.

Much of the understanding about having knowledge rests upon what it is that we perceive in the world and that others also report perceiving. The problem is that, of-course, we have direct knowledge of what are often called "sense data" (Swartz, 1965) but only indirect knowledge of the world through those data. A significant stance in this context is constructivism (not to be confused with movements of the same name in art and in mathematics) (Bruner, 1986). In this view, in our pursuit of knowledge about the world we construct it rather than uncover it. One might argue that "being sure" is about being sure that it is plausible rather than that it is true.

Beyond knowing what is we are also interested in what causes or influences what is. David Hume's work is classic here (Hume, 1777). He articulated the "problem of induction". Basically, we can never be sure that X causes Y because we cannot reliably induce the general case from specific instances (as above). However, he gave a valuable lesson in how to deal with such philosophical problems. He said that we had to rely on such induction in ordinary life or we would "perish and go to ruin." So some philosophical problems about knowledge

may be intractable or devastating, but we must carry on anyway. After all, despite the problem of induction, for example, we can boil a kettle, send an email and ride a bicycle.

Beyond knowing what is and knowing what causes what, we are also interested in knowledge about action. We are clearly able to find new knowledge about how to better achieve some end. Practical knowledge of this kind can still be shared, verified and criticised. 'Knowledge how' may not, however, provide the degree of explanation that 'knowledge that' does. The problem of induction is less of a concern. The action researcher might generate new knowledge about how to do something but leave it open to others to discover why it works. A phenomenologist might argue that this 'knowing how' precedes 'knowing that'. From that point of view, action research should come before experimental research. Until the action research is complete, it could be argued, we do not know what to study experimentally. If we were starting from a clean sheet of zero knowledge, perhaps that would be true, but reality is more complex.

Phenomenology (Lewis, 1946) has a number of strands, but one important concept is that, to put it very briefly, the body is important in perception. In practical terms, this implies that the typical theories of cognitive science may be fatally lacking. A reliable account of perception must take action into account. Further, one can argue that action, cognition and perception must be considered together in any adequate description. If we accept this view, then research about human interaction with art works, for example, must try to capture information about all three aspects and unify them in some way.

Frederick Crews put the point about how to approach knowledge nicely. He said that we should follow "the ethic of respecting that which is known, acknowledging what is still unknown and acting as if one cared about the difference" (Crews, 2006). Finally, a lighter read on writing about these topics is Francis Wheen's "How Mumbo-Jumbo Conquered the World" (Wheen, 2004). Chapter four, called "The Demolition Merchants of Reality" should be required reading for any PhD candidate.

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Thesis Outline

1. Introduction

Four key elements are briefly described in this section.

i. The Problem

This is a concise statement of the research question or issue that the thesis addresses.

ii. The Context

What is the main work that has been done that gives rise to the question and what is its significance?

iii. The Method

The approach to solving the problem (experimental, practice based, analytic etc) is described in this part, leaving the justification to chapter three.

iv. The Outcomes

Here the key contribution(s) to knowledge are concisely described. They are the things that arise from the work that are new and shown to advance understanding or practice internationally. The value of these outcomes will be to one or more community (computer scientists, artists, theoreticians etc) and it is important to be clear who they are.

2. State of the Art Review

This chapter presents the results of a literature survey of the area(s) of study. It should be a critical review in the context of the stated research question and related issues. This chapter answers questions such as: Who is doing what? Who has done what? Who first did it or published it? The survey is taken from published papers, research monographs, catalogues etc. It must be based on and refer to primary sources, not textbooks or other such reports on the work of others. It is to be expected that this chapter provides a new structured view of the field of study.

3. Methodology

This is a key chapter that provides a description and justification of the research methods used. Normally, the methods will be selected from known and proven examples. In special cases the development of a method may be a key part of the research, but then this will have been described in section one and reviewed in two.

4. Foundation Work

This, optional, chapter is a chance to describe earlier work done by the author/candidate (possibly with others) that provides a foundation or significant background. It may be helpful to revisit and reassess earlier work in the light of the research focus of the PhD. This chapter will not be needed in some PhDs where the work is from a fresh start.

