

Teaching-led research? Exploring the digital agencies of software in qualitative research

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Abstract

This work-in-progress paper explores the intersection of technologies and software with the practices, of qualitative research and qualitative data analysis. Computer aided qualitative data analysis software (CAQDAS) packages such as ATLAS.ti, NVivo and HyperRESEARCH are the focus of competing claims and critiques. We explore the positioning, continuities and disjunctures between manufacturers promoting their software, positioning in teaching and training materials and a range of views in the literature from critical to laudatory, as well as their prevalence in research on networked learning. The pre-eminence and influence of expository writing and paucity of empirical research underscore the relevance and potential contribution of this project. We argue that part of that contribution comes from drawing on insights from science and technology studies (STS) which offer a well-developed vocabulary and set of approaches for exploring the agencies and mediation of technologies in the practices of research.

The initial stages of the research project are outlined including online participant recruitment via facebook, methods of screen-share remote interviewing to generate rich data exploring software use, and incorporating accounts of researchers' practices. Their transformation and mediation to become "data" through different software packages are briefly explored.

Drawing on Latour's model of the two-faced Janus of science with which contrasts "science in the making" with "ready made science" we turn to consider ways in which this project can invert the usual trope of University education as research led, asking instead how a research project could become teaching-led. We briefly explore some of the initial approaches and opportunities this has created for opening up the black-box of research practices and shifting software training methods to engage learners in a process of discovery as "learning in the making" rather than being tasked with stepping through fixed frames of "ready made teaching".

Keywords

CAQDAS, Qualitative Data Analysis Software, Actor-Network Theory, Virtual Interviewing

Introduction

This work-in-progress paper explores the intersection of technologies and software with the practices of qualitative research, and by extension the way such practices are taught and learned. Specifically, it explores how computer aided qualitative data analysis software (CAQDAS) is used by researchers who are drawing on actor-network theory (ANT). Through networked and online methods of recruitment and data generation we are exploring the practices among this network of loosely affiliated researchers. Furthermore, we seek to explore how the ideas, considerations and demands of ANT as a methodological sensibility could enhance and shift the understanding of the agencies and effects of qualitative data analysis software. Consideration is then given to how the usual trope of University education could be inverted in practice to become teaching-led research rather than the more common phrasing of "research-led teaching". We conclude by exploring some of the implications, requirements and potential of adopting such an approach.

The contributions of this project are both empirical and pedagogical. Empirically it seeks to contribute evidence and description of the practices of a group of researchers with a shared set of sensibilities, interests and approaches. Pedagogically it seeks to open up some of these processes and to share them with learners rather than seeking to pre-package, prepare and polish them into a closed and black-boxed product.

Relating CAQDAS to Networked Learning Research Practices

Analysis of qualitative data forms a key element of research in networked learning. When coupled with a critical interest in and (similarly critical) enthusiasm for technological innovation and its potential for use in teaching and research, the ways in which software packages mediate, influence and support or shape such research have a direct impact on and relevance to this field.

To give empirical support to such an assertion we examined the networked learning literature using Google Scholar. By searching for the exact phrase “networked learning” along with key terms associated with the project and comparisons with software used in other approaches (e.g. social network analysis or qualitative approaches) we sought to gain a snapshot of not only how often such software is referred to but also how it is used. Scholar was chosen due to its indexing of key publications, especially the proceedings of this conference, which are excluded from search engines such as Web Of Science. Other useful features of searching with Scholar are automatic inclusion of stemmed words for search terms (e.g. ‘interview’ also matches ‘interviewed’ and ‘interviews’) and displaying results within a minimal context enabling sense and usage to be checked as well as any spurious matches.

This contextual snapshot helps add some validity to an otherwise rather crude method, albeit one which has the benefits of simplicity and speed which help to compensate for coarseness and overlaps. Searches were non-exclusive, thus a paper mentioning networked learning as well as the terms qualitative, quantitative and specific packages such as NVivo and would appear multiple times in each result. For example the paper by De Laat, Lally, Lipponen, and Simons (2007) mentions NVivo as being used in a mixed methods study with both qualitative coding and social network analysis using the package UCINET.

