CHAPTER 1

INTRODUCTION

Occasionally a new technology appears which promises to change our lives for the better. It either improves our performance by working more simply and at a faster rate, or it creates possibilities and options that did not previously exist. Computational machines are one such technology. Computers tirelessly perform calculations far beyond human capabilities. They also create different possibilities for interacting with the world by applying these calculations to information processing, and thus, form a new arena for social interaction. Through computers, information and communication technologies have become a major vehicle for change in the information age (Castells, 2000). Technologies like the Internet continue the social evolution of communications and information that began with speech, writing and printing (for an analysis of these influences see Ong, 1982). The Internet and the World-wide web (Web) represent the latest "disruptive" technologies (Christensen, 1997) by creating new opportunities for identity formation that disturb values that have been the mainstay of communication for a long period of time. In the process, the computer is generating new ethical challenges in many areas of modern life. All the norms of a pre-computer society, including those associated with education, are now open to question (Kizza, 1998).

For the most part, decisions to adopt these technologies for teaching are justified on technical grounds. Yet, despite a seemingly straightforward technical criterion of using the most appropriate tool for the job, there is little research that unambiguously shows whether introducing technology into teaching actually improves the quality of student learning (for a review of the "no significant difference phenomenon" see Russell, 1999). Technology is continually changing and empirical studies of the characteristics of technology do not provide answers that remain meaningful for very long. Without a normative dimension to guide decision-making, it is not surprising

that Heinich (1984) found that the research on comparative performance has never influenced teachers' use of technology. By ignoring the values in technical objects, scientific accounts of technology have simply been unable to give guidance on the right way to teach.

Meanwhile, evaluative reports continue to criticise technology for failing to live up to its promise of providing greater learning opportunities for students. For instance, Landauer (1995) offers compelling evidence that computer-based improvements in productivity in most industries are often marginal. Taking the example of computer-aided learning, the best case of improvement he was able to locate was an annual two per cent increase in student performance over the fifteen years of the study (Landauer, 1995, p. 201). Furthermore, the outcomes that technologies are able to achieve for learning are usually related to lower-order educational goals, such as the memorisation of information. Alexander, McKenzie, and Geissinger (1998) found similar results in their review of one hundred and four Australian information technology projects funded to improve higher education teaching. Less than a third actually improved student learning and less than a quarter reported an improvement in their stated goals for teaching productivity or extending access to resources (Alexander et al., 1998, pp. 54-55). Similarly, Mioduser, Nachmais, Lahav, and Oren (2000) found that the pedagogical approaches favoured by educators, such as interaction and collaboration, are not being implemented in the majority of educational web sites. Instead, the educational web sites reviewed by Mioduser et al. were structured in a traditional, hierarchical way with the most common activities focused on information retrieval and encouraging rote learning.

Larry Cuban (1986; 2001) found this to be a consistent pattern over the history of the use of technology in education. Since the advent of radio, the introduction of any new technology began with high expectations for improving education, followed by extravagant promotional rhetoric and new organisational policies to encourage an ample availability of the machines but which ultimately resulted in limited classroom use (Cuban, 1986, p. 5). In the case of personal computers, Cuban (2001, p. 138) estimated that fewer than five per cent of teachers used computers in their teaching

on a weekly basis and less than twenty-five per cent on a monthly basis, despite what Cuban calls an "over-abundance" of computer and information technology (p. 103).

Cuban's analysis, however, suggests that far from being "luddites", academics adopt technologies that match their beliefs about student learning and which add to the psychological rewards of teaching (Cuban, 2001, p. 170). Academics are indifferent to changes that they see as irrelevant to their practice, increasing their burden without adding benefits to their students' learning or weakening their control in the classroom. In contrast, Cuban found that almost all academics have adopted the technologies that are reliable and useful in classrooms. Equipment such as the chalkboard, textbooks, overhead projectors, video cassette recorders and photocopiers have, over time, all been added to academic teaching repertoires because they are simple, flexible and responsive to teacher-defined problems (Cuban, 1986, p. 58).

There remains a wide gap between educational theory and practice regarding the value of technology for learning. At some stage teachers have to decide among competing ideas and determine which is most suitable to the particular circumstances at hand. Theories of educational technology have not been able to account for a number of technical impasses that philosophical analyses predict and explain, such as technology enabling new types of interaction, identity formation and culture. This suggests that there is a lack of conceptual tools in the education technology community for comprehending its own methodological difficulties. Without an external authority or compelling evidence of the right way to use technology in teaching, individual lecturers are left to determine their own appropriate course of action. This thesis is about understanding the choices made in higher education, drawn from its own values and the situated rules of conduct they describe.

Even simply framed questions are fraught with methodological implications, not the least of which is, how do we research the social and educational effects of technology in a meaningful way? This chapter begins to explore this question in Section 1.1 with an account of traditional methods of researching educational technology, before suggesting an alternative methodology based on the work of

Jürgen Habermas (1988; 1990; 1998). I shall draw on critical theory at length throughout this thesis as it offers a critical analysis that is able to reveal the distortions that current research into educational technology has overlooked and thereby provide the methodological basis for technology assessment. "Critique" here is not simply negation but means getting to the origin of something and exposing alternative interpretations for the purpose of highlighting their contradictions and incompleteness. Section 1.2 discusses an example of this kind of analysis that occurs when social theory is applied to education. These analyses are based on normative inquiries which investigate the influence of value judgements. In the case of Habermas' critical theory, they look beyond the surface descriptions of empirical science to reveal the underlying social structures that can be discerned by looking at how the dominant interests are incorporated into the structures of society, including technology.

In Section 1.3 I will draw out some of the methodological implications of Habermas' theory from his essay "What is Universal Pragmatics?" (1998) in which he outlines the tenets for his method of critical reconstruction. It should be understood from the beginning that the interpretation of Habermas favoured here is from the mainstream of Habermas studies, in which "critical theory" is construed as the critical methodology of what Habermas calls "reconstructive method". While it is closer in tradition to technology assessment than to technology evaluation (Van Den Ende, Mulder, Knot, Moors, & Vergragt, 1998), it is only indirectly connected with any elements of particular social-critical political agendas that also call themselves critical. In the same way it is not a study of technology in the critical pedagogy tradition (for examples see Castells et al., 1999) but uses the reconstructive method to understand the underlying structures that influence the use of technology in higher education.

For Habermas, the generality of theoretical knowledge depends on the deep structures only accessible to understanding. Habermas argues we should be interested in the deep structures of meaning, as these are the enduring parts of a discourse. Section 1.4 explores the implications of an integrative analysis of the deep structural aspects of our understanding for educational technology research in higher education.

Habermas uses an analysis of the pragmatics of language to identify and reconstruct universal conditions of possible mutual understanding. Since Habermas sees meaning as an intersubjective construction, the exhibition of understanding of meaning can only occur through participation in communication. This is a structuralist kind of analysis that is held to be universal in the weak sense of constituting a deep structure of society that can be applied to a wide variety of contexts.