5. New Studies

The core of the thesis is a description of the new studies/software/artwork and the process of production. It answers the questions: What has been done, how was it achieved and what was the rationale? This can be, for example, a report on the design and execution of a set of experiments or the development of an innovative software system or the making of innovative art works. In a practice based PhD an artwork, for example, might be presented for examination. If so, this chapter will illuminate it by explaining, at the very least, what is important and novel

6. Results

The evaluation of the new software/artwork or analysis of the results or processes of the new studies will have led to certain results or conclusions. Placing the new results in the context of Chapter 4 is important. The outcomes, as promised in chapter 1, are shown to have been achieved in this section.

7. Conclusions

A discussion can now be provided that puts a wider perspective on the results and discusses the implications of them for other broader areas and domains. Future work and outstanding questions are normally also discussed.

8. References/Bibliography (including published papers)

Use a standard reference format, such as Harvard, and be careful to check each entry. It is temping to presume that software such as End-Notes will ensure a perfect reference list, but that all depends on exactly how each entry was stored. There is no substitute for a line-by-line check.

Questions and Answers

Q1. What is the purpose of the Literature Review?

A1. The Literature Review should cover that work by others which provides a basis and context for your research either because you are using the findings to support an argument to extend something or because you have identified a limitation and will be pursuing studies to address it. The review should be drawn from primary sources: e.g. papers reporting results of original research. Do not quote someone's reference to someone else's work: always go to the original text.

Q2. Should I place the background discussion of the origins and source of my methodology in the methodology chapter or in the Literature Review?

A2. Normally, you would describe the origins of your methodology in the methodology chapter. Where the contribution to knowledge is primarily a methodological one it might be appropriate to describe the state of the art in the Lit Review chapter and have a short summary of the approach in the methodology chapter. But this is exceptional.

Q3. How much detail should I go into when describing the methodological approach?

A3. Some tips are:

1. start with the actual things you have done/will do (as if instructing an assistant)
2. then add a brief description of the origins of the method(s) - sources from which they have been selected
3. if any aspect is not yet justified develop the argument to justify it.

Number 3 should be minimal. If the argument includes negatives ("statistics is no good for this" or "semiotics does not work in this case") be sure that you are knowledgeable about what you are rejecting.

Q4. How should I write reflective documentation?

A3. Monitoring and Recording 'Events' for Reflective Practice

- Keep a written record either in the form of an online diary or blog, or a hand written notebook.
- Having a notebook with you at all times to record any observations or events during the process of making a work is advisable.
- If you are collecting audio records, you will probably need to transcribe them at some point and may need to factor that in to your time and effort schedule.
- Keep an overview chart to be able to see at a glance what has been recorded and what you plan to record.
- It is advisable to designate time for reflection after the events and to record your reactions and emerging thoughts at specified Review points. Do not be tempted to only review and reflect on an ad hoc basis. Build it in to your timetable.

Good questions to ask yourself are:

- what was proposed, discussed, decided and carried through,
- what stumbling blocks arose and how they were addressed….,
- whether the ideas were workable, interesting, challenging….
- whether the collaboration worked well or not
- reasons for success or otherwise
- did the solutions work well, if not why not?
- whether there were different viewpoints between you and your collaborating parties
- whether lessons were learnt from failures.

Q5. What is the role of the artefact in reporting the results?

A5. The artefact is not an explanation in itself:

- it requires linguistic description that relates the development and nature of the artefact to understandings about creative process
- the text describes the innovation embodied in the artefact but cannot be fully understood without reference to and observation of the artefact.

Viewpoints

Ross Gibson's view is 'the text is not an explanation of the artwork; rather, the text is an explicit, word-specific representation of processes that occur during the iterative art-making routine, processes of gradual, cyclical speculation, realisation or revelation leading to momentary, contingent degrees of understanding. To this extent the text that one produces is a kind of narrative about the flux of perception-cognition-intuition. The text accounts for the iterative process that carries on until the artist decrees that the artwork is complete and available for critique, 'appreciation', interpretation, description, evaluation. All these particular practices can entail other particular texts.'

Steve Scrivener's view: 'The art object does not embody a form of knowledge'

- Art is not a form of knowledge communication
- Art is not a servant of knowledge acquisition
- Art making creates apprehensions
- Art research creates novel apprehensions

See http://www.herts.ac.uk/artdes/research/papers/wpades/vol2/scrivener.html

Ethical Considerations

All research that involves people in the collection and analysis of data is subject to ethical considerations. The first stage in designing a research project is to prepare a research proposal which outlines the proposed methodology and any ethical issues. Researchers must obtain the informed consent of persons participating in research before the research begins. Researchers should provide participants with accurate information about the purpose, methods, demands, risks, inconveniences and discomforts of the study. Information should be at a level appropriate for comprehension by research subjects. Each institution in which a researcher works will have an Ethics Approval procedure which must be followed prior to undertaking the research. Examples from CCS University of Technology, Sydney are available.

