'That's Not Quite The Way We See It': The Epistemological Challenge Of Visual Data

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Abstract

A review of books published in the last 20 years on visual methods shows qualitative processes and interpretivist epistemologies dominate. This paper challenges this assumption. It explores arguments about the nature of visual data, the applicability of what is considered epistemologically appropriate and the decision making which may accompany any appraisal of methodological process in education research. It outlines what is believed to be a key challenge of visual methodology: how to combine large scale, open-ended data sets with acceptable and rigorous analysis techniques. Using exemplification from three existing visual data sets, the affordances and constraints of the research process will be explored. We will examine the way the visual can be incorporated and give some critical reflections on the role and use of visual methods to fulfil different research intents, paying particular attention to the challenges of the analysis stage. Mixed methods practice and theory will be drawn on to unpick potential challenges to what might be considered epistemologically appropriate. By completing this enquiry we start to reflect critically on the nature of the different processes and the epistemological implications that arise.

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Introduction

Visual research is concerned with the production, organization and interpretation of images (Prosser 2007). The use of visual data is not new, but its use has been growing steadily in educational research (Fischman 2001). This is fuelled by new technologies as well as the creativity of researchers using visual approaches in new and different contexts so as to shed light on old debates (Rose 2005). Visual data includes all types of visual communication including photographs, drawings, signs, symbols, video, diagrams, cartoons, paintings and patterns. Prosser (2007) argues for three categories for the visual element:

- part of the data collection tool design (researcher generated),
- generated through the data collection process (participant generated) or
- the data itself (researcher found).

We start from Prosser's categories, but note that the visual element is the source, whereas we believe visual approaches can be incorporated at any stage of the research process and can aid synthesis, analysis and/ or dissemination. This diversity makes visual methodology complex.

As a developing area of practice, visual approaches need to be codified with other methods and evaluated alongside other methodological debates. The dominance of word and number based research (in modes of education investigation, evaluation and dissemination) is such that the acceptance of visual methods remains a challenge (Fischman 2001). Furthermore a current lack of guidance about how best to use visual data (Rose 2005) mirroring a lack of consensus amongst social scientists more generally (Prosser 1998) provides a particular difficulty. A language needs to be developed to support the way in which we talk about visual methods and their application in relation to other data collection techniques, methods and methodologies. Yet it needs to be adaptable enough to cope with the complexity and flexible enough to accommodate future developments. This is especially important around analysis,

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which Prosser (2007) argues is a particular challenge, and a reason why visual methods are not taken seriously.

The range of data included in the field means it is difficult to apply a single set of characteristics. This means considering visual methods as a distinct and coherent category is problematic. Additionally new visual processes are constantly being developed. New technologies are playing a significant role in the application and advancement of the field, for example digital cameras have increased the scope of photography as a data source (Bond 2007).

Symonds and Gorard (2010) argue that categorizing anything to do with methodology is problematic and that data collection tools should not necessarily be considered as paradigmatic. They argue that the dominant discourse within education research hampers the development of research as a craft with the example that scrutiny of any data collection tool yields doubt as to its placement in one group or another; leading to the question, is any data truly quantitative or qualitative? The irony seems to be that while visual methodology is developing with increased use and influence on the practice of education research; the very process of theoretical categorisation may be inhibiting further development and wider acceptance.

This paper will problematise issues around the application and use of different types of visual data in education research. It will question how epistemological assumptions are assigned and the way in which this methodological alignment is more or less maintained through the different stages of collection, analysis and reporting. It will explore how visual data can be used to fulfil a range of research intentions and use practical examples of data sets collected and analysed to fulfil a variety of purposes across a range of contexts to highlight areas of contention.

Background

As a starting point a review of sources published on the topic of visual methods in the last 20 years was completed. We found that within the social sciences visual methodology is most often included as a subset of qualitative methods (Prosser 1998), but the way it is considered and codified against traditional epistemological standpoints has changed and developed over time (Stanczak 2007). The balance between whether an image should be considered a construct or a record of events (Van Leeuwen and Jewitt 2004) is particularly interesting when placed against epistemological assumptions. With photographs, for example, when the shutter comes down they provide an apparently objective representation of what occurred at that point in time. Photographs are regularly used as evidence in criminal proceedings or to capture events in scientific experiments. However it is also agreed that there is a certain amount of subjectivity influencing the way that an image is constructed and how it is interpreted after it has been taken; thus leaning towards more interpretivist perspectives (Collier and Collier 1986). Based on these ideas Stanczak (2007) argued that photographs sit at an interaction point between objectivism and realism: they can fulfil multiple intentions for a range of researchers. This therefore allows for some epistemological flexibility we feel is useful in taking visual methodology forwards.