It is necessary at this point to make a distinction between communications and information technology on the one hand, and the communicative structures found in all technology on the other. The political nature of technology is poorly theorised in Habermas' later work (Kunneman, 1990), unless one considers Habermas' theory of communicative action is already formed as a theory of technology (as Krogh, 1998 argues). At the level of socially contextualised technologies, this does not provide an adequate methodological description of how symbolically coordinating media, which would include computer-based communication, transform between their mediating and coordinating functions (Rasmussen, 2000). Section 1.5 therefore compares Habermas' theory with a critical theory of technology proposed by Andrew Feenberg (1991; 1995a; 1999b) who does clarify the role universals play in Habermas' account. Feenberg has applied this kind of critical theory to a number of specific technologies, including online learning, and in the process he reveals a number of critiques needed to determine the deep communicative structures that reside in technology. The final section of this chapter (Section 1.6) outlines the key features of the methodology of a critical theory of technology for the research of technology in higher education. I will briefly expand on what questions this methodology raises for studying the discourse of academic advice in order to reveal contradictions in the use of educational technology. It is this reconstruction that will form the foundation for presenting alternative interpretations in later chapters of this thesis.

1.1 Research into Educational Technology

The lack of evidence that technology improves learning has done nothing to end the debate over whether such a relationship will ever be demonstrated (for the alternative

positions see the debate between Clark, 1994 and ; Kozma, 1994). Notwithstanding the lack of research consensus on the impact of technology on student learning, an optimistic view of the benefits of technology for learning has been a recurring theme throughout the history of educational technology (Reiser, 2001). Thomas Edison famously predicted in the 1920s that motion pictures would replace textbooks in the classroom (Saettler, 1990). Radio was expected to make classrooms obsolete and television would revolutionise education by replacing teachers in the classroom (Cuban, 1986). Teachers, however, have not been replaced in any of the areas in which it was expected they would be, and indeed university lecturers are now working longer hours than ever before to keep up with the demands of the latest technology, with few demonstrable improvements in their teaching (McInnis, 2000).

For some time, educational researchers, like Gage (1978), have insisted that good quality evidence to inform teachers' practice already exists. Thus far it has not been synthesised in a way that relates to teachers, with the result that educational research has a poor reputation among practitioners. Pring (2000) argues that there is a lack of adequate theoretical frameworks that can be brought to bear on educational understanding. He sees a tendency for different educational research paradigms to fail to recognise the different philosophical problems they raise as one of the reasons for the gulf between researchers and practitioners. This is equally true of a good deal of educational technology research, most of which has not been able to provide a clear definition or direction for educational technology practice (Ely, 1999; Hannafin & Hannafin, 1995; Heinich, 1984). What the extensive literature on educational technology does present is a variation in beliefs about the ability of all forms of technology to assist students to learn. At one extreme there are those who see computers as embodying educational characteristics such as "learner-centeredness" (for example, Khan, 1997) or "interactivity" (for example, Sims, 1997). At the other extreme, technology is merely a tool at the disposal of teachers with no intrinsic value of its own. Educators can adopt educational technology to bring about more effective student learning, but there is no further consequence in the student and teacher interaction than that (see, for example, Clark & Sugrue, 1995).

Faced with the observation that the current approaches to research have not been able to help with understanding educational technology, Heinich (1968; 1984) suggested an approach to overcome the methodological impasse in educational technology research. Heinich (1984) turned the concept of "educational technology" on its head to argue that teachers' use of technology is more likely to be influenced when educational technology is thought of as a sub-set of technology rather than a sub-set of education. In this view technology is conceived as the means to achieving educational ends. Heinich points out that the commonly held view among educational researchers that education is the parent discipline has not provided meaningful answers about the technology of education. Instead, he called for a study of technology that accounts for the context of social and institutional relationships as a way of discovering overlooked insights into the educational use of technology. Only with technology as the primary field of study is it possible to understand what, if any, educational values exist in technology.

Despite the lack of progress in finding empirical evidence that technology improves student learning, the kind of normative study called for by Heinich has not been completed. The claim that educational technology is a sub-set of education has forced technology out of the foreground of thinking so that it no longer requires attention on its own account. This has the consequence of teachers, whose only relationship to technology becomes that of a passive consumer, not needing to take responsibility for any criticism concerning the intrinsic influence technology may have on their students (Hannafin & Hannafin, 1995). Without guidance of a coherent conceptual model for working with technology, university teachers are put in the position of teaching without the concepts to analyse and discuss their own practices or justify their position. This is made all the more difficult by the great level of specialisation which goes into "high" technology and goals like "invisible computing" (Norman, 1998) that suggest the most sophisticated technology is one that sits unnoticed in the background.

All of which suggests it is necessary to restore a dimension of critical reflection to the theory of educational technology. Among other things, philosophy can be seen as a critical examination of our presuppositions that seeks to study the structures of our

thinking to expose its foundations and assumptions. This thesis takes the view that a philosophical approach to investigating technology is necessary as we take a number of things for granted in our interactions with technological objects. Rather than attempting to provide the authoritative definition of "educational technology" I will raise some of the issues about the nature of technology in general that will bring us closer to an understanding of the core question of this thesis, what is educational about technology? In answering this question, this thesis will demonstrate that technology is a hybrid concept that requires an analysis of both the technical object and the meaning derived from that object (for a further discussion of the two sides of technology see Feenberg, 1995a). Hence it is more useful to think of technology as being co-constructed, so that technology contains the values of its creator, which in turn can reinforce the political, social and cultural structures of society.

Since technology mediates the world, and educational technology is how students and teachers interact with the academic world, it is up to educators to make their technology mediate the values important in higher education. There is no non-technological world from which humans are able to objectively judge the effects of technology on their interactions. The basic task for a philosophy of technology is to critically examine the nature and significance of objects of human activity (Achterhuis, 2001). Researchers of technology argue that it is much more fruitful to embark on a philosophical reflection on technology than to take the traditional technical approach to the study of technology. For example, in examining the literature on technology Mitcham (1994, p. 137) found that a philosophical method that includes the professional values and insights of engineers was inherently more comprehensive than the narrow, value-free definition of technology provided by engineers themselves. The engineering view outlined by Mitcham suggests that technology is best left to experts who understand the mechanical, electronic, or chemical workings of technology, exclusive of philosophical critique and review. The primary concern with a purely technical perspective on technology is that it removes the ethical and political dimensions as valid considerations for investigation. It fails to recognise that there are always value decisions made in both the design and the use of any technology.

The reification of human decision-making in the making of technology represents irreversible decisions, in the sense that these decisions are built into the technical objects of the technology. If our educational ethic requires students to take greater responsibility for their own learning, the pre-determined pedagogic decisions already built into technology may restrict the scope of a self-critical appropriation of the students' own developmental history. For that critical process, (that is, a process of both positive and negative judgements) we need a critical theory that can help inform our thinking about social structure, politics, pedagogy and practice in which knowledge and its creation are seen as part of critical exploration. This would suggest a need for a social science view of technology, in which, as Rasmussen (2000) observes, technology was always considered to be a social fact, beginning with Marx and Weber who between them laid the methodological foundations for investigating the relationship between technology and social action.

