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Technology, creativity, and experience: Hermes dilemma and ethnographic authenticity

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Abstract
This paper is based on a three-year ethnographic study into how the everyday phenomenon of technology is construed by three social groups drawn from an educational setting. Using a triangulation of methods, involving an ‘opinionaire’, repertory grid interviews and unstructured interviews, a profile of individuals and group cultural and psychological attributes was ascertained. The data reveals that there are major differences in the ways in which technology is construed and that personal viewpoints are critical in the ways in which subsequent technological experiences are interpreted and applied to making value judgements. The implication of this is that there is a differential empowerment of ways of ‘seeing’ technology; by the same implication, there exists the capacity for suppressing ‘viewpoints’ that question the dominant way of ‘seeing’ technology. The dilemma referred to in the title of this paper highlights the problem of reporting research findings that lead to unsettling conclusions. The paper discusses the dilemma and the issue of authenticity with the implications for practices in technology education with the qualified view that personal experiences of the world underpin the process of creativity and innovative thinking.

Keywords: ethnography, technology, subjectivity, experians, emotionality, attributions

“Realist/positivist theories (of technology) argue that people categorise the world and objects the way they do because that’s the way the world is. Innatist theories argue that people categorise the world and objects the way they do because that’s the way people are. Social construction theories argue that people categorise the world and objects the way they do because they have participated in social practices, institutions, discourses and other actions that presuppose or in some way make salient those categorisations.” (Volney, 1991:156)

Introduction
In a paper presented at the 1997 IDATER conference (Jones, 1997), the author put forward the argument that current approaches to technology education adopt the viewpoint of a technologist; the discourse structures of technical exchanges are far removed from those of everyday usage. Traditionally, technology has the reputation of being a subject more suited to students who aspire to a career within engineering or in other industry-based practices (Hansen, 1997; Smithers and Robinson, 1992). The IDATER97 paper argued for a change in this perspective and described a multimethod approach to find out what specific social groups understand to be ‘technology’ and its cognitive, conative and affective aspects.

This paper arose from the wish to report findings from a three-year ethnographic study and how the findings can contribute to acquiring a different approach to understanding what it might mean to be technologically literate. This paper also tackles the problem of reporting research findings that lead to a radical shift away from conventionally accepted modes of thinking about research and pedagogy and towards new ideas about how technology education can be addressed. The paper discusses how personal experience of technology is marginalized for the sake of educational expediency, and yet is critical at a personal, cultural and social level if the complexities of technology are to be taken beyond assuming technology as a set of neutral ‘tools’. In the
final section of the paper, the author suggests an alternative theoretical framework for approaching technology education, arguing that emphasizing the personal and cultural elements of interpretation will remove the ‘technicism’ inherent in traditional technical perspectives of technology education and its form of discourse.

Neutral Technology and Sociological Perspectives

Most perspectives on technology start from [a] technology as an artefact or as a process, and [b] technology as a set of needs, values and ideas. These perspectives base technology in objective instrumentalism: that is, the total cognitive experiences of the material properties and the repertoire of human wants amount to the assumption of a fundamental nature about the forms that technology takes. Technological instrumentality assumes technology as a repertoire of neutral tools that can be examined in a reductionist fashion. Authors who have set out to try and search for a workable philosophy of technology tend to fall in to the trap of establishing a technology-human relationship and hence relating to the former as it were an existence independent of human involvement - there is technology and there is us. An outcome of this viewpoint is that it sets one on the incongruous path of technological determinism. This view contends that technology determines human behaviour, social relations and societal practices (Grint and Woolgar, 1997). Technological determinism is a commonly accepted explanation for the relationship between technology and society.

Many sociological and philosophical perspectives assume that there is some kind of essence or fundamental objective behind the need for either the technology to advance in its material aspect or for human society to progress along the lines predicated by rationality. Technological rationality, however, does not explain how some new technologies come to be accepted by society and how others become rapidly obsolete or fail entirely to enter mainstream consumption.

Figure 1 represents the popular trend for basing a perspective of technology. This starts from an approach to thinking about technology distinguishing between artefact or procedure and a set of norms which express shared societal values and ideas.