As pragmatic education researchers, we came to explore the visual dimension when thinking creatively about what could be included as evidence (Matheson 2008) when researching effective learning across all stages of education particularly when researching young children's perspectives. The repertoire of tools for data collection has been particularly limited when the perspectives of young participants are considered (Thompson 2008). As

many pedagogic activities in the primary age phase rely on visual outcomes, their inclusion seemed an obvious extension of our research practice. These outcomes could only be included as empirical data when the definition of evidence was widened beyond word-based and numerical as suggested by Eisner (1997). By rethinking outcomes of learning activity and developing shared understandings with practitioners of what could be included as evidence, we developed new ideas about how data could be collected, analysed, validated and reported to support both pedagogic, policy and research needs.

During this initial work we have been challenged by a number of issues that have led to the production of this paper. At data collection we have found visual methods a successful way of accumulating large, complex samples: the process tends to be accessible and inclusive for most respondents, but the open ended nature of each visual item can be overwhelming. We have explored the way in which visual data can be restricted to focus the range of possible interpretations and have used a variety of different processes to synthesise, analyse and represent the data. In particular we have found that mixed method ideas drawing on both qualitative and quantitative traditions are useful. In a previous paper (Wall *et al.* in press) we showed how deductive and inductive approaches to visual data may provide complementary insights and how they can be used to interrogate the data more fully. Increasingly, however, while we have success in talking to teachers about our findings, the visual methods community has been less accepting, and we consider that epistemological assumptions are influencing this opposition.

We suggest that if we aim to maximize the potential for this relatively new research genre then such epistemological pigeonholing is detrimental in many ways. We will explore this point from three perspectives. Firstly, we will investigate the extent to which visual data can be assumed to be a homogenous group with sufficient shared characteristics to be

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considered together. Secondly we look at the impact of different stages in the research process, how it can impact on visual elements and how they are used and changed through the process. Thirdly, we will explore the extent to which emerging understandings from mixed methods can support the development of visual methodology. This provides a conceptual frame with which to look at three data sets.

The field of visual data: The first issue when considering the category of visual methods is the wide variety of texts and processes included in it. The vast majority of work using visual data has been done in visual anthropology looking at photographers and film-makers (for example, Banks 2004; Prosser 1998). In education research the field is much less developed (Fischman 2001) and while photographs predominate (for example, Schratz and Steiner-Lőffler 1998; Cremin *et al.* 2010), other approaches such as research with children's drawings (for example, Whetton and McWhirter 1998), investigation of learning models (Copperman *et al.* 2007) and the use of concept maps (for example, Somekh and Mavers 2003), occur but are less frequent in the literature. This is surprising considering the visual culture of schools and the role of images and other visual symbols in every day routines and interactions, especially for primary schools, (Thompson 2008).

If we just consider drawn outputs there is a vast range of potential avenues to be explored, from children's drawings through to graphic novels, from graffiti through to diagrammatic representations. If you then include the different ways these drawn texts can be used against Prosser's three categories and the different points at the research stage in which they can be incorporated, then this diversity increases significantly. Perhaps one of the reasons why education research has not exploited this transfer is the breadth of possibilities, as the capacity to make manage this is challenging.

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There is a further complexity in the depth and breadth of each individual piece of visual data and the way it is used in research. With regards to depth, images are constant and lasting; they are easy to store and revisit. This means, as Galman (2009) showed in her work with graphic novels that, 'a text can have multiple and conflicting meanings' (p.204). Technology can be used to capture, review and replay texts, thereby facilitating deeper and different reflections (Mehan 1993). We have to ask whether it is suitable to consider all of these outputs in the same light. While argument about breadth and depth might neatly correspond to qualitative approaches, how should we deal with issues around scale which can be equally apparent within large visual data sets?

The field of visual data is extended by the ways each individual text can be used in connection with other pieces to fulfil different purposes. This can be relatively small scale, for example an exploration of commonality between two drawings by the same child as part of a story book (Galman 2009), or it could involve the examination of a sample of images taken at one time to investigate the themes and trends present across the texts (Lodge 2007), or it could be a comparison of data sets to evaluate an intervention (Ritchart *et al.* 2009). These different designs open up new challenges. Depending on the intent of the text and the way in which it is being used, then the extent to which the breadth and depth of each individual text can be considered has to be seen in relation to the sample as a whole.

Further challenge comes from the new and developing technologies that have rapidly increased the potential size of the visual data sets: with digital cameras it is relatively easy to take large numbers of images. Other examples, which can be generated on an almost equivalent scale, such as posters of learning dispositions (Hall and Wall 2009), provide additional challenges, particularly when generated by research participants. If qualitative analysis techniques are going to be used then, pragmatically, decisions need to be made over

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which are included and which are not in the final analysis (Wall *et al.* in press). One solution is sampling or using a purposive sub-set, but selecting an appropriate sub-set is not an easy decision.

