

'God is an Alien': Understanding Informant Responses through User Participation and Observation

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ABSTRACT

This paper considers the relationship between new technologies and educational objectives, in particular the way in which Virtual Environments (VEs) might prove to be an educational resource for education both in the museum and the classroom. Two related issues are focused on. The first is the notion of educational 'practice' and how it relates to educational 'goals', and the second is the value of particular methods for understanding and capturing such practice. This is illustrated by studies carried out in classroom and museum settings. The paper concludes that user participation and observation are closely interwoven and need to be seen as such when designing educational resources.

Keywords

Ethnography, schools, museums, virtual environments

INTRODUCTION

The relationship between participatory design stances and ethnographic studies has recently been the subject of some discussion. Work such as that of Simonsen et al. [1] and Crabtree [2] has suggested a complementarity of perspectives which, it is argued, can be fruitful for design. This paper aims to further that discussion by reporting on research conducted in museums and classrooms. The people involved in these on the face of it disparate environments actually share a central concern, since museums in the U.K. and elsewhere have a strong interest in educational work. Equally, in both environments it is often thought to be the case that educational objectives can be better served, or even transformed, by new technology. These expectations are informed, to some degree, by a burgeoning literature on this relationship. Thus and for instance the literature on Computer Supported Cooperative Learning (CSCL) [3, 4, 5, 6, 7] is largely concerned with the complex relationship between goals, practice and technology.

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Our work reflects this vibrant interest in the relationship between new technologies and educational objective, and more specifically concerns the way in which Virtual Environments (VEs) might prove to be an educational resource for education both in the museum and the classroom. We focus here on two related issues. The first is the notion of educational 'practice' and what it might mean, and the second is the value of particular methods for understanding and capturing such practice.

Debates about teaching and learning goals are not new. Indeed, they have been going on since the time of Aristotle, and show no sign of abating. One theme which runs consistently through recent literature is the contrast between learning 'styles' embedded in 'authentic' versus 'inauthentic' approaches [8, 9] and the quality of learning that takes place within 'communities of practice' [10, 11, 12]. Here, the concept of 'situatedness' is used to produce an argument about the contextual conditions under which learning might be said to take place in an optimal fashion. It also carries with it an explicit emphasis on 'practice':

"Newcomers develop a changing understanding of practice over time from improvised opportunities to participate peripherally in ongoing activities of the community. Knowledgeable skill is encompassed in the process of assuming an identity as a practitioner, of becoming a full participant, an old-timer" [10 p.68]

For us, if VEs are to be used educationally, then there will be many questions concerning how they will be implemented and used within frameworks that can be deemed 'educational'. Not least, the 'practices' of participants to both classroom and museum activities seemed to us to be relevant to the design of these environments.

Following from this, methodological problems concerning the adequacy of descriptions/analysis of practice are raised. Ethnography, of course, is usually associated with uncovering practice, and moreover is often applied to the classroom [13, 14]. It is also frequently applied to the specific problem of evaluation [15, 16, 17]. Further, its relevance to the design process is by now well-attested [18, 19]. At the same time,

and given a thread of argument in the literatures we cite above which has to do with the transformational power of new technology, it may be that observational strategies carry with them problematic assumptions about current practice. This is certainly the view of some researchers, for whom the degree to which naturalistic studies are relevant at all to changing educational environments is problematic. Thus, according to Griffin et al [20] naturalistic research:

“... fails to create new artifacts and situations for learning reveals less about, for instance, child development or the influence of education on development than it reveals about the particular current forms and context of schooling on which society has agreed.”

