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Probing understanding: mapping learning

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Probing understanding: mapping learning

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Abstract
This paper builds on and extends the paper presented at IDATER 93 entitled 'Probing Understanding - An Ethnographic Study Of Student Designing' by the same author.

The methodology employed previously has proceeded and with the same aim; a description of the development of concepts of design and technology in students. The purpose of this paper is to explore some aspects of the process of this researcher making meaning from data. It will describe the continuing use of an ethnographic methodology; specifically how analysis is proceeding through the use of an analytical tool that has evolved from the data. Some sections from individual interviews are analysed and the next stage of the study is indicated.

Background

In contrast to other curriculum areas, little is known about learning and the development of conceptual understanding in design and technology. The development of students' understanding and capability in a number of other curriculum areas has been a subject of study for a significant time, Langford[1]. In design and technology a large number of models have been proposed by various authors which profess to describe how students should engage in design and technology (linear, open and closed loops...), but there appears to be few studies which provide descriptions of the process in action. I suggest that there is a need for accounts to include not only the range of phases associated with design and technology (*inter alia*: problem identification, design, production and evaluation), but the recognition that these activities do not happen in isolation. Students' perceptions of the activities they are engaged on and their attitudes to them influence significantly what they do in a learning setting.

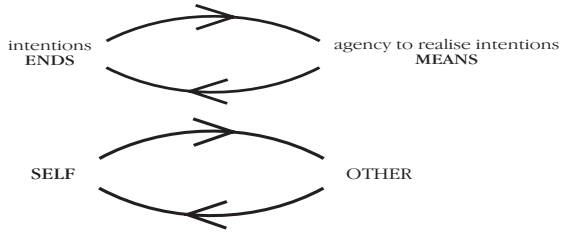
The aim of this study is to formulate a description of the development of concepts of design and technology in action in students whilst engaged on a BA (Hons) Design and Technology course. To achieve the intention of looking at what does happen, rather than what should happen, an ethnographic methodology has been adopted.

From ethnography's genesis as a means of studying, in their natural setting, the behaviour of small communities in simpler societies, it now refers to the detailed study of small groups within any society. It has always been concerned with the minimal manipulation, disturbance or interference by the observer of the setting (ecological validity) and its emphasis has been on the understanding of the meanings which underlie social phenomena. Its predominant methods are observation, in-depth interviewing, biographies and the investigation of documents. Ethnography is thus predominantly concerned with the description of cultures and rather than 'studying' people, many ethnographers would see their work to be concerned with 'learning from' people.

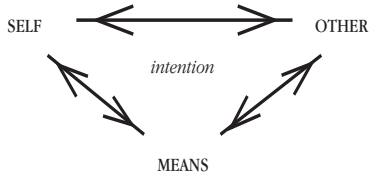
For this study, with its intention of trying to find out what students do believe and understand rather than what they think they ought to believe, a methodology within the ethnographic tradition appeared the most suitable to minimise the influence of any prescribed view of technological design.

Fieldwork for the study has consisted of some participant observation followed by semi-structured, recorded interviews. These have been fully transcribed in order to analyse the data. Students' concepts, the meanings they generate to understand their actions in learning settings, are actively sought in the data. Analysis has been directed to the construction of a typology. The aim of the typology is to enable the identification and clarification of the structurally significant differences that students use to define some specific portion of their world; a 'map' by which the underlying structure of individual observations and utterances can be seen more clearly.

A number of typologies, each utilising a variety of organising principles, have evolved from my interrogation of the data. At its genesis the present typology proposed four major domains interacting in pairs:



Each major domain encompassed further sub-divisions. Further consideration indicated that these two interactions were interconnected and the emerging typology now became a triad founded on the organising principle of intention:



As this organising principle of intention emerged from the data I saw connections in the literature of design and technology:

> Before we can assess the effectiveness of any piece of design and technology behaviour we need to know the intention that the person has in doing it. Without that, our assessment must of necessity be based on guesswork- and that will not do.
>
> APU[2]

My Present Understandings and Approaches

> What is virtually unique to the ethnographic approach is its strong emphasis on reflexivity; the observer is required to observe his own actions and interpretative processes and try to assess their effect on his conclusions." [3]

As I worked at the analysis, I came to comprehend that intentions needed to be linked to the context in which they were operating, and that 'context' was inherently complex and suffused with a number of intrinsic tensions. This would presumably be found in all academic subject courses when a learner must relate and act against a background of constraints including course aims and assessment and the established conceptions of the discipline, but there appear to be added dimensions to this tension in design and technology. One of the greatest tensions appears to be between design and technology as a stimulus for change in the made-world, and design and technology as a stimulus for change in the learner: between design and technology as means of change to **other**, 'out there'; and design and technology as means of change to **self**, 'within'.