1.2 Social Theory and Education

As outlined above, there is clearly no justification for another evaluative study of educational technology that will be simply overlooked by educators. A critical methodology has the potential to overcome this problem by moving towards using the educator's own values rather than insisting on the acceptance of external values in decisions concerning technology. This positions the educator as critic where the goal is to identify the underlying theories that influence practices so that they can be exposed to the proposition that there may be alternative approaches available. Empirical evidence can then be used to discern the extent and form of the implementation of these theories. This is not the same as taking the attitude of a cultural critic opposed to all advances in scientific knowledge. It is simply asking whether the implementation of these achievements affects our self-understanding as lecturers and students.

This assumes that there are ethical positions on which to determine the appropriate ends to which technology should be used. The ethical questions of technology centre on normativity, or how things ought to be. Normative inquiry is an area of ethics that attempts to discover the rules of conduct that enable us to operate defensibly (that is,

with ethical justification) in particular contexts. As the traditional basis of educational technology theory has been connected with and generated from experimental laboratory or classroom studies, researchers have been relatively slow to develop the social and cultural concepts in their studies. Often their value assumptions have been tacit rather than implicit. Yet, concentrating on the social and cultural concepts can be seen as an answer to the overly individualistic perspectives of psychology, which have hitherto dominated theory in the field of educational technology (for examples see Gagne, 1987). Sociologists of education, in contrast, have been concerned mainly with the structural causes of social inequality, including inequality of educational performances (Levinson & Sadovnik, 2002, p. 10). The focus of these investigations has, to a large extent, been a socio-economic enquiry rather than a study of the pedagogical impacts of classroom technologies, but the broader concept of participation remains at the heart of many sociological questions. So a sociological approach can attempt a moral reconstruction of technology without requiring a wholesale rejection of technology, providing it is also critical in the sense of promoting negotiation and progressive normative judgement.

Critical social theory is involved in the analysis of the complexities of power in order to draw attention to the political nature of everyday interactions. The version of social critical theory considered in this thesis has been formulated by Jürgen Habermas (1984; 1987c; 1990), since his version has been the inspiration for both educational thinkers and for critiques of technology, though rarely educational technology (Nichols, 1989). It is the wide application of his thinking that makes Habermas undoubtedly the most influential critical theorist today. Habermas formulated his theory of discourse ethics to address the questions of how we evaluate the normative elements in political decisions that coordinate our societies. He attempts to answer questions on the appropriate reasons to support moral decisions and how such judgements can claim to be valid. While Habermas draws insights from moral judgement in order to illuminate our understanding of political judgements, the same questions and processes are equally convincing for questions of technology in higher education.

Rather than write a separate chapter on the history and traditions of critical theory, it is my intention to bring critical theory into each chapter whenever it is relevant. However, to set the scene, it is necessary to provide some background to the main tenets of Habermas' work. Critical theory is a way of thinking and acting so that theory and practice are interwoven. One of the best descriptions of Habermas' version of critical theory is provided by McCarthy (1991, p. 40), who characterises it as a theoretically informed criticism of basic institutional structures or cultural practices. Criticism here does not necessarily mean negative but rather involves an internal review that reveals inconsistencies, inequalities and external dominance. It is an ambition of critical theory to identify and analyse the normative aspects of society. These normative aspects provide the critical standpoint from which to evaluate social change to determine whether society is becoming a better and more just place. Thus, Habermas' thought is not guided by a predefined agenda of critical content but by a profoundly democratic approach to the methodology of social problem-solving.

Educators can potentially see a role for themselves in the developmental learning that is evident in a Habermasian approach to social evolution. One of the key considerations for the theories of Habermas has been to provide a framework that looks beyond the external descriptions that are so dominant in the sciences. He goes beyond the surface appearance to deep structures of society, using language as his paradigmatic case. In short, Habermas argues that as humans are communicative beings, the analysis of language reveals important aspects of societal structures. Habermas presents us with the proposition that society is built on the foundations of communication, and communicative structures consequently influence all aspects of human action (Habermas, 1984). The ideal of language is both open to change and a tool for coordinating interactions in the world. Language is only able to coordinate human actions because there is some element of consistency in human behaviour. The consistent elements that allowed language to develop represent a weak form of foundationalist epistemology in which meaning remains provisional and open to multiple interpretations.

Thus, communicative analysis reveals something fundamental about social interaction. It is argued in this thesis that with its synthesis of critical theory themes, the theory of communicative action presents the most likely candidate for a framework that can identify areas of shared meaning between education and technology. A critical analysis brings together the ontological, epistemic and socio-linguistic aspects of technology which, as we will see in Chapter 2, have important implications for education. I have adopted a Habermasian framework because I believe it has the greatest chance of revealing something fundamental about the interaction between university teachers, students and technology in higher education. There are many conceptions of higher education and the discussion of the distinctive nature of the university has a long history (for discussions of the values in universities see, Barnett, 1990; Habermas, 1989a; Jaspers, 1960; Langslow & Smith, 1999; Newman, 1996; Readings, 1996). For example, Barnett (1992) argues that the essence of a higher education implies attaining a particular level of intellectual achievement. Critical thought is still widely held as the defining characteristic of universities (Barnett, 1997). Nonetheless, by far the greatest amount of analysis of universities is from the post-modern perspective (for a review of five recent contributions see, Blackmore, 2001). Critical theory would therefore appear to be an unlikely candidate for a critique of higher education where notions of academic freedom have favoured the neo-conservativism of subjectivism and the relativised curriculum. Yet, the association between rationality, communication, critical thinking and higher education marks universities as one of the most practical avenues for Habermas' theory of communicative action. However, it is beyond the scope of this thesis to provide a general philosophical defence of Habermas' position. Instead, I hope to demonstrate its usefulness in reconstructing the use of technology in higher education.

1.3 Habermas' Reconstructive Methodology

In this thesis I argue that there are underlying structures of social interaction that can be discerned from looking at the structure and function of particular technologies. This is due to a fundamental link between humans and technology that involves language. Language was the first tool and all subsequent tools build on the legacy

created by language. All tools include an "interface" by which their actions are controlled and interpreted by their users. Technology, therefore, has the same two-level structure as other communicative forms where it is possible to analyse both the technical object and the cultural values signified by the object. In other words, the objective side of technology can be analysed as a technical feat of engineering, while the subjective side of technology can be read as a text (Woolgar, 1996).

A large portion of Habermas' writing is methodological in that it analyses how research in the social sciences should proceed. Habermas' reconstructive methodology is a reconciliation of theory and practice argued for by Dewey (1948). In some disciplines, like the natural sciences, these questions have, to a great extent, been answered by the "scientific method", that is, the use of observation and experimentation to falsify a particular hypothesis (Chalmers, 1999). There is, however, no such methodological certainty for the social sciences, where the subjects of study are capable of interpreting their actions by themselves. Instead of seeing this as a failing of the social sciences, Habermas argues that there is something fundamentally different about the human world. What is unique to the human world is that humans are immersed in language and there is no external viewpoint from which to collect or represent linguistic data (Habermas, 1988). Researchers of the human world therefore do not have the same relationship to their subjects as researchers in the natural world. There consequently is no reason for social sciences, like education, to follow the same methodological path as the natural sciences. Essentially, Habermas argues that the "subjects" of research are also participants in the process and use of research.