Incorporating the visual: The visual element in visual methods may be at any or all stages of the research process: data collection, analysis, synthesis, or dissemination. Prosser's categories (2007) are useful to separate the different characteristics of visual data, but these categories are most helpful if applied at the start of the research process. When further use is made of an image, either in a secondary data collection stage, analysis or dissemination, then the boundaries start to blur and a data type can migrate from one category to another. For example, a drawing that was completed by a child as part of a topic on 'All about me' might be included as researcher found data in a project about families. Yet if the child is asked to annotate that same image to clarify interpretations or it is combined with other images from the same or other children as part of a dissemination strategy, then does it not transfer to participant generated or researcher generated (Prosser 2007). From a pragmatic standpoint we do not find this potential transfer or blurring of boundaries problematic, but it is important to recognise as it has an effect on the way data might be classified and used.

There seems to be agreement that if visual texts or artefacts are included in some way at data collection stage then the study should be categorised as visual methods. However when they are included later in the process it becomes a matter of emphasis and interpretation. We would particularly like to focus at this point on Prosser's (2007) 'researcher generated' category. If we accept that the visual can be included at any stage in the research process then this becomes more problematic. Should the point at which the visual element is included determins extent to which it can be classified as contributing to visual

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methodology? So if a visual element is used at a later stage as an output of the analysis, for example, a graph or diagram (which excludes very few studies), then to what extent should it be classified as visual methods? This might seem like a very naive question, but drawing the boundaries around visual methods is challenging.

This is particularly the case at the analysis stage. Visual methodology draws on a range of analytical perspectives from a number of disciplinary domains including sociology, media studies, psychology and cultural geography in order to investigate a wide range of research themes ranging from community, power, and gender studies, to spatial relationships, participation and involvement. There is considerable diversity in the different ways of looking at visual texts of different structures and processes which have been developed for looking at visual texts. From visual anthropology for example, semiotics (Peirce 1934) and visual grammar (Kress and Van Leeuwen 2006) are commonly used. The qualitative paradigm introduces grounded theory and construct elicitation based processes (for example, Harper 2002; Hultman and Taguchi 2010). In addition there are some occasions where quantitative ideas have been drawn on, for example, frequency counts (Galman 2009) and, more rarely, statistical examination (for example, Newton and Newton 1999; Ritchart *et al.* 2009).

Drawing on understandings of mixed methods: As education is a discipline where practice is fundamental (Hammersley 2003), a common objective is for students to become better learners. This means that practitioner or policy audiences are often privileged in the way that research is designed and reported (Elliott 2001). Issues arise because the needs of these audiences often differ or create tensions between approaches. For example, funders and policy makers tend to privilege quantitative data as 'better' evidence of impact; while practitioners are more likely to look for qualitative interpretations that consider the

complexities of relationships and learning environments that influence teaching and learning interactions. The alternative, which is increasingly common, is to try and fulfil multiple purposes resulting in an alignment with mixed methods (Alise and Teddlie 2010).

We have worked with a wide range of research designs (Baumfield *et al.* 2008), and tend to identify with this mixed methods perspective, but this has been especially the case with visual approaches. We argue it is not enough to consider visual methods, or even the narrower view of visual data collection methods, as solely qualitative since this limits its potential contribution. The increasing importance of impact, the need for comparison and accumulation, for evaluation and to influence policy has meant that we feel it most appropriate to draw on the full range of methodological thinking to interrogate and interpret the data and to elicit the most appropriate outcomes.

Some support for this view can be found in the development of mixed methods research. Theorising around mixed methods has tended to follow two directions: mixed methods as research design or mixed methods as philosophical stance (Creswell and Plano-Clark 2007). Both perspectives provide insight into the way that a new approach may become established. This has some parallels to the process we see needed in the development of visual methodology. Ideas related to challenging paradigmatic assumptions (Alice and Teddlie 2010) and thinking about 'research as a craft' (Symonds and Gorard 2010) ring true for us when considered in relation to visual methods. For example, we believe that just as mixed methods have provided new and alternative answers to research questions (as well as new ways of asking old questions); have answered questions which may not previously have been answerable; have encouraged researchers to cross boundaries and explore different standpoints; encouraged multiple world views; and provided more 'practical' opportunities in terms of opening up a full range of tools to answer a research question (Creswell and

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Plano-Clark 2007), then new ways of thinking can be prompted by considering and using visual methodology. In particular we feel that mixed method theorising around the analysis stage has been useful in supporting explicit examination of the different stages to this process, unpicking how different data can be used in combination (Greene 2007; Onwuegbuzie *et al.* 2008). We argue therefore that these ideas may be useful in shedding light on some of the issues around the process of analysing visual data.

At this point it is useful to reflect on the issues that have emerged. The positioning of a piece of research depends on the epistemological and paradigmatic assumptions of the researcher. The predominant standpoint for visual methods in the literature is interpretativism relying on qualitative techniques. However we have shown that visual methods, due to their diversity, the range of intentions which can be fulfilled and the evolving traditions in education research more generally, is likely to be limited if this standpoint is adopted too rigidly. There are different key points in the 'pathway' which we argue can lead to productive and insightful new perspectives that can enhance better understandings. These points are:

- The intent with which the data is collected is fundamental and has a strong relationship with the potential audience. It impacts on the type of research question asked and the nature of the visual text chosen to answer them.
- The research design then dictates the nature of the relationships between the 'texts', their groupings and the sampling strategy used.
- The research process may provide further manipulation of the visual, particularly around analysis and synthesis stages that resonate with the use of visually based approaches.