The same authors [21] make another point, when they suggest:

“When we casually observed children using the program, we saw that they could be happily engaged working alone, with peers or with a teacher. Although there was no drill and practice on the solutions and the children failed at first, some of them later succeeded consistently. We were not all sure, however, what they were learning and how they went about it.” (p. 270-271)

That is, and unlike descriptions of practice, uncovering the ‘goals’ of educational tasks is more problematic because they are not directly visible. When the business is that of, as it were, trying to figure out what educational tasks are for, the methodological presumption is more often participatory. Here, the voices of children and teachers as informants on design are held to be central. There are variations here, ranging from arguments linking contextual enquiry and participatory design [22], supporting the learner-as-designer [23], to specific limitations on informant ‘reliability’ [24]. Argument within this broad perspective in effect revolves around the degree to which children might or might not be a special category of user, and following on from it, whether we should be ‘Designing for or Designing with?’ [24].

Druin [22], following substantially on from Papert’s constructivist approach to education, makes fairly strong claims concerning what children are capable of (with careful support). Contextual enquiry and participatory design are combined with what is termed technology immersion. This requires children to make design decisions within a technology-rich environment. Druin’s approach is explicitly child-centered and does not provide details of how to integrate the needs of educationalists.

Kafai [23] follows a similar child-centered approach. Children are given the responsibility of designing, testing and evaluating software. However, Kafai does not see this as a means of generating useful or prototype educational soft-

ware, but rather as a way to study how learners think about educational software.

Scaife et al [24], take a broader view and recommend something less than full participative design with children, specifically because children are poor reporters of their own educational goals. Their method more explicitly identifies the strengths and weaknesses of various participants (educationalists and children) in their roles as informants to the design process.

While we broadly agree with Scaife, we feel there is a need to understand better how it is that any category of user might report on ‘goals’ in the first place. In other words, where teachers and other professionals might be thought to be ‘superior’ informants in the matter of educational goals, this might be an artefact of the questions they are asked. To be clear on this, our point is essentially methodological- that ‘goals’ become visible only in the question and answer structures we associate with some variant of participatory design, because goals are prescriptive matters.

‘Practice’ is a descriptive matter, and becomes visible in and through observation of whatever kind. In neither instance, and this is the methodological issue we reflect upon below, will we as participants or as observers derive relevant design information unless we know ‘what to ask’ or ‘what to look for’. The point is that some kind of ‘ethnographer’s stance’ at the level of description may well be implicated in both approaches, not only in ethnographic work.

THE SCHOOL

Our own involvement in this arena was prompted by a somewhat opportunistic, not to say naive, response to the use that existing Virtual Environments were being put to. We should stress that initially our interests were not specifically about the educational value or otherwise of such applications, but had more to do with their value in the context of the museum visit.

Work had been done on the structuring, intervention and interaction of teachers with children during museum visits [25]. Another study we carried out at Manchester Museum proposed an educational resource based around the pyramid builders’ town of Kahun [26]. As part of that project a number of Virtual Environments had been built including a virtual walkthrough of the town (see Figure 1) and working models of various Egyptian artifacts such as the shaduf which was used for drawing water (see Figure 2).

These VEs had been placed on the web. A teacher made contact some time later to remark on how useful she had found the site as a resource for teaching about ancient Egyptian life. We decided that some further discussion with pupils and teachers at the school might be useful in determining how to proceed with our research.