Social construction approaches such as actor-network theory (Callon, 1986; Law, 1988) and social construction of technology (MacKenzie and Wajcman, 1985; Bijker, 1987) move away from viewing technology as object and towards examining relationships and the consequential steps made in human decisions in the development of technological structures. The author would argue that to develop new pedagogy for moving technology education out of its technical roots towards a broader mainstream education, it is important to discuss technology in its everyday role and go beneath the social relationships that unfold. Focussing on technological possibilities and human interactions and the outcomes depends on being able to ascertain social and cultural relationships and intentionality implicit in them. This means adopting an approach that moves the analysis of technology as object-human relations towards a holistic study of the collective experiences of technology and the experiences of situations in which technology

* 'technicism' is a term used by Keith Grint and Steve Woolgar that refers to technology as an agency capable of being studied objectively using a reductionist approach.
Table 1: Criticisms and new criteria for evaluating ethnographic data. (Adapted from Denzin, N.K., 1997)

<table>
<thead>
<tr>
<th>Positivist Criticisms of Interpretive Ethnography</th>
<th>New Criteria of Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiction</td>
<td>Verisimilitude</td>
</tr>
<tr>
<td>Not objective</td>
<td>Dialogue</td>
</tr>
<tr>
<td>Not valid or reliable</td>
<td>Construction of Facts</td>
</tr>
<tr>
<td>Biased texts</td>
<td>Scenic method</td>
</tr>
<tr>
<td>unrepresentative sample</td>
<td>Multiple points of view</td>
</tr>
<tr>
<td>Too literary</td>
<td>Emotion</td>
</tr>
<tr>
<td>No method of verification</td>
<td>Narrative truth</td>
</tr>
<tr>
<td>How to read?</td>
<td>Praxis</td>
</tr>
<tr>
<td>Inconsequential topics</td>
<td>Emotion-lived experience</td>
</tr>
<tr>
<td>Journalism</td>
<td>Language</td>
</tr>
<tr>
<td>No science</td>
<td></td>
</tr>
<tr>
<td>No hard facts</td>
<td></td>
</tr>
<tr>
<td>Personal biases</td>
<td></td>
</tr>
</tbody>
</table>

is present. An ethnographic study was used to explore personal constructs of technology and to create ‘vignettes’ based on the details about the social and cultural constructs provided. This allows the author to propose an alternative framework for studying technology.

Interpretive Ethnography: Personal and Collective Meanings for Technology

The premise behind using an ethnographic approach incorporates the argument that technology is an inseparable part of society, culture and meaningful experience, rather than being ‘expert knowledge’. This implies that any study should look at the personal as well as the collective experiences of technology. Human beings are continuously engaged in activities directed at objects, whether actual or residing in the mind, that imply intentionality towards raising consciousness about them. The intentional reference of mental acts towards objects constitutes an experience that can be both conscious and unconscious in the sum of perceptions (Mohanty, 1972). For this reason, the author will refer to the human organism as an ‘experian’* rather than as an individual or as a subject.

Uncovering the complexities embodied in intentional acts towards that which we understand to be technology needs a contextual approach based on ethnography to present a holistic picture. Interpretive ethnography is an advancement on traditional ethnography, which presumes that visual texts, fieldwork notes and transcribed conversations can be rigorously and scientifically analysed in a realist fashion, based on criteria situated in objectivity and generalisability.

Interpretive ethnography stresses subjectivity, emotionality, feeling, and the many possible points of view in its account of the sample groups in the study. Its validity is founded on reducing the use of discourses of power and ideology in providing authoritative claims to the truth (about technology). Instead, the interpretive ethnographic text bases its legitimation on verisimilitude and whether the text has the capacity to reflect what the reader can believe in. Also, the ethnographic text attempts to present a nonlinear account with multiple centres in which many people speak and present their own perspective of the situation. Denzin (1997) provides a table which identifies main criticisms, by the positivist camp, of interpretive ethnography and alongside provides an extended list of evaluative criteria for the new ethnographic process (see Table 1).

Ethnographic Fieldwork

Over three years, the author has been engaged with three social groups exploring how each construe technology, or, put in other words, how they construct ‘facts’ about technology.

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* ‘Experian’ is the author’s word for the human organism who is a self-recreating, self-revealing potentiality through a use of events attributed to thought, language, matter, space and time in the totality of things, rather than an individual as a self-conscious, fully knowable agency or as the subject as a ‘free self’ (in a phenomenological sense) defined by the use of language.
As was outlined in the 1997 paper, the ethnographic process was based on a triangulation of methodologies; a combination of an 'opinionaire', a repertory grid test and an unstructured interview. Denzin (1970) discusses triangulation as a way to vouch for the accrued data by overcoming "the intrinsic bias that comes from single method, single observer, single theory studies". According to Denzin, "triangulation involves varieties of data, investigations, theories and methodologies" with the additional purpose of enriching the amount of detail than would possibly be obtained from any single method.