However, like science, critical theory is interested in the formation of theory, but it does not take the construction of knowledge to be a straightforward, dis-interested, process. Both positivist and interpretivist traditions of research have come under attack in the social sciences (for a wider discussion see Outhwaite, 1987). Positivism is faulted for being reductionist and losing sight of questions of social norms, while interpretivism is criticised for declining into relativism. Habermas' critical theory proposes to overcome these shortcomings through a synthesis of both traditions. This integration is possible because Habermas makes the distinction between research

based on observation and research based in understanding (Habermas, 1998, p. 29). Observation is the hallmark of empirical studies directed towards external objects perceivable by an individual. Understanding, on the other hand, is an interpretative process that requires social participation in communication to develop shared meanings. Habermas argues that it is not possible to have direct access to an observation, other than for the original observer. Understanding therefore relates to the processes of symbolic expression, namely the words and illustrations used to describe first-person observations. All research is therefore open to reinterpretation to take into account alternative explanations or alternative theoretical frameworks rendering research open to participation by members of the community upon which the research is done.

1.3.1 The Critical Reconstructive Method

Habermas arrived at his critical social theory by applying language analysis to intersubjective interactions at the level of the whole society. The term "reconstruction" was borrowed from field linguistics which reconstructs the deeper structure of a language (that is, grammar) from observations of a limited set of instances of its situated public use. Just as a field anthropologist reconstructs the cultural norms of a society in a similar way, so the critical theorist reconstructs the political process of cultural formation and the reification of sectional interests through observation of a finite set of communicative processes in which norms are contested, reaffirmed or changed. All of these "reconstructive sciences" produce fallible, testable, empirically grounded theory. But only critical theory allows the identification of silenced voices and unrepresented interests.

For Habermas, a presumption of the possibility of reaching an understanding lies behind every speech act, where an understanding is said to be an agreement to coordinate actions (Habermas, 1987c, p. 262). Habermas uses the same principle, that reasons lie behind claims to validity, as a framework for investigating the enduring structures of social situations. This involves three broad stages of identifying clear cases in which the reactions of the subjects involved in social interaction converge, developing a structural description of that case and finally

rendering less clear cases more clearly (Habermas, 1998). The starting point is the paradigmatic case as these represent what we have already come to accept in order to understand. Habermas points out that only well-formed symbolic objects provide the resources for making sense of experience and therefore have the strongest sense of these deep structures. In the case of language, it is not possible to go back to some un-interpreted beginning state as the language that we use today has already been developed by countless generations. This linguistic lifeworld provides the background for all interpretations.

Tradition is always the take-off point for communication and a reconstruction therefore also starts with the background consensus of taken-for-granted understandings that form the backdrop for communication. This takes the form of an anthropological analysis in which the goal is to appreciate the questions being asked by the discussants so that a consensus can be formed on the procedural constraints to understanding. As these assumptions are taken-for-granted, and therefore not obvious, the understandings embedded in these situations are made clear by a search for misunderstandings in the discourse (Habermas, 2001a, p. 137). In coming to understand the traditions of a discourse the presumptions become clear and it is possible to assess which of these assumptions appear unacceptable. Habermas argues that misunderstandings reveal the rules by which the symbolic formations were produced, which he considers "the intuitive rule consciousness that a competent speaker has of his own language." (Habermas, 1998, p. 33). In light of the hypothesis gained from developing an understanding of the traditions of a discourse, the researcher attempts to render the less clear cases more precisely.

Critical theory operates through a debate between alternative points of view that search out performative contradictions in social arrangements (Habermas, 1990, p. 80). These alternative interpretations acknowledge that there are always areas of disagreement and critical theory progressively turns these conflicting views to collectively agreed better ends. The data of reconstructive understanding is the intuitive ability of competent speakers to recognise and understand the rules (Habermas, 1998, p. 33). These understandings contain categorical knowledge

competent speakers use to evaluate and select possible data. For Habermas, the procedural rules of understanding are what permit communication to take place.

> Communication is not a self sufficient game with which the interlocutors reciprocally inform each other about their beliefs and intentions. It is only the imperative social integration—the need to coordinate the action plans of independently deciding participants in action—that explains the points of linguistic communication (Verständigung). (Habermas, 2000, p. 346)

Habermas describes reconstruction as taking a theory apart and putting it back together in a new form in order to gain a fuller understanding of the goal it sets itself (Habermas, 1979, p. 95). A reconstructive procedure requires the transformation of the competence of communication to a second level of understanding, one which is developing explicit knowledge. Habermas' method involves identifying the gaps or tensions that can be located historically and then pointing to another reality that is possible but has been suppressed. Where critical theory goes beyond immanent critique, which starts with the conceptual principles and standards of the object of study and unfolds their implications and consequences by forcing existing views to their logical conclusions, is in its attempt to sketch the alternative results that might exist if silenced voices could have been heard. Thus, unlike the critique of Adorno, which was relentlessly negative, Habermasian critical theory has a positive dimension, given to it by its quasi-transcendental preference for deep democracy in human problem-solving.

1.4 Applying Critical Theory to the Reconstruction of Technology

Despite the often observed link between technology and modernity, Habermas has written very little specifically about technology since his "technology as ideology" debate with Herbert Marcuse (see Habermas, 1970). As outlined above, Habermas does not concern himself with the concrete cases of communication, such as everyday speech or computer-managed communication, but works at the meta-theoretical level, leaving the application of his theories to others. In his explicit reference to technology, Habermas responds to Marcuse's idea of "new science"

(Vogel, 1995), in which Marcuse proposed a revolutionary transformation of basic practices in which it would be possible to take up a new position towards nature and technology that would be in harmony with nature rather than trying to dominate it (Marcuse, 1964, p. 18). Habermas was unconvinced by this argument and in response argued that rationalisation threatened technocratic intrusion into the lifeworld of communicative interaction (Habermas, 1970, p. 118). Technocracy, he argued, is not in the nature of technology as Marcuse, or Heidegger before him supposed, but stemmed from an imbalance between two actions, work and interaction.

This debate with Marcuse, and through him with Heidegger, provides a starting point for many of the themes that Habermas develops later in his theory of communicative action. His mature theory, however, largely ignores technology and focuses almost exclusively on markets and administration, with his most tangible application of communicative action to an actual institution being the reconstruction of the theories of law (Habermas, 1996). For the implications of critical theory in an increasingly technologised world we need to turn to an interpretation of Habermas that returns to the basic themes of the Frankfurt School. Aware that Habermas does not concern himself explicitly with technology, Feenberg (1991; 1995a; 1999b) has been able to give the most complete account of Habermas' thinking in relation to technology by bringing the Frankfurt School analysis of technology up-to-date. He achieves this by reviewing the attempts to define the essence of technology by the various strands of critical theory that can be traced back to a common history of Adorno and Horkheimer, who argued that instrumentality is a form of domination and therefore controlling objects violates their integrity.