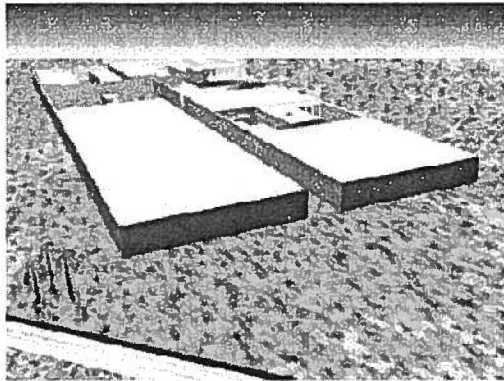


Figure 1(a). Virtual walkthrough of Kahun

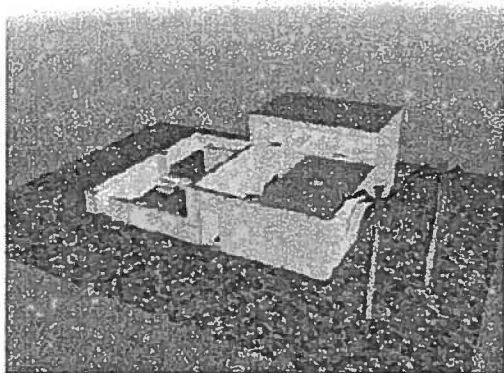


Figure 1(b). Virtual walkthrough of Kahun

Accordingly, one of our research team began, by E-mail to work with various children. There were 4 groups of 7 children each, aged 10-11. The children were encouraged to design, using paper mockups, web pages containing versions of artifacts and text that they would like to see on the website in question. That is, the children were in effect being asked to design web pages that they would see as having some educational value. After discussions with the class teacher, we decided to spend some time with the children in question to improve our own understanding of what was happening, and to deal better with some (in hindsight) rather obvious problems (for instance, that children had no sense of the scale of images to be placed on a website). Subsequently, we visited the school.

Our interactions with the children took the form of small-group discussion both about Kahun and about the mock web pages designed in response to the design suggestions of the groups. A flavour of their concerns can be gleaned from the following extract:

“What did you like about the walkthrough?”

“I like the way you can move ... you can actually see into the houses and that ... it’s quite good, it’s good good colour ... I’ve not seen anything better. One

thing is, though, you don’t want to fall through the floor ... you get lost I quite like walking through the walls, though you’re like a ghost ...”

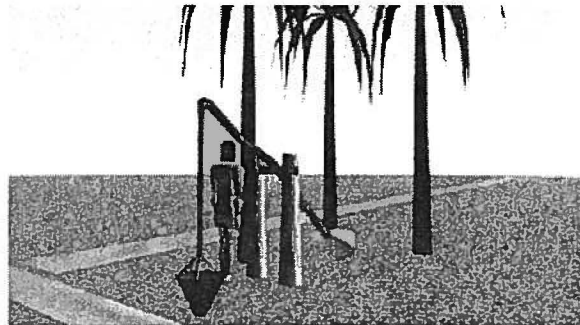


Figure 2. Virtual model of the shaduf

The first issue that arises is what is of relevance to children. As seen in the extract, children, for the most part reflected on their experience of this virtual environment largely in terms of the ‘fun’ they had in navigating through it. Their positive and negative comments about navigation reflect difficulties in navigating through a vertical plane when ‘solid’ walls turn out to be solid, but their pleasure in doing exactly the same thing on a horizontal plane. Similarly, when each group in turn was invited to assess the appearance and value not only of their own design but that of other groups as well, the kinds of comment made were along the lines of:

“oh, its brilliant ...” (referring to their own design)

“look at the buttons ...”

“But they’re mixed up ... the bowl and the basket are mixed up ...”

“have you got the writing?”

“In our general workbooks”

“Hold on, I’ll go and get my general workbook”

“I don’t know what I’ve done wrong ... when we chose the two objects”

....

“So, you need to give us a basket picture ...”

Or:

“We wanted the candles in the background. Can you make the candles flicker? We wanted some stars as well. The sky’s like a bluey blacky colour.”

The children reported willingly and happily on the matters that they deemed relevant, but what they saw as important reflected broadly a concern with colour and other effects, or a concern with ‘mistakes’ they had made in linking text and pictures. Children were very good at identifying attractive and immediate features of the interface but appreciably less adept at discussing educational content. Thus, they seemed to focus on ‘surface’ issues in design (e.g. what colours to use).

It was also sometimes unclear how much importance children placed on various features of their designs. For example, the King Tut group specified the flickering candle. However, the website developed had only a simple, static, dark background (see Figure 3). Despite this the website still met with their approval.

In this respect, of course, we were identifying exactly what Scaife et al point out, which is that children “are very good at letting us know what it is that keeps them engaged, which is often not what adult designers or their proxies ... would have expected. We also need to recognise, however, that children cannot design their own learning goals.”