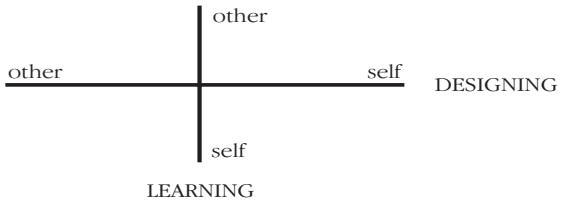
This tension is caught by Schon[4]

> But communication between student and studio master is in several ways problematic. Messages often refer both to the process of designing and to the process of learning to design. An event like Petra's desk crit, pertaining to both processes holds a potential for two-tiered confusion.

and Stables[5]

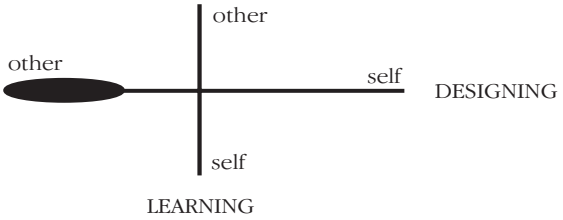
> Inevitably the school situation carries a variety of tensions ranging from the extent to which the task will be accepted as 'real' and worthwhile by the children to the dimension of learning it aims at developing. At the heart of these tensions is the perception by both the teacher and the child of the purpose of the activity.

As I struggled with this tension in the data, ideas crystallised to form a schema which I have used subsequently as an analytical tool to help reveal understanding of the respondents' transcripts. (I use the term schema as meaning the representation of a field of interaction.) The schema has two dimensions, each with two domains:

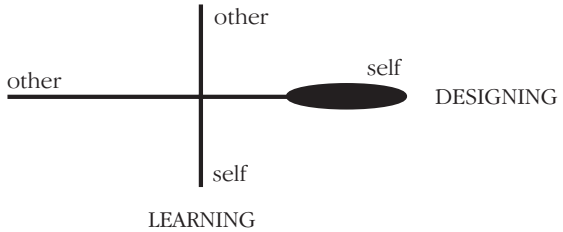


To assist my understanding I considered some imaginary examples of it in use.

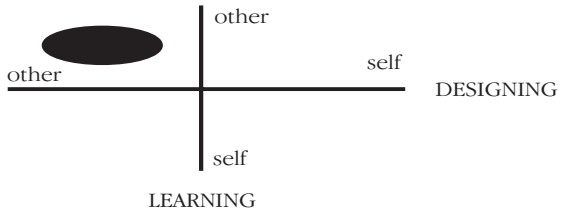
Consider a professional designer's activities that are directed to the act of DESIGNING for a client/ sponsor/user/manufacturer. These are all examples of OTHER. In the activity of designing the person may learn, it is very unlikely that no learning occurs, but that is not an explicit intention. Thus the schema shows a locus (hatched area) located solely on one dimension, DESIGNING and in the domain of OTHER:



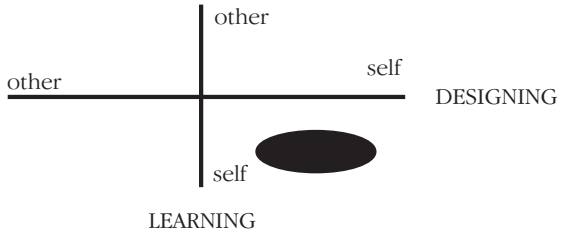
Contrast the 'do-it-yourself' person's activities which are directed to the act of DESIGNING but for SELF. This schema shows a locus located solely on one dimension, DESIGNING and in the domain of SELF:



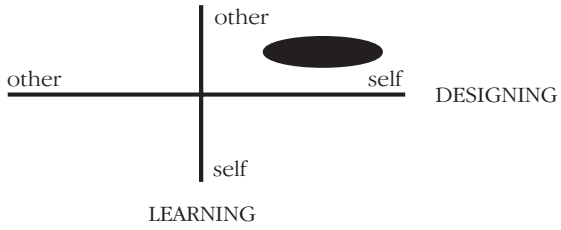
For the person in a learning environment, if designing is directed to meet perceived needs of OTHER through, for example the learner's interpretation of the design brief - toy for child, and LEARNING intentions are directed to meet requirements of other (eg honours classification of exit qualification) then:



whilst if DESIGNING directed to meet needs of SELF through interpretation of the design brief (eg 'storage system for my study') and LEARNING intentions are directed to meet needs of SELF (eg working to a known weakness 'I don't know anything about working in wood') then:



whilst if DESIGNING directed to meet needs of SELF through interpretation of the design brief (eg 'storage system for my study') and LEARNING intentions are directed to meet requirements of OTHER (eg working to a known strength 'I know a lot about working in wood and therefore the final artefact will impress my peers') then:



From these imaginary examples I turn to sections from two recent interviews, both concerned with the very broad question of 'How was the project for you?' [*Italics indicate the interviewer's speech.*]

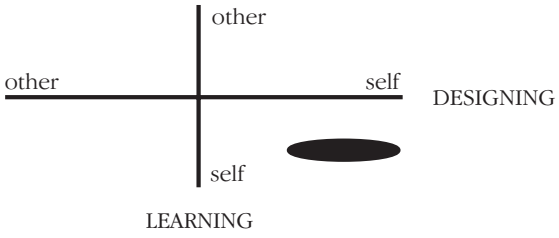
Interview One

Looking at the RSA [Royal Society of Arts Student Awards] *project in particular, how has the project gone for you?*

. . . I think it went quite well. . . yes I'm quite pleased.

What constitutes 'being pleased' for you?

. . . one of the tasks I set myself was to do a reasonably professional model . . .



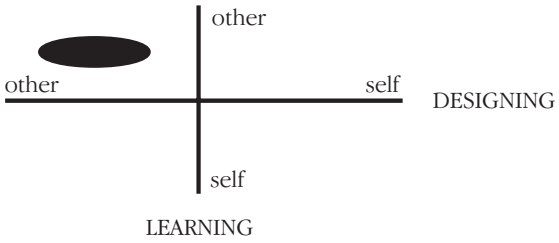
And what was prompting you to make, in your own words, a 'professional model'?

I don't know. [Pause]

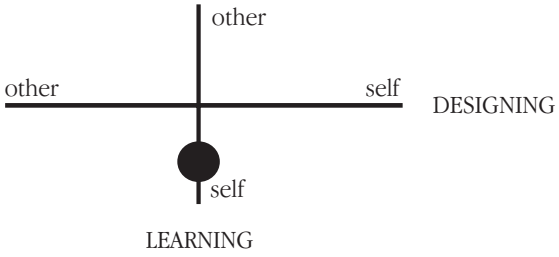
It's one of the things that I've been criticised for before. . .

The tutors involved in the course prompting you to do that?

Yes.



we had to write down our own objectives and I did sit down and think about them and think of what people had said before and I think I managed to do all that I set out to do.



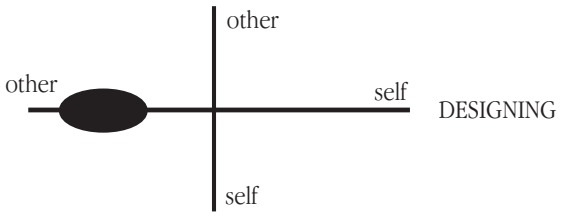
My interpretation of these utterances is that the initial response was positive to the very general question of how the project went. ('Being pleased' is a very common initial answer to many evaluative questions.) The cause of this pleasure is readily articulated as a 'reasonably professional model', but deeper probing as to who or what had identified this as an intention elicits bewilderment - 'I don't know'. Allowing pause for thought, it emerges that criticism by course tutors of previous project work prompted the identification of this particular intention. Although not identified initially by the student, crucially this prompt has been recognised and accepted by the student, and integrated into a personal set of learning intentions.

It could be argued that this may be a designing intention, or that learning and designing intentions are so inextricably bound that their disaggregation is neither possible nor useful. Approaches to resolve this question are considered later in Next stage of the study. Additionally, it would appear that the requirement to enunciate 'objectives' through writing them down at the commencement assisted this process.

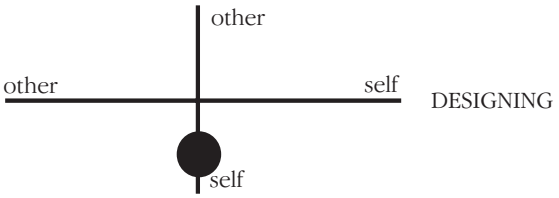
Interview Two

How was the project?