Since society has entered what Feenberg (1995a, p. 2) describes as "a new era of pervasive technology", he argues that the goal must be to construct a critical theory of society with a theory of technology at its core. Habermas' reconstruction of modernity in the framework of communicative action provides Feenberg with new insights into the process of social learning that underpins rationalisation. He uses the communicative dimension of technology to the same effect, creating a technological analysis of society that rests on a critique that highlights the unequal distribution of

social influence and public participation in the design and use of technology (Feenberg, 1991, p. 38). It is the process of communicatively coordinated rationalisation that Feenberg shows can provide the basis for a unifying meta-theory of technology.

A key communicative concept in Feenberg's thinking is the idea of a technical code that determines the meaning of technology in the social world in which it is embedded (Feenberg, 1991, 1995a, 1999b). Technical codes are the background of unexamined, culturally shared, assumptions, such as the belief that efficiency is the sole measure of productivity, that privileges one approach over another. Through their technical codes, technologies contain a collective agreement on socially agreed norms. In formulating an understanding of the mediating and coordinating functions of technology, Feenberg clarifies a common misunderstanding regarding Habermas' media theory. The two spheres of system and lifeworld that form the basis of Habermas' theory are not dichotomous concepts, but are analytical distinctions compatible with the two different ways of looking at the same phenomena, which in Habermas' case is society. Habermas' critical methodology advocates a series of complementary reviews to handle the systemic and interpretative dimensions of coordinating actions that are intertwined in a reflexive relationship in society. The power of critical theories come from this program of critique by which contradictory interests, due to false consciousness caused by the unequal distribution of power and knowledge, can be overcome.

1.5 Critical Theory of Educational Technology

Education is also experiencing a period of pervasive technology and this thesis recognises the need to develop a theory of education with technology at its core. However, the tradition of critique is not well developed in the educational technology literature. Instead, the cultural manifestations of educational technology are largely taken for granted. Nichols reports widespread hostility to his application of Habermas' ideas to educational technology (see, for example, Nichols, 1997). He argues that most educational technologists are only interested in exploring the positive aspects of technology, even if there is evidence that it may create poorer

outcomes. This leads him to conclude that educational technology ought to be examined as a moral issue in which teachers understand both the positive and negative effects of technology, so they are able to give up on controlling learning and allow students to have a greater say in decision-making (Nichols, 1988).

Although educational theorists have rarely attempted a critique of technology (some exceptions include Blacker, 1994; Bowers, 1988; Streibel, 1993; Yeaman, 1994), many critics of technology have turned to higher education to illustrate their theories. The formulation of critical theory has largely been an academic enterprise, in part due to the fact that its chief theorists all work and write in universities as academics. This produces a unique relationship between academic theory and practice that is only matched by the relationship that exists between academic development and university teaching. Critical theorists critiquing higher education are among the small band of insiders who are able to write about their own workplace from an authentic, first-person perspective. In this case it is researchers reflecting on research. With all of the key theorists drawn on for this thesis, (including Heidegger, Popper, Levinson, Feenberg and Habermas) working within higher education at the time of their writing, it can be assumed that they all had access to a basic pre-understanding of educational discourse, although one that was no doubt largely drawn from their own experiences of teaching and learning rather than the literature of higher education research. While being profound thinkers in their own domains, their focus on research as the distinctive component of higher education and their immersion in the research culture of universities undoubtedly influences their understanding of higher education teaching and learning.

Feenberg's own analysis of online learning in higher education has, to a large extent, been concerned with the discussion of academic work and therefore examines the labour relations in university teaching. His focus has been on questioning the value of administrative decisions for teaching and learning, especially the significance of automating teaching in order to remove teachers from the classroom. A critical analysis from the perspective of student learning and technology has yet to be done. Here I am making a distinction between educational research and research undertaken in an educational setting such as a school or university (while

acknowledging that there is still some disagreement over whether it is indeed possible to have educational research. See for example, Hammersley, 2003). Taken in the broad terms of Stenhouse (1975) and Carr and Kemmis (1986), educational research informs educational decisions and judgements with the purpose of serving teachers and learners. While concentrating on the normative dimension of technology in the wider society, the main thrust of Feenberg's work is not primarily concerned with discussing the validity of educational norms from a stance *within* education that draws on an educator's experience of the classroom to discuss the value of online learning. As a thesis located in the discipline of education, this thesis is guided by knowledge about teaching and learning that directly addresses educators and thus extends Feenberg's analysis of technology into the classroom by drawing from within education and among educators to determine the decisions about education that can influence technical choices.

In another sense, this thesis can be seen as a further application of Habermas' ideas. Education, in the sense of a deliberate intellectual endeavour, is a practical discipline that requires practical solutions and the practical application of critical theory in educational technology research is in the process of integrating research with educational goals and norms. That is, goals and norms which are to do with the full development of human well-being. Higher education, like all social institutions, is in a constant state of change, limiting the relevance of inherently time-bound empirical research. However, as has already been noted above, educational research tends to borrow its research traditions from other disciplines, primarily psychology. This results in a wide range of research methods, represented in the numerous studies published about higher education each year. Integrating this literature requires a deep and conceptual understanding of the educational questions relevant to each study, not just the question each study is addressing. For the most part, integrative studies in this research use surface forms of statistical analysis, like the meta-analysis of social research that compares the measurable properties of different studies (Glass, McGaw, & Smith, 1981), which simply accepts the assumptions of the researcher. Critical reconstruction provides an alternative, interdisciplinary approach that applies philosophical principles to bodies of empirical research with emancipatory and transformative educational intent.

The primary contemporary technology-driven problematic for higher education is how to understand the Internet and its influence on teaching and learning. To draw together the themes of critical theory and apply them to the specific context of this problematic, this thesis presents a mixture of theoretical and empirical work that aims to account for the complexity of technology in education. Each chapter takes the form of a reconstructive critique outlined by Habermas above, involving a brief genealogical introduction to the core concept designed to build an understanding of the questions researchers are asking themselves about the area under investigation. With this new understanding the premises of the discourse are then reconstructed into an alternative interpretation through a dialogue with Habermas' theory of modernity. The empirical material comes from investigations that advise staff on teaching and learning. This comes from a variety of sources including teaching handbooks, empirical research and university policy. Reconstruction seeks to present alternative interpretations for these texts by going beyond descriptions of superficial change and examining their underlying beliefs and principles. The reconstructions themselves can be falsified by such processes as the identification of incompleteness in the data considered or other similar empirical anomalies. This permits many more interpretations than just the realistic ones of the natural sciences, with the theoretical descriptions said to correspond to certain aspects of reality if they correspond with the deep structures that have been made clear through their reconstruction.