See CCS Code of Ethics document
See CCS Procedures and Application Form

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Survey

On-line resource about how to conduct survey
http://www.managementhelp.org/commskls/surveys/surveys.htm

Interviews

http://www.ul.ie/~infopolis/methods/interv.html

Brief information sheets from University of Illinois Extension on 'how to do interview'
http://www.aces.uiuc.edu/~PPA/KeyInform.htm

Bob Dick. http://www.scu.edu.au/schools/gcm/ar/arp/iview.html A technique for qualitative data collection. How to do interviewing.

Introduction to Interviewing Techniques
http://www.wpi.edu/Academics/Depts/IGSD/IQPHbook/ch11.html

Kvale, S. (1996) InterViews: An Introduction to Qualitative Research Interviewing
Steinar Kvale, Institute of Psychology, University of Aarhus, Denmark

This is an introduction to interviewing outlines both the theoretical underpinnings and the practical aspects of the process. After examining the role of the interview in the research process, Steinar Kvale considers some of the key philosophical issues relating to interviewing: the interview as conversation, hermeneutics, phenomenology, concerns about ethics as well as validity, and postmodernism. Having established this framework, the author then analyzes the seven stages of the interview process - from designing a study to writing it up.

Observation

Data collection methods:
http://www.acf.dhhs.gov/programs/ccf/resources/gbk_om/om_gbk_dcm.html

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Drawing process analysis

Digital Sketching Website (in progress) http://www.uoregon.edu/~arch/digsketch/

Software for Data Analysis

The need for handling large qualities of observational data has given rise to software applications that allow the researcher to collate the audio, video, text material and perform various forms of qualitative and quantitative analysis.

Computer aided qualitative data analysis packages such as NVivo 2.0 do not directly support the analysis of video. Other tools that do support video, such as Atlas/ti, Qualrus and Hyper Research, are designed to work with small edited video clips, not with large libraries of raw or unedited videos. Transana handles videos more effectively than the mentioned ones and it is largely used because it is freeware, on the other hand Observer and Interact are higher end, more professional software which offer more flexibility for data collection and analysis across many disciplines.

NVivo where data are stored as sets of text documents, which can include field notes, interview transcripts, communications between individuals (especially email communications), and any other form of textual data. It is a text based analysis tool, which does not provide us with the synchronous analysis of audio video data. (www.qsr.com.au).

Atlas.ti is an application for the visual qualitative analysis of large bodies of textual, graphical and audio video data. The software supports all areas of document based research and works with video, image, audio data attached to text. (http://www.atlasti.de/)

"HyperRESEARCH" which enables the coding of any type of source including text, audio, video and image. HyperRESEARCH™ is a qualitative data analysis software package enabling users to code and retrieve, build theories, and conduct analyses of observational data. Recently with advanced multimedia capabilities, HyperRESEARCH allows users to work with text, graphics, audio, and video sources. The video recordings or captured images could be attached to text records to support heterogenous analysis (more information can be found at http://www.researchware.com/).

Transana is a free software for analyzing video and audio data. User can organize video clips (from the same or from different video files) into meaningful categories, as a mechanism for developing and expanding the theoretical understanding of what the video shows. The software allows one to apply searchable analytic keywords to these video clips. Search tools allow data mining and hypothesis testing across large video collections. It is also possible to share analytic markup with distant colleagues to facilitate collaborative analysis (more information can be found on www.transana.org).

Observer (by Noldus) is for the collection, analysis, presentation and management of observational data. Noldus, providing a wide range of features for instrumentation for data collection and analysis, their software Observer can be applied to study observable behavior such as activities, postures, gestures, facial expressions, movements, and social or human-system interactions. The latest version of Observer integrates analysis of textual data and handling transcripts to the video data. Observer also integrates different data collection techniques with accessories to suit different research environments (field/ lab/ dynamic) such as event logging interface, eye trackers, mobile device camera, spectacles camera, and so on. Specific data collection and analysis tools vary according to the needs of the discipline (Neuroscience, Psychology, Zoology, Usability) and Observer XT provides with add-in tools to satisfy these needs. U-Log, logging tool, automatically records user computer interaction, EthoVision, a video tracking system is used for automatic recording of activity, movement and interactions of animals; and Theme is used for detection and analysis of patterns in time-based analysis. More information can be found at http://www.noldus.com.