We are not advocating one pathway instead of another but rather trying to show how by presuming that visual methods fits only within a specific standpoint it limits the choices and

this means that the full potential cannot be fully exploited. If each of these points is considered pragmatically then a wider landscape should emerge.

Method

In this paper we use three visual data sets as a basis for our discussion, each representing one of Prosser's (2007) three types of visual data. All these data need some level of interpretation but, depending on the scale and intent with which the data is generated, synthesized and analysed, all vary quite distinctly in the nature of the approaches that are applied. The examples will explore processes which have positivist, interpretivist and mixed method origins and as such will focus the discussion on the affordances and constraints of each aspect of the process. This critical reflection will allow us to identify and examine themes we feel exist across the visual methods domain.

The three data sets have been collected across one large national project in England exploring Learning to Learn across different educational sectors. The Learning to Learn in Schools Phase 3 and 4 (Wall *et al.* 2010) was a collaborative practitioner research project which ran from 2003 until 2010 across a network of 50 schools in four regions. Over the past three years the model has been expanded to include not just teachers in schools but also those in further education and higher education sectors of the English system (Wall et al. 2010; Robson *et al.* in press). These projects rest upon an approach to research and knowledge construction developed over the last 20 years by academics who have all spent time working at the Research Centre for Learning and Teaching at Newcastle University (Baumfield *et al.* 2008). It is a model which emphasises partnership, trust and complementary roles in research undertaken collaboratively by HE researchers, local

authorities, schools and colleges (McLaughlin and Black-Hawkins 2004); thus it represents part of a developing trajectory of a dispersed research-informed practice community (Lieberman and Grolnick, 1996).

The resulting project network does not necessarily bring together teachers from the same geographical areas, subject disciplines or from specific phases of education, but rather it constitutes teachers from a wide range of contexts with a shared focus on learning: the desire to make the process of learning explicit and prioritise resulting enquiry. Within this project visual data has been used to fulfil a number of different purposes. Indeed in many cases the visual has been explicitly chosen as a way of crossing barriers and including a range of participants as part of the enquiry (Stanczak 2007).

We have purposefully not chosen to include the typical visual data form of photographs in this paper. This is for two connected reasons. First working with teachers in the UK currently means that we have to acknowledge and be sensitive to fears held around the use of photographic images of young children. Regardless of official guidelines, this is something that our partners were concerned about and so their use was limited. Secondly we wanted to expand and explore a wider range visual data. Working in partnership with teachers, the relationship between research and pedagogy was paramount and so thinking about the interation and new opportunities this opened was important for us. Therefore the data chosen for this paper are:

- **Diamond ranking** (for example, Connor 1991; Aspinwall *et al.* 1992) is used to represent participant generated data. It was administered across a diverse group of teachers to elicit views of learning across sectors of the education system (Towler *et al.* in press; Woolner *et al.* 2010). It needed to be relatively efficient to complete but to allow comparisons to be made. Analysis techniques were mixed method including both quantitative and qualitative processes. This

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data could be classified as participant generated using Prosser's (2007) types of visual method.

- Representing researcher generated data (Prosser 2007): we will focus on **network diagrams** (Fox *et al.* 2007; Hall *et al.* 2010). These data were chosen in the projects to explore and represent professional communities of enquiry across education sectors. The nature of this process was to present survey data in a visual way to support a validation process with project participants. The analysis procedures were qualitative and drew on phenomenological techniques to draw out themes and understandings represented by the network.

- Researcher found (Prosser 2007), **pupil views templates** (Wall and Higgins 2006) are designed to be a worksheet type activity which can be used as with either pedagogical or research intent. In the projects these templates were used by teachers to explore children's views of learning across schools leading to a sample of over 550 completed templates. In that this process has achieved such a large sample size deductive, positivist approaches to analysis were drawn on as a way of interrogating the data and providing comparisons across the data set.

Each data set provides a different perspective on the application of visual methodology. The three samples will allow examination of the conceptual stages previously identified, the intent with which the data is collected and the research design and process. In addition we will explore the way the visual was incorporated and give some critical reflections on the role and use of visual methods. By completing this enquiry we can start to critically reflect on the nature of the different processes and the epistemological implications which arise.

Diamond Ranking

INTENT: Diamond ranking (for example, Connor 1991; Aspinwall *et al.* 1992) is a technique used to explore perceptions. It supplies a visual structure (of a diamond, see figure 1) for

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respondents to rank statements or images in response to a prompt question. The structure is loose enough to generate dialogue, diamond rankings are often done as part of a discussion, but tight enough to allow some systematic analysis of the responses. The visual prompt of the structure supports the respondent in thinking about their order of priority, from top to bottom, but allows for their thinking in the middle to be less clear.