1.6 Researching Technology in Higher Education

By drawing on education as an institution that illustrates their principles, each of the theorists in this thesis clearly indicates that their larger framework can accommodate both pedagogical and technological considerations. This thesis progresses from developing an understanding of technology and how it can be researched to the specific case on which this thesis is focused—the university. In this introduction I have outlined the difficulty of researching technology. By reviewing the existing tradition of the study of technology in higher education, the problematic of researching educationally relevant situations was revealed. As we have seen in the case of technology, studies of single factors in these complex situations fail to provide the type of information that is useful to educators. What has been missing

from the dominance of quantitative methodologies in educational technology research is an understanding of technology as a complex collection of things. The norms included in the designs of technology make possible highly artificial communities of associations between teachers and students. The social and cultural world, its practices and artefacts all combine to co-determine the way teachers and students approach teaching and learning.

One of the most frequently asked questions about educational technology concerns what the adoption of a particular technology means for teaching and learning. This thesis will not attempt to determine one true or correct interpretation of technology, but, consistent with the sociological tradition outlined in Section 1.2, its orientation is towards building a deep but fallibilistic understanding of the range of views about the multiple dimensions of technical objects and their use. This understanding is constructed from an examination of the advice on the appropriate use of technology given to academic staff by educational researchers. As outlined in Section 1.1 quantitative review studies have not proven sufficient for a literature that is as theoretically derived or procedurally diverse as that found in higher education (Pring, 2000). Nor are they suitable for studies of technologies that will have changed in character, often before the study itself is complete (for a discussion of the rapidity of technological change, see Agre, 1997). Consequently, this thesis takes an approach to technology assessment that is in the tradition of secondary studies where the object of study is the discourse of research on technology and higher education. The key data source is the advice provided to academics published in research reports and teaching handbooks which can be used to reveal the underlying understandings of the procedures of higher education. The objects of research are therefore not so much the technological objects themselves, which in any case, are so prone to change as not to be a particularly useful focus of study, but the way in which human beings have experienced and discussed those technology objects as solutions to the problems of higher education. The result is a new understanding of the different ways in which we can understand the technological world and its influence on teaching.

These interpreters of higher education that provide advice to academic staff are already doing the mediating and crystallising work that makes the data they provide

more readily available to critical social theory than the messy world of data provided by examples of ordinary talk (Roberts, 2001). A critical reconstruction considers that the influence of technology can only be managed with an equally effective moral renewal of values that directs the means of technology towards human ends, in this case the shared values of higher education. This is far more valuable than a wholesale rejection of technology, although it assumes that there are ethical positions on which to determine the appropriate ends for which technology should be used. The moral propositions that advisors provide academic staff are put to the test in this thesis through a two level critique of alternative perspectives for talking about technology in higher education. The first level is theoretical which specifies the prescriptive contents that serve as regulative ideals. The second level is a review of the practical application of those ideas through social processes. The goal is to capture the richness of the capacity to manage technology which Komninos (2002, p. 177) calls "technological intelligence". This is the use of technology that triggers a learning process that is best captured through a cross-disciplinary approach that draws on the fullness of all the ways in which lecturers experience and describe the phenomena of technology.

To begin this learning process, Chapter 2 of this thesis discusses the antecedents for a critical theory of technology. Habermas has been influenced by a number of theorists who have investigated questions of technology. Chapter 2 describes the technological implications of the work of three of these, Heidegger, Dewey and Popper. Each theorist assists in building an understanding of the complexity of technology by describing a different element in the experience of technology, object, action or knowledge in what I characterise as an experiential understanding of technology. Drawing on each of these theorists' descriptions of evolutionary interaction with technological ideas, the goal of Chapter 2 is to discuss the nature of an authentic relationship with technology, which Heidegger argues involves creating order to the world. Dewey adds that this is an active process drawing on a storehouse of human ideas while Popper describes the nature of this storehouse which is represented in technology as the physical manifestation of human adaptation to the environment. Chapter 2 concludes that decisions regarding technology are difficult to critique as

we are immersed in the technological world in much the same way that Habermas argues we are immersed in a world of language.

Even though we are immersed in technology, as human experiences with the world are all represented in some form of technology, they can be revealed through systematic review. This challenges us to determine where the boundaries to technology begin and end to establish contradictions generated by technology use. An important methodological consequence of an experiential view of technology is the observation that it is through experiencing the problems with technology, what Heidegger calls "unusability", that we come to know the limits of technology. Following Habermas, descriptions of technical objects are not enough for a critical social theory and we must develop an understanding of technology through the reconstruction of its dialogue with higher education, and specifically through identification of the silent voices in this dialogue.

Chapter 3 describes a critical theory of technology that has been applied to a number of different technical situations. Habermas uses the work of Parsons to argue that social interactions are becoming increasingly mediated and the work of Weber to argue that the lifeworld is being colonised by these mediations (Habermas, 1987c, p. 333). The alternative to colonisation is an appropriate rationalisation of the world. Feenberg draws on these concepts to present a critical theory of technology that argues that a deeper understanding of technology is achieved by studying the social role of the technical object and the everyday life it makes possible. Feenberg's critical theory shows that technology acts as a steering medium that uses technical codes to structure the interplay between technology and future designs. There are multiple interpretations in any technology and it is in the concept of underdetermination, in which there are alternative choices to all designs, that Feenberg finds the greatest hope for ordinary people's participation in technology.

In broad terms I will have, up to this point, outlined the difficulty in understanding the influence of technology on higher education. A critical explanation will allow the ontological, epistemic and socio-linguistic dimensions to be brought together into an analysis of technology. Following the methodological arguments put forward by

Feenberg, it will be necessary to undertake a number of critiques to understand the norms that are embedded in technology. Chapter 4 is the first of this series of critiques investigating the instrumentalization of educational technology. The experiential view of technology argues that we need to understand the situated use of technology. Universities are complex entities that combine workplaces, business enterprises, residential and recreational areas into a multifaceted organisation. Within this organisation classrooms represent a fairly stable set of well-established spaces important to student learning. For the purposes of this thesis the analysis of educational technology is restricted to the classroom since it is a sophisticated technological context in which teachers and students meet to share an understanding of problems facing learning. While other professions are responsible for the many alternative sites of student learning in a university (for example, university libraries), and teaching is not restricted to the activities that take place in class, the kinds of pedagogical problems resolved in classrooms demonstrate underlying beliefs academics have about their students' learning.

What is argued in Chapter 4 is that the classroom is the university's machine for learning. As such it has a conceptual side that is open to analysis. The experience of technology in higher education takes place in the classroom where interactions between university teachers and students combine to create a storehouse of ideas about student learning. The structures of lecture theatres and tutorial rooms are investigated in Chapter 4 to determine the kinds of learning they support. It is the deep structures found in these classrooms that are also being designed into online technologies as educational designers attempt to replace physical classrooms with metaphorical ones. Classrooms provide students with access to the lecturer and it is this social space that is intended to be transferred to cyberspace. Chapter 4 compares the Internet to the structures of physical classrooms to determine whether it can provide authentic situations equivalent to face-to-face learning. It concludes that interaction online is different to that which occurs when students and teachers meet face-to-face and, therefore, only in limited cases does the Internet represent an experience equivalent to the classroom. However, online interactions are still appropriate for certain kinds of higher-level learning in which participants explore their identity as a learner.