INTERACT is a software tool that helps you to save hundreds of hours of time during analysis of video recordings and live observations, offering sophisticated logging and analysis methods. Interact can be used to study observable behavior such as activities, postures, gestures, facial expressions, movements, and social or human-system interactions. With Interact it is possible to record events (segments of information based on video) independent of a method. Events can be logged simultaneously in one video, and the ways to achieve it very flexible. Interact allows annotation, integration of text/ transcripts connected to the videos events, and it can handle any type of multimedia file as well as the functionality to control video devices directly. Interact has add-ins for specific research disciplines (Neuro Science, Psychology, animal behavior, Usability). With Data view user can display any kind

of externally acquired data synchronously to the video recordings, such as physiological information, or data acquired by mechanical systems. With Sound Analyzer user can identify parts automatically whenever special audio events happen e.g. where a person is speaking. With Highlight Movie Creator user can combine all video events where a specific action occurs and makes them into one video file. With the use of PATTERN add-on, the user can discover and quantify behavioral patterns in the observational data. The recent add-on, LogSqare records information about user activities and screen content in human-computer interaction studies. More information can be found at http://www.mangold.de.

Comparison chart between qualitative data analysis tools which involve video analysis

	Observer	**Interact**	**Transana**	**HyperResearch**	**Atlas.ti**	
Runs on Windows and MAC	W only	W only	√	√	W only	
Integration of text with videos	√	√	√	√	√	
Precise time codes for video events	√	√	√	√		
Handling any multimedia file?	√	√	Mpeg	√	limited	
Event recording	√	√	√	√	-	
Method independent event recording?		√				
Annotate videos?	√	√	√	√	√	
Multiple coding of videos?	√	√		√		
Coding textual data	√	√	√	√	√	
Organize coding systems	√	√	-	-	√	
Export facility?	√	√		√	√	
Add-on functions?	√	√	-	-	-	
Statistical tools	√	√	-	-	-	
Pattern analysis (add-on)	√	√	-	-	-	
Video-tracking (add-on)	√	√	-	-	-	
HCI logging (add-on)	√	√	-	-	-	
Acquiring/integrating external data (add-on)	√	√	-	-	-	

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PBR Web links

http://www2.rgu.ac.uk/subj/ats/research/home.html
http://www.sunderland.ac.uk/~as0bgr/learnmat.html
http://www.point.ac.uk/
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Advice to PhD Students

http://www.uow.edu.au/research/rsc/hdrhb/PhDNotNobelPrize.pdf
It's a PhD, not a Nobel Prize - the most difficult thing is to get to grips with is how un-amazing your PhD can be. This article presents the results of a study of experienced examiners' attitudes.

http://www.phinished.org/ Peer support for finishing a PhD. Might strike some as a bit too community/US-centric.

http://www.insidehighered.com/workplace/2005/11/30/tips - What They Don't Teach You in Graduate School

http://polaris.gseis.ucla.edu/pagre/network.html: Networking on the Network: A Guide to Professional Skills for PhD Students - long article, but focuses on the things you should be doing other than writing a thesis.

Appendix

Definitions and Terms

This part of the document is intended as a placeholder. The entries will be updated regularly.

Action Research

Action research grew out of attempts to acquire knowledge that would help change social systems. It was essentially a theory-based approach grounded in real life that, in simplified form, consisted of a cyclical process of conducting an investigation, taking action based on the results of that enquiry, followed by evaluation of the improvements in the situation under consideration. It has been developed further in organisational (Burke, 1994) and educational research (Stringer, 2003) and different forms have evolved.

Action research requires intervention in order to study impact of change on a given situation and thereby understand the situation under consideration. A number of forms have been developed in different domains since its origins in the social sciences in the 1940s.
Action Research Electronic Reader:
http://www.scu.edu.au/schools/gcm/ar/arr/arow/default.html

Data Collection and Analysis Methods

Conversation analysis

The study of naturally occurring talk-in-interaction in order to discover how we produce an orderly social world. CA provides an account of the machinery in operation within talk by a fine-grained analysis of talk. It does not refer to context or motive unless they are explicitly deployed in the talk itself. Conversation analysis has developed a highly sophisticated form of transcription notation (q.v.) to support its fine-grained analysis.