Top
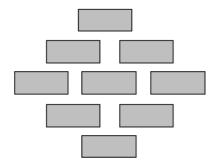
Upper

Middle

Lower

Bottom

Figure 1: Diamond ranking activity

We used diamond ranking to explore the perceptions of teachers from different regions and education sectors in England who were involved in the L2L project network. Opportunities to share understandings of learning across sectors are rare in England. There is a common misconception that same 'age and stage' is essential for effective professional learning, yet this network was widely cited by participants as the most effective learning experience they had ever experienced. Therefore we were interested to know whether they had shared underlying conceptions of learning which facilitated this success, and, if they did, how these ideas co-existed with the specific practice knowledge they held which was relevant to their own teaching contexts.

DESIGN: The questions above were considered through the use of a diamond ranking activity incorporated into a comparative design. We wanted to focus on the aspects of learning considered to be general and those perceived to be valued within the teachers' educational

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sector. The diamond ranking exercise used nine statements based on the themes, ideal',
'shared' and 'school' learning, identified by Hadar (2009) and previously introduced to the
teachers (table 1).

Table 1: Nine statements used for diamond ranking activity

'School' learning descriptors:	Item letter
You need to be able to remember it in the future.	A
Listening to what you are being told.	B
Practising so that you can do something correctly.	C
'Shared' learning descriptors	
Using the skills you have in a different situation.	D
Understanding how ideas are connected.	E
Adding new knowledge to what you already know.	F
'Ideal' learning descriptors	
Finding ways to apply knowledge in real situations.	G
Developing your own view in relation to the ideas of others.	H
Putting together what you know and seeing something new.	I

PROCESS: The teachers did the diamond ranking exercise twice. They arranged one set of
statements in response to the title, *The learning that is valued in my sector of education* and
another set in response to the title, *The learning that is important for more general 'life-long'
learning*. Ten diamonds were completed by school teachers (from primary and secondary
schools), seven were completed by teachers from FE and eleven from HE teachers. The
results of the diamonds were calculated based on the position given to each of the nine
statements (see figure 1). This process meant that a comparison of frequency counts for
each statement in each position could be made across the different sectors as well as a
comparison of individuals' responses for each statement to the two prompts, revealing how
their perceptions of learning in their own sector compare to their views of lifelong learning
(table 2).

Table 2: Pattern of significant differences for each sector

Statistically significant differences between

Statement		sector and general learning ranks			
		All sectors N=28	School N=10	FE N=7	HE N=11
A	You need to be able to remember it in the future.	p=0.029	p=0.046	ns	ns
B	Listening to what you are being told	p=0.001	p=0.027	ns	ns
C	Practising so that you can do something correctly.	p<0.001	p=0.012	ns	p=0.009
D	Using the skills you have in a different situation	p=0.014	ns	ns	ns
E	Understanding how ideas are connected	ns	ns	ns	ns
F	Adding new knowledge to what you already know	ns	ns	ns	ns
G	Finding ways to apply knowledge in real situations	p=0.008	p=0.010	ns	ns
H	Developing your own view in relation to the ideas of others	ns	p=0.023	ns	ns
I	Putting together what you know and seeing something new	p=0.008	p=0.016	ns	ns

INCORPORATING THE VISUAL: As a participant generated activity, diamond ranking was chosen as it fulfils similar purposes to traditional techniques such as an attitude questionnaire: to systematically elicit respondents' beliefs. The visual element, the structure into which the statements had to be sorted was chosen to be more motivating for the respondents and to add a dimension of fun to the data collection exercise. It was rationalised that this technique was different enough to increase our response rate and the authenticity of the answers. It aimed to stimulate conversation between the teachers so as to ensure thought around the topic area, an objective that might have been achieved through the use of focus groups, but within the more economic and structured parameters of a survey. Indeed, a ranking activity such as this might be expected on a traditional questionnaire. But the diamond meant that the ranking process was more flexible in accommodating the complexity with which teachers tended to view learning and teaching, while keeping to a

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format that allowed an analysis procedure that enabled comparisons. In that we asked for individual outcomes the process supported comparisons between the different cohorts included in the sample. The way it was administered allowed for some generalisations to be made despite the small sample size.

CRITICAL REFLECTIONS: The diamond ranking process allowed us to complete multiple comparisons of perceptions quickly and efficiently. The data collection process was completed in half an hour and as such was efficient in its administration. The time constraints however did limit the extent to which we captured the wider conversations around the topic stimulated by the activity. While this was acceptable within the scope of our target question, it does provide areas for further exploration: what were the rationales given by the teachers for their final ranking of the statements? A little more time could have allowed us the space to support the respondents in annotating their diamonds. We did manage this validation somewhat at a later date, by showing the quantitative analysis, in the form of stacked bar charts, to the teachers (Woolner *et al.* 2010) which led to some interesting interpretations but this still meant a gap of a couple of months between discussions.