It occurred to us that perhaps the problem was that we were not placing these issues in a context that children would readily understand, and that a more narratively based approach might be useful. This, we thought, might resolve the fact that the conceptual designs generated by the children did not make full use of the potential of VE. They all followed the ‘traditional’ pattern of a set of information pages. One of the exercises, therefore, that children undertook was writing stories in which the various artifacts they had already designed might appear.

This task exploited more of the potential of the VE medium for narration and exploration. At first glance, however, the stories were, for us, disappointing (though very entertaining). Children seemed to have difficulty reconciling the two demands of on the one hand telling a good story, and on the other structuring tales in such a way that the salient artifacts could be brought out. In any event, our problem was precisely one of understanding how the meaningful world of schoolchildren related to our own.

A second issue arose when we observed a series of lessons and spent time in discussion with teachers involved in the delivery of the curriculum. Observation of classroom practice showed us something which we recognised in museum visits, and one which closely relates to the use of artefacts as educational resources. That is, observing the conduct of lessons made it clear that the achieving of an educational outcome is largely a matter of practical management. Teachers visibly orient to a set of practical management issues, including for brief mention: the amount of time available to them; the number of children in a given class that have to be organised; and the structuring of the task at hand. In a sense what we discovered was that educational goals were not paramount for the teacher, at least not visibly, much as they were not with the children. Educational practice, was however, very much to the forefront. Of course, the methodological problem is very much how one learns to recognise practice in terms of these concerns for practical management on the part of teachers, and how to reflect that in subsequent discussions.

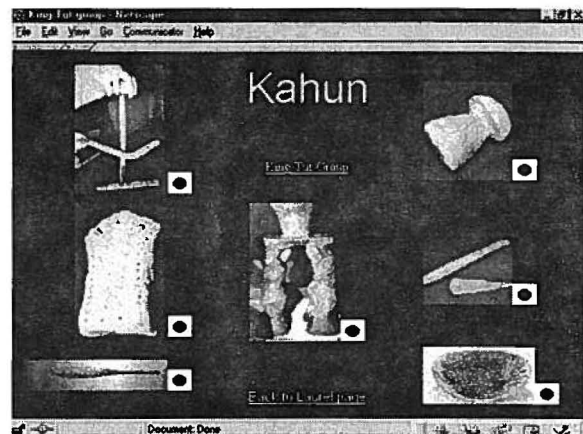


Figure 3. Web site designed by King Tut group

In discussion with teachers, it became clear that practical management was indeed a major issue for the classroom practitioner, and very much to the foreground when they were asked to talk about these matters as constraints and affordances. Hence, resourcing played a role in the structuring of activities:

“we’re lucky three computers (!) ... we allow the children on the computers in twos and generally everyone gets a turn”

These resource constraints influence the way in which computer-related work will be structured in and through the teacher’s recognition of the need for ‘everyone to get a turn’, and the time available for the completion of the activity. Allocation of time, again, is critical to the teacher’s construal of objectives:

“The biggest problem is organizing the day, especially with compulsory literacy and numeracy. You can get things going really well ... and then you’ve got to stop because its numeracy hour ... and then try to pick it up again another time.”

Additionally, teachers have to structure activities on the basis of assumptions they make not only about the competence of children, but also about the competence of their colleagues. Here, for instance, we discovered one feature of group working on-line that we had not previously considered:

“actually, using the Net fits really well with groupwork. You’ve got to organize the class, of course, because we don’t have the equipment to have everybody doing it at the same time. But the groups work really well with it- there are always suggestions about what to do. Maybe that’s why there isn’t any problem with navigation.”

Put simply, many of the navigation problems we had imagined might occur did not, for the reason that children helped each other, quickly and economically, arrive at appropriate

solutions. Expertise on the part of staff, however, was more problematic:

“We’ve been doing Egypt with year 5 and 6. Five of us have been working on the project, in a team. We meet once a week and myself and [the I.T. coordinator] basically run through what we want to do. We provide all the resources the people in the team will need. The big issue is technophobia. Several staff really don’t feel confident using the technology.”