Area	Search Terms	Results	Example usage (selected from first 4 results as unreferenced illustration)
“Networked learning”	“Networked learning”	18,700	
Qualitative Data Analysis Software	“Qualitative data analysis software”	105	...questionnaire feedback and research conversations, and using qualitative data analysis software to assist...
	CAQDAS	33	We used computer assisted data analysis soft- ware (CAQDAS) to achieve this...
Qualitative Data Analysis Packages	NVivo	354	We used NVivo 1.1-3 ...for this work, and set up the categories in our two schemas as 'nodes'
	ATLAS.ti	181	Each segment representing the main meaning was coded and analysed using the computer program (ATLAS/ti) for qualitative content...
	MaxQDA	23	We coded the messages using the the CoI enhanced Teaching Presence model with the software MaxQDA ...
	HyperRESEARCH	16	A software tool, Hyperresearch , designed by ResearchWare for qualitative data analysis, was used in this process...
Quantitative Data Analysis Packages	SPSS	897	Using SPSS , the five-point Likert scale variables were each weighted to obtain their summed scores...
	STATA	135	Although SNA data can be transformed and exported to 'classical' statistical programmes, such as STATA or SPSS...
Social Network Analysis Packages	UCINET	221	... UCINET , the program that we used to carry out the analysis, also allows one to make different kinds of visualisations...
	GEPHI	76	Visualizations and sociometrics for this paper were computed in Gephi (gephi.org)...
	NodeXL	50	... diagrams constructed using NodeXL to identify 177...

The table above indicates that specific CAQDAS packages are mentioned in the networked learning literature; however aggregate terms “qualitative data analysis software” or the unwieldy acronym “CAQDAS” are less prevalent than mentions of specific packages. Surprisingly to us – given the prevalence of social networked analysis approaches in the field and at the NLC conference NVivo was mentioned very slightly more frequently (354) than the three combined SNA packages listed above (347). Less surprising was that the 4 specific CAQDAS packages added together (574) were mentioned only just over half as many times as the combined 2 most popular statistical packages SPSS and STATA¹ (1032).

As such this shows that qualitative data analysis packages *are* being actively used in networked learning research. Furthermore, it is reasonable to believe that the rate of reported usage– especially given that the usage can be so variable – will be only a fraction of the actual incidence of their use in practice.

However, the relevance of this paper and project to the field of networked learning extends beyond just the use of the software but more broadly to the way technologies are understood, theorised and positioned as they mediate research practices as Schaverien and Alexander (2008) note because “research itself is a paradigm case of learning”.

CAQDAS in context: competing claims and positioning

CAQDAS has been defined as “software packages which include tools designed to facilitate a qualitative approach to qualitative data” (Lewins & Silver, 2009). Popular software packages that are covered by this definition, and explored in the project, include ATLAS.ti, NVivo, and HyperRESEARCH.

These packages are often conventionally associated with particular approaches to engaging with data (for example coding data and retrieving the codes, abstracting and reducing data to themes etc.). However, the vendors are keen to promote these packages as not being tied to particular approaches but instead supportive of a range of methods, bringing substantial enhancements without methodological restrictions. Accordingly NVivo is promoted as:

“a place to organize and manage your material so that you can start to find insights in your data. [Which] also provides tools that allow you to ask questions of your data in a more efficient way.... By using NVivo to support your research project you can: Work more efficiently, Save time, Quickly organize, store and retrieve data, Uncover connections in ways that aren't possible manually, Rigorously back-up findings with evidence” (QSR International, 2015)

Similarly ATLAS.ti claims to represent:

“The next milestone in professional qualitative data analysis... one of the most powerful tools for qualitative research. [With] Managed documents, multi-document view, high-performance multimedia engine, intuitive margin-area coding for all data types, and much more.” (ATLAS.ti, 2015)

One of the reviewers of this paper queried the relevance of such claims by asking “won't sales people always attempt to describe their products by using exaggerated claims?”. This as a legitimate concern, however we argue that it is indeed relevant as there is a continuum from the promotion of features and their association with benefits and enhancements in manufacturers' texts through to the support material they offer for users and on to the activities, step-by-step demonstrations and other instructional texts that appear in books and workshop materials. Such a continuum is not only in the texts but also in their authorship with those writing these materials occupying several roles. For example, the ATLAS.ti user manual (REF) is largely written by Dr. Susanne Friese, who also wrote two textbooks (REF) and runs training courses and researches in this area. Similarly, the principle author of this paper has written materials and runs training in both ATLAS.ti and NVivo, writes for the ATLAS.ti research blog and is now employed by ATLAS.ti to run introductory webinars

¹ Another leading statistical software ‘R’ was not searched for due to definition problems and spurious matches.

and training for that company². As such the lines between “sales & marketing” and “education” are porous in terms of not only also texts and software, but also for people.