Chapter 5 investigates how the designed-in norms of higher education are manifest in the common concepts used by students to describe teaching and learning. These norms are the students' responses to the structures of classrooms. They are investigated through an examination of student learning research which, following a review of the changing questions in research of teaching and learning in Australian higher education, I argue concentrates on surface descriptions of learning which has made it overly idealistic and devoid of critical power. Like Heidegger, the phenomenographic method discussed in Chapter 5 is interested in creating an authentic language for teaching and learning. In Chapter 5 I argue that phenomenography succeeds in providing a powerful empirical method for describing student language but it fails to fully take into account the socially constructed nature of knowledge. Consequently, I turn to Habermas' theory of communicative action to locate the social in the centre of this schema. These norms are built into the structures of higher education to provide a standard for judging the success of any educational design.

The process critique outlined in Chapter 6 explores the nature of interaction between student learning and technology. The chapter argues that educational research that holds too closely to a correspondence theory of truth is too instrumental and insufficiently contextualised to allow students to develop towards deeper approaches to learning. Alternative, contextualising theories of education are based on the work of Vygotsky, and include situated cognition and cognitive apprenticeship. In describing teaching as mediating learning, Laurillard (2002) also adopts Vygotsky's terminology, but she does not go as far as to apply his concept of cognitive tools to her notion of conceptions of the world. Instead, she draws on Pask's (1976b) conversation theory which is primarily an analytical tool for determining the idealised conversational elements necessary for learning the representation of a designated academic domain. Laurillard's great insight was that Pask's conversation theory might provide the underlying learning theory that is missing from phenomenographic research. But in relying on phenomenography, supplemented by Pask, Laurillard does not go far enough into the communicative structure of technology. The reconstruction of conversation theory shows that it is necessary to move beyond both Pask's limited concept of conversation and phenomenography's

limitation to surface meanings, to Habermas' theory of communicative action and the deep meanings produced by his reconstructive methodology.

Chapter 7 completes the critiques of technology in higher education. It tests whether the adoption of online learning by a university represents a process of colonisation that has reduced its potential to discuss teaching and learning in a manner that maintains academic values. As a way of understanding the struggle for change in higher education, I shall represent the response to the introduction of information and communications technology into teaching and learning by an Australian university whose identity is closely aligned to technology. The use of proprietary course management software is the latest technology in a familiar pattern of innovation that has been seen over the history of higher education (Cuban, 2001). How universities have chosen to employ this technology displays their response to the situated, technical codes of educational technology. This chapter describes how the two main codes used in higher education, accumulation and participation, are interpreted in the implementation of online learning to cater for the needs of worker-students.

It is the combination of these critiques that come together into a fuller understanding of technology in higher education. It is only through understanding the multiple facets of technology that we are able to determine whether any particular manifestation of technology is educational. As a thesis that critiques advice given to educators about technology, this thesis does not end with a version of pedagogical implications of a critical theory of educational technology. Instead it concludes with what we have learnt about the educational characteristics of technology that can inform a scholarly approach to educational technology design. As a critical study in the Habermasian tradition, this thesis is more concerned with the processes by which we come up with answers to problematic questions, rather than in finding fault in a situation or advocating any particular set of answers. By blending the procedural ideals of Habermas with the design ethic of Feenberg I will conclude by drawing out themes of what is educational about technology to propose the means for realising more of the participatory potential of online technology in higher education.

CHAPTER 2

UNDERSTANDING TECHNOLOGY

In the previous chapter it was argued that almost a century of comprehensive investigation into the use of technology in education has been unable to determine whether technology influences student learning. By adopting an empiricist stance the majority of this research has only ever been able to consider the past implementations of technology in descriptive terms. This has made it unsuitable for making evaluative statements about the quality of past changes. Science's status as an objective research method generally excludes evaluative reflection from its range of legitimate methods. Instead, it investigates the phenomena that existed in a particular time and place, and any attempt at projecting to other situations, or identifying basic value tensions in a situation, is classified as a speculation and not within its methodological considerations. However, what is required in these circumstances where change can be seen as occurring both from the past and projecting into the future, is a qualitative study that can capture enduring issues of value while all else changes. The conclusion that can be drawn from this observation is that the changing nature of technology is best understood through a reconstructive methodology which allows researchers to identify the role of value in the construction of enduring situations. By focussing on procedural conditions and deep structures, critical reconstruction provides the methodological rigour that is missing from other qualitative review methods. This makes taken-for-granted understandings explicit and permits the development of alternative methods of appreciating how the insights drawn from this analysis may be embodied in technology.

With this in mind, reconstructing an understanding of what is educational about technology still requires some further preparation. Technology has its own traditions of inquiry (for an overview, see Ferre, 1995; Ihde, 1993; Mitcham, 1994; Pitt, 2000; Scharff & Dusek, 2003). Whereas we are used to invoking the authority of science as

one of the primary forms of justification in a modern society, theories of technology differentiate themselves from the logic of science. Each formulates their theory as a response to "scientism", which is the exaggerated claim that science solves all problems. As the natural sciences have undergone a degree of critique for failing to acknowledge the uncertainties and gaps in our knowledge, the dominant view that technology is dependent on science has increasingly come under attack. It has been observed that any one-sided distinction between science and technology is meaningless as many forms of science, such as microbiology or astronomy, are themselves totally reliant on their instruments for their investigations (Ihde, 1991). In addition, ethnographic studies of science demonstrate that the relation between science and technology is reciprocal rather than one where there is a direct application of scientific principles to practical problems (see, for example, Latour, 1987).

Those endeavouring to overcome the methodological limits imposed by scientific investigations of technical objects are inclined towards non-representational views of technology. These argue that we do not come to know technology only through its outward appearance but also through its situated use. I call this the experiential view of technology. It recognises that while objects change slowly, making them amenable to scientific study, the culture of their use changes quickly, requiring reconstructive forms of socio-cultural investigation. The purpose of this chapter is to undertake an analysis of the foundations of technology theorising in order to go beyond descriptions of the external reality represented by different technical objects to an understanding of the experienced reality of technology.

As outlined in the previous chapter, Habermas provides just such a reconstructive framework, one that is capable of accounting for both the technical object and its meaning, although he has not elaborated this framework as a systematic theory of technology. To work out the technological implications of Habermas' position it is necessary to return to his foundational philosophical material to make some implied understandings explicit. His theory of communicative action has been developed as a dialogue among a wide range of authors who have shared some of the same basic philosophical assumptions as Habermas. Debates with three theorists are presented

here. Heidegger, Dewey and Popper have all marked significant turning points in Habermas' thinking. Further, Habermas' position presents a largely complementary view in which technology is seen as an adaptation to the environment that, as a form of knowing, is fallible and evolutionary.

While Heidegger, Dewey and Popper share an experiential view of technology, they each emphasise different aspects of it. The numerous connections between the three show the advantage a combination of their ideas might have in trying to work out the technological implications of educational technology. I will begin in Section 2.1with the work of Martin Heidegger, whose philosophical project was to describe the nature of authentic human experience. Heidegger's account of the essence of technology is acknowledged as the most influential work in the development of a philosophy of technology (Ferre, 1995; Heim, 1994; Ihde, 1993; Mitcham, 1994; Pitt, 1995; Rapp, 1974). Heidegger focused on language as the site of discovery and his way of reasoning proceeds at a highly abstract level that devises and employs a specialised terminology in an intentional attempt to have us rethink common notions of technology (Bernstein, 1992). Heidegger's influential analysis of human existence demonstrates that authentic human interactions involve technology. In short, technology involves a way of seeing the world that involves catching sight of the opportunities for exploitation of it, which, Heidegger argues, is the essence of all technology.