Other issues which were raised have a clear educational relevance, and might be conceptualised in terms of ‘goals’. If so, however, the goals themselves can be viewed in a ‘situated’ way:

“We don’t encourage the kids to ‘surf’ for sites themselves. I spent some time looking around, which is how I found your site. And then I told the kids, right, this is where you’re going. The kids can’t discriminate between useful and less useful material. Like, with the Egyptians, there’s all this ‘God was an Alien’ stuff, and I don’t want them going there.”

In other words, teachers carry with them a view of what is worth learning and what is not, and decide on their strategies with that in mind. Nevertheless, what is ‘useful’ is constructed out of experience:

“if there’s a text, you want it to be pitched ... these are 10 year olds, for instance, and its got to be pitched for them. Its one of the reasons I keep my own resources- I know what’s right for them. The other thing, as I think I said, is that its got to be non-specialist teacher friendly.”

This emphasis on what we might term the pragmatics of teaching and learning was not wholly unexpected, since we had seen something of the sort in museum educational contexts [25]. Since it happened that one of our continuing interests was also the conduct of educational experiences in museum environments, we decided to continue our investigations into this area by shadowing (with the consent of the school parties concerned) groups of children, teachers and parents on a visit to a museum. Again, our interest was in the pragmatics of the visit and how these ‘relevances’ are produced, and specifically how they are produced for teachers in the museum context. We therefore undertook observation of a group of schoolchildren and teachers around Quarry Bank Mill - a Victorian textile museum.

THE MUSEUM

The school visit to the museum is in one sense highly structured. It begins with a short talk by the guide who will accompany children and teachers around the exhibits. The guide is concerned with a number of things, which include placing the visit in a historical context. A consistent theme during the talk is the relationship between the manufacturing process and the social and economic conditions of the people

who worked in the mill. In keeping with normal school practice with regard to the teaching of history, the talk aims to situate children’s understanding imaginatively. They are encouraged to imagine ‘what it would be like’ to work in a mill of this kind.

Our first extract from fieldnotes illustrates the way in which ‘spinning’ is demonstrated and explained:

The guide introduces the demonstration by saying, “here we are, a cottage industry.” The children sit on benches arranged in front of the demonstrator. The demonstrator asks the children if they have felt the cotton, and says, “if you haven’t. Feel it ...” and passes pieces of cotton around, adding, “can you feel? ... it’s all tangled up ... I’ve got some brushes called ‘carders’. They straighten it all out.”

As she speaks, she is carding cotton:

“This was done by children younger than you. The ladies did the spinning. The girls learned at 7 or 8 years old. See ... I wind the cotton round the stick ... I’ve got a fleecy roll ...”

She turns to the spinning wheel, and says, “I’m going to do a little bit of spinning and then I’ll explain ... the wheel turns and it turns the spindle ... it’s twist, twist, twist ... jus before I twist, I pull ... I reverse the wheel, because the cotton needs to go on here (pointing) ... six spinsters had to do this (emphasising ‘spinsters’).”

She stops and says, “Would you like to ask any questions?”. There is a pause of about one second, and the guide says, “It was probably started by the Chinese about 6000 years ago ... the principle is exactly the same today ... any questions? ...” Another brief pause and the demonstrator says, “Just remember, it’s the twisting that gives the strength.”

The demonstrator then says, “right then, over to this side have any of you done any weaving?”. The teacher replies, “not yet”.

A couple of features of this demonstration are immediately apparent, most notably it’s pace. Both demonstrator and guide are manifestly aware of the time this demonstration ‘ought’ to take, and structure it so that it takes that amount of time. Equally, they demonstrate their awareness of the need for a ‘flow’ in the demonstration at the point where they ask if there are questions. Each in turn takes the second speaker part in the absence of any questions from the children, and does so with pauses no longer than we would expect in normal conversation. A third aspect is the way in which the prospect is raised that the children may well have done exercises in the classroom that relate to the demonstration, and the teacher’s recognition of it’s relevance when he says, “not yet.”