The fieldwork centred on three sample groups drawn from an educational context. The first group comprised Year Ten school students (n=197); the second, Year One BA(Ed) students (n=138); and the third group, technology educators (n=45). Each was persuaded to complete an 'opinionaire'. The opinionaire acted more as an individual call to elicit what each experian 'felt' about technology. It achieved this by asking the experian to decide and select technological from non-technological images (see Appendix 1 for a graph of the selection frequency), choosing an appealing and non-appealing image from the array, and responding to a series of statements indicating how much they agreed or disagreed with each. It was on the basis of the types of responses in the opinionaire that the second round of the fieldwork found its next body of experians to undergo the 'repertory grid test'. (A fuller account of the methodologies can be found in the 1997 IDATER paper.)

Twelve students from the original Year Ten student sample, twelve students from the original Year One student sample and five technology educators were involved in the repertory grid elicitation procedure and follow-up interview. The repertory grid test is not really a test at all, more like an extended conversation focusing on stimuli in the form of 'elements' (the images) to elicit constructs. The elicitation used the images in threes, known as the triadic method, and asked the experian in what ways are the first and the second image most alike and different from the third (Harre, 1993; Pope and Keen, 1981).

The ensuing dialogue is taken to indicate the ways in which each image is personally construed; the statements made are the personal constructs upon which interpretations about technology are built. The subsequent unstructured interview drew freely offered insights about technology, which might have been suppressed by the design of the opinionaire and the repertory grid test. All grid elicitations and interviews were recorded, then analysed and coded. It is due to the quality of using the multimethod approach that the authenticity of the ethnographic process can be affirmed and that the collected material is contributed by the experians rather than constructed through statistical or positivistic reasoning.

Public and Private Spheres of Experiences

Ethnographic findings are extensive by nature and rich details emerge from the fieldwork, so much so, that the means to discuss the findings is beyond the limits of this paper. However, summary details are possible. After listening to the taped interviews, during the repertory grid elicitation and the ensuing unstructured interview, an index to code aspects of statements given was devised. This index is based on [a] the recording of constructs which are consistently used for the same set of repertory grid elements and which constructs are more widely used and which elements are taken to be more alike; and [b] information extracted from interview material. Items for the code [in bold] were as follows, each accompanied by a brief definition:

- Physical need-mention of any requirement or relation to bodily functions, physical well-being and extension of ability;
- Psychological need-mention of any requirement or relation to mental functions, states of mind and mental well-being;
- Physical or psychological state other than a need-mention of any requirement or relation to knowledge, probity, verbal and textual exchanges;
- Practicalities-mention of any property of or relation to the utility, purpose, limitations and developments;
- Identity-mention of an endowment of or relation to status, history, cultural values
and norms;
• Property-mention of any endowment of or relation to quantity, scale, shape, matter, manipulation, and behaviour.

These codes can then be used describe attributions (Heider, 1944) for the construction of technology in five dimensions. Fritz Heider believed that people are motivated to make sense of the world in order to improve their ability to predict and act on the environment. He cited attributions as a way of analysing how we make inferences about causes and made a link between emotion and attributions. Social construction of attributes focuses on the ways people make inferences through everyday discourse. Culture is a major influence as a source of attributes and, although belief systems vary across cultures, they serve the same function of legitimising the social hierarchy (Pratto et al 1997). The attributes derived from the ethnographic data are based on the overall analysis to establish patterns and nodes representing centres within heterogeneous discourses. The dimensions of technology according to the attributions are:

• stable/unstable-is the construction process and subsequent outcome a steady, incremental affair or is it subject to changing rapidly over time?
• global/local-does the construction process sustain the belief that any consequences are broadly significant, or is the consequence extensible only to the immediate environment?
• internal/external-is the construction process and outcome entirely based on self-developed insights within the person or is it influenced by insights from other cognisant agencies?
• personal/universal-is the construction process and outcome merely self-applicable or can it be applicable for everyone?
• controllable/uncontrollable-is the object of the construction process and outcome subject to some amount of personal influence or is it governed and decided on by unspecified agencies?

What the study uncovered was the multiplicity of viewpoints of technology, with each group providing a collective signature for the way they construed technology. The attributional pattern refers to the dimensions about technology that formed the backbone of the construction process for multiple experians. Appendix 2 shows cross-group profiles of attribution patterns, along with the authors evaluation of these patterns based on rereading of these patterns based on rereading of the transcripts and on further discussion with those who participated in the interviewing.