Given these continuities as we turn to examine such texts we see similar claims being made in different contexts, the primary textbook for learning NVivo suggests that:

Perhaps surprisingly, the tools described in this book are ‘method-free’, in so far as the software does not prescribe a method but rather supports a wide range of methodological approaches.” (Bazeley & Jackson, 2013, p. 4)

Similar claims populate other pedagogical and research texts:

It is important that software is seen as providing tools to support rather than drive analysis. Most programs have sufficient flexibility in design that they can be adapted to a researcher’s chosen methodological approach. ... [it]supports you to carry out your analysis by removing the limitations imposed by paper processing and human memory.(Bazeley, 2013, p. 18)

There is strong advice that CAQDAS packages should be seen only as an 'analytic support' to aid the process of analysis and not as a replacement for the intellectual role that is required of the researcher. (Spencer, Ritchie, Ormston, O'Connor, & Barnard, 2014, p. 292)

Claims of tools being “method free”, merely supporting and flexible enough to adapt to (rather than shape or mediate) existing research practices deserve some unpacking. Arguably, they are located in a somewhat uneasy position between the claims of the manufacturers we encountered above, and a more critical set of assertions, that we shall explore below, which suggest these software packages drive, dictate or otherwise substantially alter the methods and approaches to analysis.

Most of this writing acknowledges the presence of critical voices that have expressed concerns about the risks and challenges from the championing of QDA software. Bazeley and Jackson (2013) collect these concerns together as being focussing around four themes:

- the concern that computers can distance researchers from their data;
- the dominance of code-and-retrieve methods to the exclusion of other analytic activities;
- the fear that use of a computer will mechanize analysis, making it more akin to quantitative or ‘positivist’ approaches; and
- the misperception that computers support only grounded theory methodology, or worse, create their own approach to analysis. (p.7)

The most significant and widely referenced critical paper by Coffey, Holbrook, and Atkinson (1996) explores and in many ways codifies all of the preceding themes. A particular focus of its argument is that a code-and-retrieve paradigm dominates in QDA software with elements of grounded theory implicit in this. The influence of this paper is significant, as considered by Bazeley and Jackson (2013), who note that authors of the literature critiquing CAQDAS claim to be research-focussed however in practice “they consistently cited a single expository article by Coffey et al. (1996) rather than any actual research that confirmed these potential problems.” (p.181)

With this single expository article from 20 years ago, when the web was still in its infancy, still carrying such influence (at the time of writing it has 460 citations in Google Scholar, with 24 within the last year) there is a need for an empirical grounding to the discussion. We also suggest that there is a concomitant need for a more nuanced set of tools, words and concepts through which to explore this area and the way influence is manifested and practices are mediated by technology. Such a language needs to escape the binaries such as CAQDAS being a supportive “method free” tool versus a dominating “own approach” machine.

² The commencement of this role is forthcoming at the time of writing but is acknowledged here for openness about outside interests, the author is confident these will bring insight and opportunities for critical contribution rather than compromise of research and intellectual independence/

Susanne Friese offers some ideas for developing a more nuanced view - suggesting that software is more than merely “method free” and does indeed mediate the qualitative research process. Moreover, she suggests this requires an adaptation of method in response. Writing about her surprise at finding descriptions of cutting out paper and sorting it into piles in a book published by Bernard and Ryan in 2009:

The authors point out that the various procedures they describe can also be accomplished using a software package, but they do not explain how. Maybe the assumption is that it goes without saying: you simply load the software and it is immediately obvious how to adapt your old manual procedures.

I argue that this is not the case. Today, with the new possibilities available, we can approach data analysis in different ways. Therefore the methodology of analysis needs to be rewritten to exploit the benefits of a software-supported approach. Software changes the way we build up coding systems. The process becomes much more exploratory due to the ease of renaming and modifying codes.

Computers also change the ways we ask questions about the data. Data analysis procedures have become much more sophisticated because, for a computer, it is much easier to find things in the data and to output results. ... This creates new opportunities and also new challenges. (Friese, 2014, p. 3)

Developing a more nuanced view – a place for STS?