The demonstrator says, “I’m using a large loom ... see

these threads ... that's the warp ... it's called the warp ... I'm going to go over and under with a shuttle ... the threads are connected to a foot pedal". At this point, the teacher says to the children, "come over here, can you see these? ..."

Demonstrator: "I'm lifting up every other thread ... those are the even numbered threads ... see the bobbin going over and under? ..."

Here, we see the teacher ensuring the relationship between verbal description and physical demonstration, and the demonstrator recognising his desire to relate the two. Even at this early stage in the visit, we have seen several interactions between guide and demonstrator; teacher and demonstrator, whereby a structure of relevance is accomplished between them:

There is a wall display on one side which distils the information the demonstrator has given.

Teacher: "What's this called?"

Demonstrator: "The flying shuttle."

Teacher: "Someone actually invented this, didn't they?"

Demonstrator: "yes, it was Kay in 1733"

Guide points to wall display.

Demonstrator: "When you get two floors lower, you'll see a modern loom, but the noise is exactly the same ... but some modern looms don't use a shuttle ... they use water or air."

Teacher: "How long did it take to set up?"

Demonstrator: "It took about a day and a half."

Teacher: "and how much do you get out of one bobbin?"

Demonstrator: "I get through three or four a day."

Again, what happens here is that the teacher establishes a particular relevance for the demonstration, which has to do with who invented the flying shuttle, and an assessment of the effectiveness of the machinery. Both guide and demonstrator orient to this request for a particular relevance. We can contrast this with the following:

Move to 'Interactives' room.

Children are running from one exhibit to another. This room contains several 'interactives'. The children spend some five minutes playing with them. Notably, they fail to read any instructions.

As the group moves out of the interactives room, some children stop and use the interactives again

Teacher: "come on ... come on ..."

The move to the recently implemented 'Interactive' gallery was notable for the radical shift in orientation on the part of both children and teachers. Children construed the opportunity to use the interactives as an opportunity for 'play', and moved rapidly from one artefact to another. The teacher can be seen as construing this activity as play as well, when he hurries them from the room.

The group returns to the room in which various bales are kept.

The teacher organises the children to listen.

Guide: "take any samples you want ..."

Teacher: "remember what you've got!"

Guide: "get a bit of linen"

Teacher: "You've got nylon, have you ... got cotton?"

Teacher: "we haven't mentioned this ... its linen ... it comes from a plant too ..."

Guide: "its the longest and strongest."

Teacher gathers children in front of a wall chart.

"Just come round here for a moment ... remember yesterday? ... we tested at school? ... one of the properties we tested was ..."

Child: "absorbency ..."

Teacher, looking at panel: "here you can see the difference"

Once again, the relevance of the visit to the 'lesson to be learned' is reinforced, as the teacher encourages children to collect samples of various fibres (with a view to a school lesson yet to be undertaken) and then reinforces a lesson previously given on identifying a panel with information relevant to it. Practical management, then, seems to be important for the teacher in both of these educational contexts. In each instance what we see is the teacher establishing the relevance, the timeliness and the 'pitch' of the lesson to be learned. In some ways, of course, these issues echo debates between those who favour an exploratory approach to education, whereby students are encouraged to pursue their individual interests, and if you will, motivational factors are seen as paramount; and those who favour a more 'instructional' approach. Regardless, in this paper our primary purpose is not to argue the case for a more 'instructional' educational stance, although much of what we review above can be read that way. Rather, the methodological features are of interest here.