Discourse analysis

A study of the way versions or the world, society, events and psyche are produced in the use of language and discourse. The Foucauldian version is concerned with the construction of subjects within various forms of knowledge/power. Semiotics, deconstruction and narrative analysis are forms of discourse analysis. Further reading:
Hammersley, M. (2002), Discourse analysis: A Bibliographical Guide
http://www.cf.ac.uk/socsi/capacity/Activities/Themes/In-depth/guide.pdf

Drawing process analysis

A new kind of pen allows us to examine the drawing process in more detail. With a commercial digital pen and special paper, we can record a designer's pen strokes, and use its "instant replay" software to see how a picture was constructed.
Digital Sketching Website (in progress) http://www.uoregon.edu/~arch/digsketch/

Interviews

The interview technique is a systematic collection of verbal information. It consists in asking about users opinions and attitudes to get basic information with prepared questions asked by the interviewer. The answers are either written or recorded. The interviews can be structured or unstructured. The terms structured interviews implies that the content of the interview, in terms of the questions and their sequence, is predefined. Because of the structuring the interview offers the opportunity for more systematic collection data. The unstructured interview is more open-ended, and the interviewee develops the themes proposed by the interviewer. Further reading:
http://www.ul.ie/~infopolis/methods/interv.html

Survey

Surveys are used to collect quantitative information about items in a population. Surveys of human populations and institutions are common in political polling and government, health, social science and marketing research. Survey may focus on opinions or factual information

depending on its purpose. On-line resource about how to conduct surveys: http://www.managementhelp.org/commskls/surveys/surveys.htm

Observation

Observations can be conducted of individual behaviour or interactions among individuals, of events or of physical conditions within a site or facility. They require well-trained observers and detailed guidelines about whom or what to observe, when and for how long and by what method of recording. The primary advantage of observation is its validity. When done well, observation is considered a strong data collection method because it generates first-hand, unbiased information by individuals who have been trained on what to look for and how to record it. Observation does require time—for development of the observation tool, training of the observers and the data collection—making it a more costly data collection method than some of the others. Further reading:
http://www.acf.dhhs.gov/programs/ccf/resources/gbk_om/om_gbk_dcm.html

Protocol analysis

Protocol analysis is a rigorous methodology for eliciting verbal reports of thought sequences as a valid source of data on thinking. It is used to gather data in usability testing in product design and development, in psychology and a range of social sciences.Further reading: Ericsson, K.A. & Simon, H.A. (1993), "Protocol Analysis: Verbal Reports as Data", Cambridge, MA: MIT Press.

Software for Data Analysis

The need for handling large qualities of observational data has given rise to software applications that allow the researcher to collate the audio, video, text material and perform various forms of qualitative and quantitative analysis. Examples include:
NVIVO: www.qsr.com.au
ATLAS.ti http://www.atlasti.de/
Observer (by Noldus: http://www.noldus.com/products/
HyperRESEARCH: http://www.researchware.com/
INTERACT: http://www.mangold.de/english/intlatest.htm

Video-cued Recall

Video-cued recall or retrospective reporting is a method for collecting verbal data commonly used for investigating human cognitive processes. Because reports are made after the experience, this method is regarded as having less impact on cognitive processes than concurrent think-aloud methods. Reporting retrospectively, however, presents the risk that the participant will forget details and that their recall will be interpretively filtered. The video cued-recall method helps to avoid these pitfalls by using video to help the participant recall the detail of their experience and avoid selective interpretation.

In order to support your claims, you need to provide an appropriate form of evidence. Evidence can be acquired by three main approaches:

- Argumentation
- Proof
- Empirical

Evidence by Argument

- Argumentation

The act of forming reasons, making inductions, drawing conclusions, and applying them to the case in discussion; the operation of inferring propositions, not known or admitted as true, from facts or principles known, admitted, or proved to be true

Evidence by Proof

- Legal definition

Proof is the perfection of evidence, for without evidence there is no proof, although, there may be evidence which does not amount to proof: for example, a man is found murdered at a spot where another had been seen walking but a short time before, this fact would be evidence to show that the latter was the murderer, but, standing alone, would be very far from proof of it.