By using the diamond to structure responses we limited the ways that the teachers could respond to our questions. This aimed to increase the reliability within the context of the comparative design, however in that we did not close down the response structure completely then the extent to which this was useful and appropriate has to be questioned. Did the flexibility gain enough in terms of validity to balance out the decreased reliability? In addition, we have categorised diamond ranking as participant generated in Prosser's categories, but given that the respondents had to fit in with this pre-prepared, researcher generated, pattern, this perhaps makes that categorisation misleading. This illustrates the

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diversity that exists in the boundaries placed on the participants' involvement and influence on a visual data source.

Network Diagrams

INTENT: We wanted to measure, as Little (2005) puts it, the potential for exchanges at the annual project residential to leave 'footprints on practice' and examine their effect on teachers' research practice as well as teaching practice. The residential was the only forum in the project where all the teachers across regions and sectors had the opportunity to meet face to face. It meant partner teachers were able to share common understandings and explore differences but we also saw it as an opportunity to capture data on network learning 'live' and as it happens. Posters reporti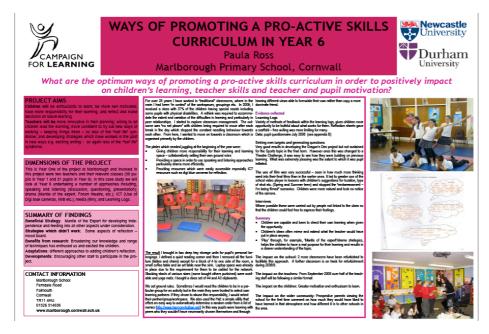ng the teachers' practitioner enquiries (Wall *et al.* 2010) were used as visual cues to mediate and stimulate conversations (Hall *et al.* 2010).

Figure 2: Example of a Year 1 poster

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DESIGN: When deciding on a data collection technique, one potential solution was to get participants to draw a map representing the people and/ or posters that, they felt, had influenced their thinking (for example, Fox *et al.* 2007). However while this type of participant generated visual display may be most appropriate for inquiries treating each participant as a discrete entity, it was felt that researcher generated displays may be better for studies such as this seeking to draw comparisons and relationships across individuals and organisations (Meyer 1991). In view of this we opted for a verbal data collection instrument that would yield both the qualitative and quantitative data necessary for us to represent teachers' learning diagrammatically. The feedback sheet, below, was trialled and revised following comments from the university team and the teachers on the appropriate categories for success within the project: a mixture of research utility, pedagogical fit, personal learning journey and sheer enjoyment.

Name:	
School/College:	
The case study that	Came from
1. Had the best Learning to Learn idea	
2. Broadened my horizons	
3. Had the L2L idea that I'm most likely to use in my own teaching	
4. Entertained me the most	
5. I will use/adapt one of the data collection methods for my own research	
6. Had application for a range of curriculum areas or ages of learners	
7. I would recommend to other teachers	

Figure 3: Feedback sheet

The feedback sheet was designed to provide simple numerical data that could give us some idea of the range of interests of the teachers: would secondary school teachers from urban schools be at all interested in the projects from rural infant schools? In addition, it also served to encourage delegates to reflect critically on their own practice, thus ensuring that

what may otherwise have been a simple 'show and tell' was extended to a deeper critical analysis of issues around teaching and learning (Little and Dorph 1998).

PROCESS: A first-level analysis of a simple count suggested that while some posters were more popular than others, all but one made their mark on someone. The time spent in the project, the education sector or the region from which the teachers came did not seem to be significant factors in attracting votes. Simply inputting the data began to generate an impression that respondents from primary, secondary and further education were equally likely to vote for the same poster but mapping the data did not capture the way in which these networks of interest were forming.

The new version of Nvivo has model-building capabilities and it was possible, by representing the posters as external links and the individual teachers as cases, to set up as data elements the relationships between them. This allowed us to create a 'knowledge transfer map' indicating what is transferred (practices, methodologies) and by whom (schools, individuals, brokers). An example can be seen in figure 4 below. It is important to note that, reflecting the collaborative research process engendered by the L2L project, we have explicit permission to name individuals, checked out both at data collection (residential 2009/10) and collaborative analysis (insets and residentials) stages. As reflective practitioner enquirers, the teachers recognised the importance of making learning processes within the network transparent. The advantage of visualising the network in this way was that it elicited the implicit transfer of knowledge that occurred in these exchanges and therefore made the learning more widely and easily understood (Eppler 2006). This allowed two kinds of visual representations to emerge – complex maps based on categories that have been very powerful for theory building work and cleaner and more 'translatable' pictorial representations of the reach of individual posters.
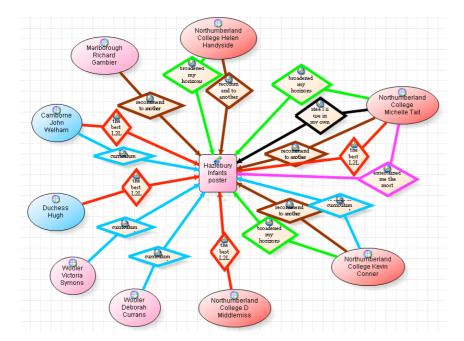
Figure 4: Example of a researcher generated network diagram