CONCLUSION

Of course any discussion of the role of new technology in the educational process is predicated on assumptions about appropriate ways of collecting and analysing data about the process in question. These methodological issues, it seems, are quite as controversial as the more substantive issues raised

above. They are concerned firstly with the best way to collect data to understand the educational process, and whether knowledge of current arrangements tells us anything useful about the future; and secondly with the degree to which participants to the education process should be involved in the design of machineries to support the process. They seem to raise difficulties with the idea that certain kinds of informant, notably children, are cognitively reliable, and also with the idea that naturalistic observation can solve problems of education and technology.

With respect to children as participants, our own research seemed to confirm the view that children have little sense of their own educational goals, but also suggested that they lack a sense of the 'scope' of new technology. At the same time, our results did not suggest that understanding educational goals was an easy matter when teachers respond, because their 'goals' are also highly situated.

Conversely, where naturalistic research may, through examination of practice, help us understand what the situation in question is, there may well be limits to it in terms of the recommendations that result, and it may well be the case that these limits are a function of the degree to which we can generalise from 'here and now' [20]. The obvious way forward would seem to be to use the two approaches together.

We have already pointed out that 'goals' are not visible in 'practice' and vice-versa, and this would seem to support the contention that participatory design strategies and observational strategies have a largely complementary value. Indeed, we had originally thought this might be the case, and it does appear that using the two together, much as suggested by Simonsen above [1], might alleviate some of the difficulties attached to 'informant reliability'. Things are not quite that simple.

We remain convinced that an amalgam of the two approaches produced useful and 'rich' results, and even pointed to possible design directions. At the same time, we were struck by the interdependency of our chosen methods.

Our classroom interactions with both children and teachers were informed to at least some degree by what we knew from observation of museum visits. That is, our understanding of these arrangements pointed to 'what to ask'. At the same time, we understood 'what to look for' in subsequent museum visits as largely a matter of teachers confirming the importance of practical management in the classroom.

It was not simply that by using two different approaches we might discover different kinds of thing, but that their intertwining was what allowed us to decide both 'what to ask' and 'what to look for'. After all, 'participant observation' - a term often used in the social sciences more or less interchangeably with 'ethnography' - makes sense precisely because observer and subject interact knowledgeably.

At the level of description, the answers users provide, by

definition, can only be made sense of in the context of their and our mutual knowledge of the domain. At the level of prescription, however, this necessary relationship does not hold. In design for education, as elsewhere, the relationship between description and prescription is fraught and perilous. Design in education is a hugely complex matter, resting as it does on a range of moral and political, cognitive, theoretical and practical assumptions, all of which are contained to a varying degree in arguments about informant reliability.

Trying to untangle the relationship between ethnography and participatory design at this level is much more problematic because it is less to do with 'what we are trying to find out' than it is to do with 'why we are trying to find it out'. Understanding the relationship between practice and 'goal' implicates, it seems to us, all of the above issues, and is not something that observational work alone can accomplish, precisely because it is to do with understanding the relationship between description and prescription.

For the ethnographer, relevant issues may turn out to be such matters as how to organise a classroom or a visit for this number of pupils in this space of time. For the participatory designer, issues may also include educational goals, or indeed discussions of child-centredness as against instructional procedures, or how to accomplish an 'educational' experience. These complexities cannot be resolved by merely adding ethnography in.

To better understand the relationship between practice and goal we will be observing several children and teachers at a summer school at a local museum. The children will be asked to act as consultants to the museum and propose ideas to them which will help to attract a younger audience. The children are 'gifted and talented' and drawn from several local schools. We wish to contrast the goals and practice of their visit to Quarry Bank Mill with the one previously observed.

We also propose to look more closely at the problems of informant reliability, or rather, relating the children's meaningful world to that of the designer. A partial solution in the work at Brampton was to get the children to express designs in the form of narrative. Further work will be looking at techniques for 'deconstructing' such narrative accounts and isolating narrative elements that can then be used as design elements within an educational resource.

We believe that design of effective educational resources is not simply about ensuring user participation and observation of the 'real world'. Rather we think the two methods are closely interwoven, and should be recognised as such.

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