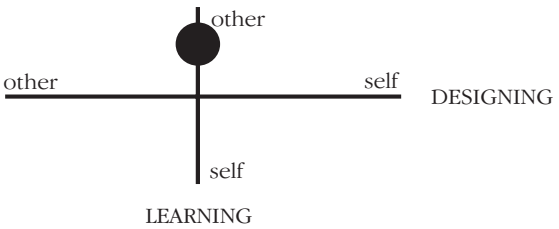
> A good project. I enjoyed it. I think I enjoyed it because for me it addressed as what I see as real designing. The idea was to find something that real people, ordinary people, could actually use and I find that area of designing appeals to me.



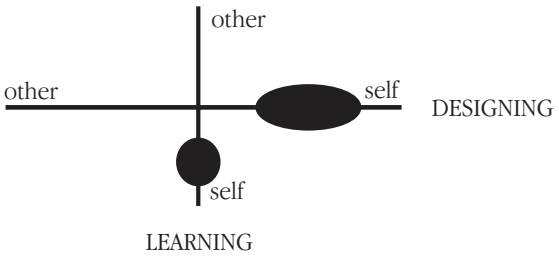
> . . I think the idea not to charge in like a headless chicken with the answer, so that's a real sort of learning thing



> . . and I think that learning commodity can be put into use when you're talking to children about how they're going to do a project.



and yet there seems something very important about clarifying what you are going to design for. You don't always get it right, I'm not sure that I got it right. Getting it right maybe isn't important, understanding that's what I'm trying to work towards is probably important.



My interpretation of these utterances is that the reason for a positive response to the project is readily articulated as 'real designing'; designing directed to trying to meet the needs of ordinary people. But this enthusiasm for designing does not prevent reflection on what is being learnt. This learning is then transferred to another context - when working as a teacher of design and technology.

Then a complex set of statements, interpreted (at present solely by the researcher) and paraphrased as, I'm coming to understand that you don't always get the designing right, and that this is less important than I previously believed. It would be tempting to go further, and propose designing is less important than learning through designing, but this is less interpretation and more, at present, unvalidated extrapolation.

Next Stage of the Study: Respondent Validation

Respondent validation means checking with participants to see if they recognise the validity of the analysis being developed, and it forms part of the approaches for checking reliability and validity in qualitative material. In distinction to the prevalent approaches in other fields of enquiry, neither are statistical. Some researchers have the whole manuscript, or substantial chunks, validated by some or all of the participants. This can be a political act by people who believe that the respondents own the data. The response to a manuscript by respondents is always interesting and can provide new data or confirm hypothesis but a person using ethnographic methods cannot assume that the respondents have sole access to truth. The researcher's account may be more valid than any participant's perspectives because the researcher has been focusing on the setting rather than living in it. Respondent's knowledge may be different from ethnographer's knowledge but not necessarily superior to it.

In recent years the use of the concepts of reliability and validity have been questioned by some researchers, and they have used the term trustworthiness, and its components of credibility, transferability, dependability and conformability,

Lincoln and Guba[6], or of authenticity criteria, Guba and Lincoln[7], as means to keep qualitative research honest and believable. These researchers would see these terms not as just different ways to say the same thing that positivists say, but that they indicate real differences.

As conceived presently, respondent validation in this study will consist of my respondents analysing their own interview transcripts using my schema, followed by them analysing interview transcripts of another respondent's interview(s). The interviews have been chunked into episodes in order to reduce the time required for them to undertake this task. Following the implementation of a pilot, this chunking maybe undertaken by the respondent. Throughout the process the aspiration is to be consonant with an ethnographic methodology in allowing the meanings that students are making of design and technology to emerge.

Summary

The paper describes some of the approaches being taken to explore what actually happens when students are engaged on technological design. It explores the use of a schema, grounded in the data, that is being used as an analytical tool to help uncover meaning in interviews with students of design and technology. Its genesis was the perceived tension between design and technology as a stimulus for change in the made-world, and design and technology as a stimulus for change in the learner.

It is proposed that there may be significant advantages in differentiating between the activities of learning and designing, and to whom these activities are directed. Although the concept of learning through designing has been pervasive, it would appear that learners need to be more self-conscious about the diversity of intentions that they are attempting to manage.

Layton[8], in examining published 'models' of design and technology activity, notes their lack of attention to the complexity of the activity of design and technology.

> However, they fail to represent some essential aspects of design and technology, perhaps their most significant weakness being their silence on what might be called the politics of the activity, ie who shapes the decisions at various points in the process and in terms of what value considerations.

This paper proposes a means of exploring this complexity, a means of mapping intentions in order that distinctions may be made clearer between *inter alia* designing, learning, self, and other. Drawing distinctions may allow a means to reduce tension and conflict and thereby allowing learners to be better able to control the process of learning and technological design.

This research was supported by a financial grant from King Alfred's College.

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