INCORPORATING THE VISUAL: The visual element was incorporated both as an initial stimulus for the data collection (the posters) and, more powerfully, as part of the analysis procedure (network diagrams). The latter facilitated communication with participants and allowed easy validation of the findings, which is not as apparent with other dissemination tools. The power of the visual element was communication and as a researcher generated visual text, they revealed a new perspective on the way that the network was working and when used as a stimulus to further conversations with participants they facilitated talk that in itself was inherently valuable in adding to project understandings. Simply seeing their 'web of influence' in this way encouraged participants to take seriously their role as translators of pedagogic research. Moreover, in further iterations of the analysis, we have been able to trace the influence from an initial feedback sheet through into the next cycle of enquiry: for

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example, someone who highlighted a data collection tool as interesting going on to use it in their own enquiry design.

CRITICAL REFLECTIONS: Outsiders to the project have sometimes had a negative reaction to the spidery diagrams, suggesting they are overly complex and contain too many embedded references. This is a genuine issue, but only if the network diagrams are intended to communicate about the project to people beyond the project. As a mediating tool for communication within the network, where understanding of categories and contexts as well as a common language have already been established, they have served their purpose, to focus on relational and research impact and to shift the emphasis from 'teachers as learners (from the university)' to 'teachers as collaborative learners (with each other and the university). This visual approach could be criticised as being too highly researcher-driven and potentially less sensitive to network learning that was not linked to posters or presentations; it could have been complemented by a participant-drawn web of connections based on informal interactions and these in combination would provide a more authentic view of collaborative learning in networks. However, it has the virtue of being very low-impact on participants, and because of the quantitative slant and the use of Nvivo for model-building, relatively low impact on researcher time as well. Given the complexity of analysis associated with visual data, this is an important factor.

Pupil Views Templates

INTENT: The purpose of this analysis was to investigate how the L2L project was impacting on students' understandings of their own learning. As this was a large project and we wanted to get as definitive picture across as wide a sample as possible, a survey design was used and

deductive coding techniques applied. Pupil view templates (see figure 5) aim to gather information on pupils' attitudes and beliefs about teaching, curriculum content and school or classroom structures (the process of teaching), but also to elicit their descriptions and reflections on the process of learning. The templates have been shown to be a mediating tool between research and pedagogic agendas and due to this factor the take up of the use in schools has been high. This meant we achieved a sample of 584 templates completed by learners from the age of 4 to 16 across 12 schools.

Figure 5: An example of a completed Pupil Views Template

DESIGN: We examined whether there would be differences in five dependent variables that were based on observers' scores of pupils' ability to perform several cognitive skills. These skills were Information gathering, Building understanding and Productive thinking (Moseley *et al.* 2005) and Metacognitive knowledge and Metacognitive skilfulness (Flavell 1979). With regards to main and interaction effects, the hypotheses across the dependent variables were as follows.

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- There would be main effects for age whereby older pupils would use more sophisticated types of cognitive thinking.
- There would be a main effect for gender with boys using more sophisticated types of cognitive thinking.
- However, these main effects would be qualified by an age by gender interaction whereby boys would only use more sophisticated cognitive thinking in KS1 and KS2 but that these gains would be equalised in KS3.

PROCESS: Pupil views templates use a common superimposed structure of speech and thought bubbles added to the cartoon representation of a learning context. The thought bubble is intended to look at the 'internal' processes: the learning of the individual or their metacognitive thinking about what is going on inside their head. In contrast, the speech bubble looks at factors external to the individual: the learning of other pupils, teachers and parents and practicalities of learning in the particular context (cognition in general).

The written content of each template was transcribed and imported into Nvivo for analysis using a deductive coding procedure (described in Wall 2008). Codes were applied based on the sense and meaning of a pupil's response with a judgement made by the researchers as to the intended meaning, and a category code applied accordingly. A category could therefore be applied to a single word, to a sentence fragment, a full sentence or a paragraph. This coding system was checked for inter-rater reliability with an agreement of 82%. A statistical analysis was conducted using a fully between-subjects 3 (Age) x 2 (gender) two-way factorial ANOVA. Results were presented in terms of total words coded as the most sensitive output of NVivo (both proportionally and in relation to the research aims).

INCORPORATING THE VISUAL: The templates have been designed as a stimulus for discussion about learning. The pupils should easily recognise the visual prompts as representations of different learning situation. The familiar setting supports discussion and the design of the picture also means that the pupil can engage with it further. For example,

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drawing in the faces of the teacher and pupils, adding features of their classroom, or drawing what was on the board in a recent lesson, can help to trigger further reflection. This is also a useful way to support discussion and reduce any tension or implication that there is an expected or a correct way to complete the template and to ensure that the children are able to express their own thoughts and opinions.