- Mathematical definition

Proof - a formal series of statements showing that if one thing is true something else necessarily follows from it, as in Euclidean Geometry or Mathematical Logic

Empirical Evidence

Empirical evidence is needed for research that bases its findings on direct or indirect observation as its test of reality. Evidence is acquired by:

- Observational Studies
- Situated studies
- People and technology interaction in context
- Practitioner accounts
- Personal reflections on activities and events
- Observer viewpoints
- Independent perspective on participant actions

Experimental Research

Experimental research involves testing hypotheses by manipulating variables within a controlled situation

- Experimental Design
- Hypothesis Testing
- Controlled Variables
- Laboratory Environment
- Statistical Tests
- Empirical Evidence

Gödel's theorem

http://en.wikipedia.org/wiki/Gödel's_incompleteness_theorem

Interactive Art and Research Practice

Studying art is recognised as a historical or critical scholarly activity rather than a natural subject for field research. By its very nature, interactive art has particular characteristics that necessitate a different form of inquiry to conventional areas of discourse in this field. The involvement of the audience in the active experience of the work, for one thing, is a radical departure from normal expectations of our relationship to art works. Some artists view audience interaction as an integral part of the work itself and are not only keen to learn from that behaviour but also wish to engage with the audience directly. In both audience and artist collaborative experience, a process of evaluation takes place, an activity that requires systematic forms of information, analysis and reflection. The evaluation of an emerging interactive artwork or system is analogous with the development of an interactive software system using user-centred design methods. In creative work there is a dual need: for best results, the work should be carried out in as realistic (naturalistic) setting as possible and, at the same time, the results should provide an opportunity to turn what is learnt into modifications in the evolving art system. There are some important constraints that differentiate the normal process of creating art from the research-oriented approach. Artists working in a studio are in a natural setting for them but for research to be effective the gathering of information is critical and this imposes constraints upon the way of working. Artists working in a public space learn from the audience's behaviour as they interact with the new work. How they learn and discoveries that inform their work is both a new area of creative practice and a source of knowledge for the wider community.

Practice-based Research

Practice-based Research is an original investigation undertaken in order to gain new knowledge partly by means of practice. In a doctoral thesis, claims of originality and contribution to knowledge may be demonstrated through creative outcomes in the form of artefacts such as painting, music, designs, models, digital media, or creative events such as performances, installations and exhibitions. Whilst the significance and context of that knowledge is described in words, a full understanding of it can only be obtained with reference to those outcomes. The textual description includes documentation of the research process, as well as textual analysis or explanation to support its position and to demonstrate critical reflection.

Practice-led Research

Practice-led research is concerned with the nature of practice and results in new knowledge that has operational significance for that practice. Such research includes practice as an integral part of its method and often falls within the general area of action research. The results of practice-led research may be fully described in text without the inclusion of an artefact. These are not practice-based doctorates of the type that include artefacts and works, although the focus of the research can be to advance knowledge about practice, or to advance knowledge within practice.

Practice-Based Research Methods

Practice-based researchers should devise a clear set of methods and techniques for collecting data and analysing data. An important initial task is to identify the key elements of their personal process which they intend to include in the data to be collected:

- Initial starting points or motivation for the project or work.
- Prior models or theories about how to create, perform or realise a creative artefact, act or outcome…
- Time frame for the work or works to be created, performed, realised.
- Role of the creative artefact in the creative process.
- Environments and tools required to achieved the output
- Information to be gathered about the thinking, methods, tools, resources, support, collaboration…
- Methods for collecting and collating data gathered
- Methods for analysing collated data
- Expected outcomes of the research process
- Relationship of the practice outcomes to the argument of the thesis.

Reflective Practice

The concept of ***reflective practice*** (Schön, 1983) provides a link between action research and practice-based research. Schön is concerned with an individual's reflection on his or her own professional practice as distinct from the early forms of action research which were concerned with situations more broadly. The combination of action research and reflective practice is an approach widely adopted in educational research by teacher-researchers who might equally call this form of research 'practice-led'. Today a new generation of researchers in the creative arts are pursuing both practice-based and practice-led research.

Usability Studies

ISO 9241 Usability Standard
"The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." (Harker, 1995)
Provides a definition of the qualities of software systems in terms of the benefit to users, tasks and organisational goals. Test criteria in the form of measures and metrics have been developed from the ISO base criteria of task effectiveness and efficiency and user satisfaction (Thomas and Bevan, 1995).