We take Friese’s ideas as a point of departure, a signpost of the need to re-specify the terms and points of reference for these discussions. Doing so would then contribute to better understanding, theorisation and exploration of both the practices of use and the transformative potential of using software in qualitative research. Furthermore, such developments could make a significant contribution in the spaces and places where qualitative methods are taught and learned. If we therefore seek to expand and develop more nuanced engagements with the way that technologies mediate research practices, where could we look for the resources to support such an endeavour?

We suggest that work from the interdisciplinary field of science and technology studies (STS) has made significant contributions to the explorations of the agency of software (e.g. Berry, 2011; Mackenzie, 2006), the practices of using and managing data (Star & Griesemer, 1989; Thompson, 2012a, 2012b) as well as engaging with broader questions and challenges around the work of method (Law, 2004).

Within STS the loose affiliation of approaches known as actor-network theory (Callon, 1986; Latour, 1998, 2005) or material semiotics (Law, 2009) holds particular promise. Through explorations of technological innovations and failures ANT has developed a rich set of intellectual tools, terms and concepts for exploring how technologies come to thrive and spread or fail and die.

Drawing on ANT ideas can therefore function not only as a resource for exploring such agencies and mediation, but also as topic for investigation. Through exploring how those working with ANT use, explore, theorise, account for and rethink the agency of QDA software there is an opportunity to extend and engage with the ways in which these packages are enrolled in and act upon research processes and analysis. Recent publications and contemporary work by Thompson and Adams (2013) offer some early steps to which we seek to contribute.

ANT oriented approaches also make demands of the researcher to acknowledge and consider the agencies in their crafting of research accounts. For example ANT seeks to be scale free with a focus on networks and connections rather than hierarchies. The use of a priori social categories such as class and gender (which can be enacted within QDA packages as “attributes” of cases) as having de facto explanatory power is challenged along with many of the assumptions about method and perspective. Conventional dualisms such as ontology/epistemology are rejected and there are numerous calls to incorporate and acknowledge the messiness and partiality of research practices rather than taming or excluding them (Law, 2004).

However in practice ANT and its successor projects are very elusive in giving indications of how analysis proceeds. Ethnographic methods are pre-eminent with the frequent call being to “follow the actors” (Latour, 1987) rather than “find the themes”. Yet, how this can, is, or could be done remains obfuscated with (perhaps appropriately) hints and clues in Latour’s (1996) semi-fictionalised research detective story *Aramis*.

Actor-Network Theory and (After) Method

The closest thing to any clear explication of method comes in Latour's book "Reassembling the Social" which proposes that analysis proceeds through the use of "four notebooks":

In keeping with the logic of our interest in textual reports and accounting, it might be useful to list the different notebooks one should keep—manual or digital, it no longer matters much...

The first notebook should be reserved as a log of the enquiry itself. This is the only way to document the transformation one undergoes by doing the travel. Appointments, reactions to the study by others...

A second notebook should be kept for gathering information in such a way that it is possible simultaneously to keep all the items in a chronological order and to dispatch them into categories which will evolve later into more and more refined files and subfiles.

A third notebook should be always at hand for *ad libitum* writing trials...

A fourth type of notebook should be carefully kept to register the effects of the written account on the actors whose world has been either deployed or unified. (Latour, 2005, pp. 134-135)

Latour notes in connection to the proposed second notebook that:

There exists lots of software nowadays that maintain this contradictory specification, but older hands like me have benefited enormously from the tedious rewriting of data onto cards. Whatever the solution, the movement through one frame of reference to the next is greatly facilitated if the data set can be kept at once unspoiled while still being reshuffled in as many arrangements as possible. (Latour, 2005, p. 134)

How such software is, or could be, used is not explored further. Considering and exploring how such an approach has been realised and could be developed is therefore an empirical preoccupation for this project, with initial explorations and a more extended consideration with ATLAS.ti (Wright, in press). It is to that project that we now turn.

Project overview

The small-scale research project seeks to explore how ANT-oriented researchers use technologies in their research practices by exploring the following questions:

How do social scientists studying science, technology and mobility in their research consider, engage with and account for the effects of using CAQDAS on their investigations and analysis?