Conclusion
What is important to accept about these findings is that they are not about establishing normative beliefs that can be applied to everyone, nor are they accepting that there is a right and a wrong perspective of technology, what it is, or how it should be thought about. Rather, it presents the findings as an ecology of relations versus meanings at the level of an experian’s mental states and at a collective level. With technology education’s reliance on process-driven models of technology (see Richard Kimbell et al) there is the emphasis on objective assessment as the means to chart the development of technological practice. This means that any assessment of technological practice is from a standpoint outside of the artefact. This study has shown that there are mental events, which occur without the artefact, preceding its actuality, yet nonetheless, which contribute to the way it is constructed as a reality. The implication of this has far-reaching effects on the school-based practice of the technology curriculum and the promotion of creative and original thinking. To see education as cultural transmission, and cultural transmission requiring cultural learning, implies learning and transmission are being separated only by convention. With the role of technology educators as purveyors of cultural means, there might be the bias of committing to research and pedagogy that supports their own viewpoints of the convention of learning about technology. An inquiry into cultural learning that promotes technological literacy will have to step outside of conventions of its own discipline and embrace alternative perspectives of technology, particularly those...
side-stepping the technology-human duality. This research has shown such an inquiry and the findings suggest a ‘multi-centred’ approach to thinking about technology is more appropriate, where neither one model nor a single form of discourse dominates interpretations of technology.

References


- Mohanty, J. N. (1972), The concept of intentionality, Warren H. Green Inc, Missouri, USA.


Graph showing the percentage frequency of image selection from the opinionnaire across the three study groups.
### Appendix 2

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Year Eleven students</th>
<th>BA(Ed) students</th>
<th>Technology educators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attribution pattern</td>
<td>Unstable-Local-Internal-Personal-Uncontrollable</td>
<td>Stable-Global-Internal-Personal-Uncontrollable</td>
<td>Stable-Global-External-Universal-Controllable</td>
</tr>
<tr>
<td>Evaluation</td>
<td>This pattern indicates that constructs elicited from these experiences are apt to change and beliefs are only confidently applied to immediate experience in accordance with the range of constructs which relates only to themselves. It is notable that the patterns ends with the experiments feeling they are not in control of the world they directly experience.</td>
<td>This pattern indicates that constructs elicited from these experiences are not subject to switching. There is the belief that they do not expect to share the same constructs when opining about political or ethical issues with a broader audience.</td>
<td>This pattern indicates that constructs elicited from these experiments are relatively steady and that there is an appreciation of consequences of technological factors being widely spread. Constructs about technology can arise from interpersonal exchanges and this belief arises from some consensus about the qualities of some technological aspect.</td>
</tr>
<tr>
<td>Content coding pattern</td>
<td>- extensive references to physical needs; - extensive references to psychological needs; - references to a physical or psychological state other than a need usually raising issues about doubt about perceived purpose and of the probity of technical institutions; - references to identity in locating acceptable positioning of self in relation to peers.</td>
<td>- extensive references to physical needs; - references to psychological needs; - extensive references to a physical or psychological state other than a need usually raising issues about probity and the justification to the self when trying to overcome contradictions that arise around environmental issues; - references to identity in locating acceptable positioning of self in relation to global issues and what the perceptions of the social norms are.</td>
<td>- extensive reference to practicalities; - references to property; - references to a physical or psychological state other than a need usually raising issues about importance of awareness, duty, personal requirements; - references to identity and the existence of norms.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>It would seem that where physical needs are concerned such as physical safety, necessity and moving from one place to another, and where psychological needs refers to influencing the way one feels, these are intimately bound up with the moral justification and the sense of self. These aspects tend to be in a state of flux. These shifts in reflection are attributed to the variable meanings built in to artefacts.</td>
<td>It would appear that the physical and psychological needs are justifiable on the basis of introspection and this later enables the handling of contradictory beliefs to be dealt with in ways that reflect a broader awareness of contentions and social behaviours.</td>
<td>This list appears to emphasise the dynamic rather than the social concerns pertaining to technological features. The raising of awareness applies socially insofar as it reinforces the need for capability and resources to be part of society. The constructions of technology are, largely, impersonally directed and address physical qualities of technology. These qualities are established through readily acknowledged consensus.</td>
</tr>
</tbody>
</table>

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Table showing modal attribution patterns from across the three study groups and the content coding patterns of the interview transcripts that provide a mental profile of the experiences within the study groups