In a traditional interview, dialogue between an adult and child can be influenced by unequal power relationships or by expected conversation dynamics. The templates attempt to mitigate this by not only giving the child a familiar classroom activity (a worksheet) to complete, but also by directing attention towards the templates, away from the adult-child dynamic and emphasising through the cartoon representation that it is permissible to talk about what they think. The template forms the basis of an interview about learning and the centre of a three-way interaction between an adult (likely to be the teacher), the pupils and the template. The teacher (or other adult) has an important role: they help to initiate the discussion about the chosen learning situation and to a certain extent will steer the dialogue that develops. The template serves as a reminder of the learning context under discussion and is a stimulus for this; however, as part of the process it is also annotated by the children, and so becomes a record of the discussion and a stimulus for further dialogue and ideas of their own.

CRITICAL REFLECTIONS: Pupil view templates are well received by teachers. We have written elsewhere about the way they bridge the gap between pedagogy and research (Wall and Higgins 2006) and how it can be used as a catalytic tool for supporting dialogue across different groups and contexts (Baumfield *et al.* 2009). However in answering this research question they have been accessible enough to support teachers' engagement and therefore have been extensively used in project schools. Due to this take up, the resulting data set is of

a large scale, lending itself to the application of more quantitative analysis techniques. The extent to which it is appropriate to use such statistical analysis procedures on what is essentially qualitative source material is one that characterises this paper, but which also arises in the generally accepted practice of analysing written texts through counting words or other elements. But the other consideration is the extent to which a relatively narrow analysis process does not take into account the complexity of the source data and therefore misses extensive perspectives on the topic under scrutiny.

Discussion

In this paper we have shown how visual methods and techniques can be used in ways that suit a range of approaches. This means that any epistemological structure and language that we apply needs to be flexible enough to include all the different intents with which data might be collected and used. Limiting visual methodology to a single epistemological position would appear to not only be restrictive but also potentially to inhibit innovation. This type of epistemological questioning is important in a new field and as has been learned in the context of mixed methods, it should bring about better understanding and practice (Greene 2008). The point of this paper is not to promote the exchange of a pragmatic mixed methods epistemological framework for an interpretivist one when reflecting on visual methodology, but rather to re-open the debate. While our own forays into visual approaches have certainly owed much to our pragmatic standpoint, we would argue that this paper is more about how researchers more generally can start to engage with visual data and methods on a number of levels. We are therefore simply arguing for greater diversity in the exploration of the potential of visual methods, rather than a narrowing of protocols.

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This enquiry has allowed us to undertake an exploration of visual methods in practice. Using Prosser's (2007) categorisation of visual data we have highlighted the importance of the image choice as part of data collection, but we have also shown how these categories can become blurred and increasingly complex as the research process progresses. We have shown how the intricacies of the field make this a challenging proposition in practice. Prosser's categories are useful when designing and theorising data collection, but at later stages - synthesis, analysis and dissemination - there are increasing difficulties. A single piece of visual data may fit in more than one category or move from one category to another depending on the intent and the actions of the researcher. In particular, the distinction between researcher generated and participant generated is hard to maintain when conducting the sorts of collaborative data generation for which visual methods seem so appropriate.

If we focus on the research process we can critically examine the application of visual data through the collection, analysis and synthesis stages and the impact of the transfer and transformation of the data set which might occur within and between these phases. This, we believe, contributes to the intricacy and indeed the potential of visual methodology. At this point we would like to briefly draw on the theorising around mixed methods research in unpicking this. In the mixed method field researchers have also looked at this idea of transformation of data during the research process, with particular emphasis on the analysis stage felt, just like in visual methodology, to be a weak point. To target this perceived weakness Onwuegbuzie *et al.* (2008) presented a mixed-analysis matrix showing how a mixed methods design, which incorporated a mixing of approaches at data collection *and* analysis stages allowed for much 'more complex analytical designs' (*ibid.* 2008: 8). These

ideas feel particularly relevant to the flexible approach we are suggesting to visual data and the challenges we have made to the traditional interpretivist epistemologies applied.

Onwuegbuzie and Teddlie's (2003) seven stages of mixed method analysis were used as a target for effective analysis: data reduction, data display, data transformation, data correlation, data consolidation, data comparison and data integration. It is suggested that the only way to successfully achieve all these stages is through an approach that draws on multiple perspectives (Onwuegbuzie *et al.* 2008). We believe this expansion of the analysis stage is useful in supporting and facilitating a more creative exploration of the practice of visual data analysis. In our enquiries we do not have the multiple data sets that characterise mixed methods; but rather a single visual data set that is characterised by its complexity and often comprises a large number of individual texts. We have shown how these data sets, even when there is some limits placed on the output, for example in the diamond ranking activity, provide enough scope for both qualitative and quantitative approaches to be used.

This paper has sought to open up the arguments around visual data and prevent a restriction of visual approaches to qualitative paradigms. We support a more flexible and focused basis on which decisions around visual methodology can be made that allows for translation and transformation as the visual is incorporated at different points in the research process. This will enable a broadening of the field of visual research methods, with visual data being used in more creative and intentional ways, with structures for use and analysis which do not restrict different approaches, but rather provide increased rigour and confidence in our theory and practice.

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