- What influences choice of software?
- Which tools and options within CAQDAS are adopted, and how are they used?
- How is the use of software accounted for in public research outputs?
- How is the use of software accounted for in private research outputs?
- How are breakdowns, limits and workarounds understood, drawn on, incorporated or theorised?

Participants were current researchers, recruited through a poll posted to the very active and informal Actor-Network Theory group on Facebook³, the majority of whom are engaged in educational research.

The method used to explore practices with using CAQDAS was primarily through screen-share interviews enabling elements of remote participant observation in addition to semi-structured interview questions. The researcher conducted these interviews from either his office or home, with participants likewise in their office or home. Several different 'webinar' platforms were used in the course of the interviewing - with the experiences, mediation and breakdowns also documented and incorporated into the research as mediating technologies to be accounted for rather than neutral channels to be used and black boxed. The interviews were intended to be in a "naturalistic setting" where the practices of interest were done, with some of those practices observable and recordable. The use of screen-share in many of the interviews allowed the participants to give virtual tours,

³ At <https://www.facebook.com/groups/220398254694166/>

demonstrations and show their use of software. This enabled interviews to be framed by, and responsive to, the software and associated practices with a rich audio-visual interview record that incorporated not only dialogue but also visualisation, exploration and collaboration. Such practices are well established in technical support settings, however a demonstration of their potential for researching user engagements with digital tools and spaces is an area of contribution to methods for this project.

In addition to the interviews, these are supplemented by participants' existing accounts of CAQDAS use. These include elements of researchers' CAQDAS projects as a whole project or selected component parts (e.g. code lists, comments, memos, reflections and research journal entries) as well as public accounts in publications. These are further supplemented with reflexive auto-ethnographic recording of the progress of the project and use of technologies.

Thirteen people took part representing a range of experience and engagement with CAQDAS software. These included three participants who did not use CAQDAS packages at all, instead assembling other software and hardware tools for their analytic engagements with data. The other ten participants used a range of commercial CAQDAS packages. Many of these were supplemented with other software to support visualisation, transcription, writing or making links between qualitative data, and/or engaging with different data sets in different ways. These extended assemblages spanned from using digital notebooks through to computerised natural language processing of electronic texts using the Actor-Network Text Analyser (ANTA). Other software was employed to organise data and create visualisations as social network diagrams for exploration in Gephi, through to exploratory engagements with engaging non-human AI software agents for classification and retrieval of research literature and data using DEVONthink.

The reflexive, iterative, technology-mediated development of data analysis procedures informed by the practices and tools from the interviews is a key focus of the methodology. The practices engaged in by participants (for example thematic coding and retrieval) are being deployed in analysis of their accounts. A key aspect of this is conducting the analysis in a range of available CAQDAS packages. This is not only part of the investigation - comparing the mediation and effects of different software on the process of analysis, but also opens up interesting and rather unique possibilities for developing not only research methods but also pedagogical resources and practices.

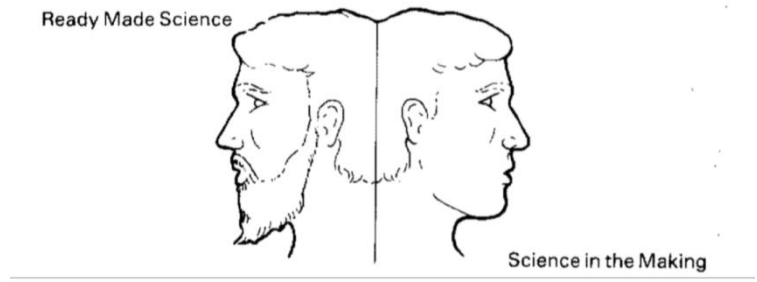
A key element of participant recruitment and informed consent was to enable the re-use of data for the purposes of teaching. Applying this research to practice is a key concern, with a key element of practice being the way that CAQDAS software is evaluated, selected, learned and applied to other research projects. The topic of this research makes for a particularly perspicacious dataset - with the topic of the data (how experienced researchers use QDA software and issues they have encountered) having a particular relevance to those learning how to use such software. As a teacher I could (and do) stand up and warn students about the problems of cloud storage synchronisation and CAQDAS databases, however reading an interview segment and coding it as a practice exercise where a researcher describes losing their whole PhD project dataset due to DropBox synchronising carries that message with far greater impact!

Opening the black box of computer training – towards teaching-led research?

We conclude by considering some of the early approaches to using this dataset in teaching, and using teaching CAQDAS workshops as a vehicle for engaging in the research. One of the key challenges for supporting and developing postgraduate students and research staff in using CAQDAS software is managing the tension between control and freedom. The greatest relevance and value of such sessions typically comes from a participant working with their own data and research questions so that the activity in the sessions is directly connected to their developing work. However, enabling such an approach radically decreases the ability to control for outcomes or illustrate them to show successful completion. How can you say “your screen should now look like this” if what is on screen is different for each participant?

This has been an on-going struggle – the easy route out is obviously to move to a more lock-step approach with sets of more-or-less demonstrate-drill-practice routines working with set data through set processes producing a pre-determined outcome. However, such an approach is pretty strongly rooted in a behaviourist model of learning with emphasis on repetition, fixed outcomes and measurable success or failure against a pre-existing or

pre-determined ideal model. We see a real challenge in this from two key viewpoints. From a pedagogical viewpoint there is the importance of a more constructivist engagement with an active student engaged in a process of directed enquiry. From a more STS viewpoint there is a question about how this represents and packages research processes. Should learning be, and research be represented as, “ready made”: clean, neat, ordered and resolved, stripped of the uncertainties, failures and explorations of their making? Alternatively could some of the actual messiness of the practices of doing research (and concomitantly the messiness of learning) be somehow allowed in and even celebrated? This is to develop further the “slow hunch” of Bigum, Rowan, Hamilton, Haxell, and Wright (2014) from the previous networked learning conference, and seek to apply some of those ideas to the topic of this project and incorporate those developing insights into the authors’ pedagogic practices. We suggest that behaviourist models “black box” the learning process and focus instead on the input/stimulus and output/correct answer. Likewise, science – when it is represented after the event – also does this, an idea explored by Bruno Latour:



Uncertainty, people at work, decisions, competition, controversies are what one gets when making a flashback from certain, cold, unproblematic black boxes to their recent past. If you take two pictures, one of the black boxes and the other of the open controversies, they are utterly different. They are as different as the two sides, one lively, the other severe, of a two-faced Janus, 'Science in the making' on the right side, 'all made science' or 'ready made science' on the other. (Latour, 1987, p. 4)

This two-faced Janus seems particularly prevalent in the specific teaching and learning setting of software training. Within such courses and classes the revelatory trope so associated with the Children’s BBC TV series Blue Peter of “here’s one I made earlier” becomes a dominant resource. Teaching / training often becomes oriented towards resource creation and a focus on versions, control and the use of fixed screen shots and steps to follow in order to create an ideal model for the trainee to compare their progress against. That progress is then self- or tutor-evaluated as right or wrong, complete or incomplete, supported by the “here’s one I made earlier” model to enable time-shifting and a jump-cut to a future where the time-consuming work has been done, and cleaned up.



And all of a sudden it’s gone... A model for software training by Anthea Turner on Blue Peter?

Our suggestion is that while these approaches have some merit and may often be a necessity there is an opportunity to recognise and identify spaces for opening up the black box of each ready-made example and consider alternative approaches to their construction and presentation. Such an approach could also serve as a useful reflexive inoculation against shifting from a critical engagement with the complexities of learning into the sort of sales patter of a rehearsed product demonstration which seeks to gloss over, exclude and prevent any intrusion of the sort of complexities, challenges and interruptions that punctuate actual research practices.

Such an approach then involves engaging in analytic approaches reflexively and seeking to document them not only as a reflexive account but also as potential examples and approaches to be demonstrated or applied anew when teaching (rather than as a rehearsed and restricted re-treading). Teaching in class then involves working “for real” with real data. Students can be invited to contribute, make suggestions or (if they are not working on their own data in parallel) apply their own insights to the project data and thus creating potentially new and different insights and ideas.

Initial steps with taking this approach in the classroom have been met very positively. From the rapport of shared commiseration that *none* of us have got as much done as we’d hoped on our research projects, to being able to share genuine enthusiasm of discovery and engaging with data, through to showing some of the messiness and variations in practice working there are many benefits. Early attempts to put this in to practice through working with project data in teaching and using that teaching to lead research is proving to be a far more exciting, challenging and open than exhuming the usual closed cases and pre-ordained outcomes.

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