Even though Heidegger's views anticipate many of the contemporary positions of the theory of technology, he explores the question of human experiences of technology from a uniquely ontological perspective. In the second section of this chapter I will introduce an alternative, but corresponding, action-theoretic position by John Dewey (1925; 1938). Dewey, in particular, wanted to eliminate the distinction between the object of experience and how it was experienced (Dewey, 1925). He emphasised the problematic aspects of situations that fail to perform, and therefore require resolution through inquiry-based activity. What is characterised as technological by Dewey is the application of tools through imaginative projections of possible consequences, which he calls the "end-in-view" (Dewey, 1938, p. 496). Dewey demonstrates that rather than being an uncontrollable force, technology is an active human

reconstruction that addresses specific problems in the world. The appropriate tool is judged by the kind of work it will do and the kinds of change it generates.

Dewey's theories of technology are less prominent than Heidegger's as he did not locate his critique in a single work, making it necessary to draw these connections from a number of sources (Hickman, 1990, p. 60). Nevertheless, Dewey constructed a problem-based theory of experience based on inquiry which Hickman (1990) has shown is fundamentally technological. In Section 2.2 I will outline the main components of Dewey's pragmatic theory of technology, drawing extensively on an analysis by Hickman (1990; 1995; 2001). Hickman shows that technology fits into Dewey's larger project of analysing and critiquing the meaning of human experience, producing many of the same observations as Heidegger but without the same focus on a specialised vocabulary. Using Hickman's discussion of the technological nature of inquiry, I will argue that technology is a repository of ideas used to solve human problems.

Much the same observation was formulated by Karl Popper who can be conceived of as providing a framework that unifies the ontology of Heidegger with the epistemology of Dewey. In Section 2.3 I will argue that Popper's evolutionary view of technology has many close parallels with Dewey's theories of the creative growth of knowledge. Both men are committed fallibilists, arguing that no belief is ever beyond criticism. Both emphasised active involvement in inquiry and saw a continuity between common sense and science that describes their common form of knowledge acquisition as problem-solving. Popper's later metaphysical work even shares many of the features of revealing through ordering that forms the basis for Heidegger's technological subjectivity, even though Popper was highly critical of Heidegger in other respects, like being ultimately nihilistic (Popper, 1966). Popper places our problems and our feelings about them into three different ontological worlds. His conceptual World 3 cannot be identified with any material objects as such, instead, it is constituted of the ideas that lie behind the objects of the physical and subjective worlds. This overturns the idea that objective knowledge comes from subjective experience since all messages are interpreted from the mental and psychological disposition of humans. The human mind, as distinct from the human

brain, never produces a purely unmediated response to stimuli. World 3 objects are the products of this interpretation that is abstracted, made public and discussed. They influence the physical world through their embodiment in technology where they are resistant to refutation as they are evaluated independently of specific individuals.

Each of these theorists, Heidegger, Dewey and Popper, has had a major influence on Habermas' intellectual development, and their discussions of technology help to clarify some of the issues that have given rise to misconceptions about Habermas' work. All four theorists are linked by their critique of the logic of science and its application to human actions. Language is likewise critical to all four perspectives. For Heidegger, it is the redefinition of words to develop a vocabulary used to describe the world. Dewey describes the process of open discourse and debate. Popper sees language as one of the most important aspects of World 3. Habermas, however, is the only one of these theorists who took the final step in linguistic analysis and explicitly located his work in the social. In Section 2.4 I will describe how he draws on the other three theoretical foundations to develop a matching framework that employs a communicative concept of human rationality to analyse intersubjective interaction as the basis of social evolution. In Chapter 3, I will draw on the theory of communicative action put forward by Habermas (1984; 1987c) as a socio-linguistic approach to understanding the technology of universities. This is the starting point for developing a methodology that can answer the question of what is educational about technology in higher education.

2.1 Heidegger and the Question of Technology

Alternative views to the prevailing empirical science view of human involvement with the world have flowed from phenomenological perspectives in the social sciences. Theorists from this tradition have been interested in the relationship between the experienced world and physical world. Heidegger (1977), in particular, has been highly influential in the analysis of technology by arguing that human existence is clarified through an account of objects in the environment. The essence of technology, according to Heidegger, is different from the object of technology itself. For Heidegger the essence of technology revolves around the concept of

"An-wesen". This refers to a way of revealing and concealing the world that brings objects into awareness (Heidegger, 1977, p. 12). This overturns the positivist notion that objectivity is the process by which we know and relate to things as external observers. Contrary to the Cartesian view, Heidegger argues that the outward appearance of an object does not let us discover the character of a piece of equipment. Rather, technology is defined in terms of its function and therefore an understanding of technology is related to its usefulness.

Heidegger argues that there are many sides to our existence. One of the most important is how we interact with objects in the world. Heidegger describes the enduring characteristics of an entity in the world as "present-at-hand" (Heidegger, 1962, p. 41). These are the self-evident properties of an entity that are always present and given to us by tradition. To be present-at-hand is a theoretical knowledge relationship to the world which entails an awareness of the transcendental technological object. This is a generic classification of objects represented by their dictionary definition rather than any particular instance of that technology. That is, it is the pre-experienced table not the specific table that someone might actually own. An entity becomes present-at-hand by being differentiated from the background of uses for which the object can be employed to manipulate the world.

Present-at-hand materials can only be appreciated in their relationship to the practical application of technology and the equipment that comes into awareness when one needs to make use of a tool (Heidegger, 1962, p. 98). Thus, Heidegger conceives of knowing in terms of how we use a piece of the world, through entities that are called tools or equipment. The concept of equipment, in Heidegger's terms, is not a single entity but belongs to a totality of experiences with technology. In order to experience a piece of equipment authentically, Heidegger argues it must first come to our attention and then, through its use, withdraw from our perception. This withdrawing from perception to become an object in its own right is what Heidegger calls "ready-to-hand" (Heidegger, 1962, p. 98). In becoming ready-to-hand, awareness shifts from the tool to the action so that the technology takes on a different quality from being present-at-hand. The object is no longer a thing, but becomes a means to an end. That is to say, the technology is present physically in the hands of the user but in the

background of his or her awareness. The situated, ready-to-hand, use of technology creates a new entity that is the sphere of existence for equipment in which tool and action fuses into a single entity, a tool-in-use. Through becoming ready-to-hand, objects are able to slide into the background of human experiences where they are converted into an extension of their users, who are freed from concentrating on the equipment to make their mark on the world.

The use of any hand-operated tool provides a simple illustration of ready-to-hand equipment. For example, the keyboard I am using may exist in the physical world as a combination of plastic and metal that is present-at-hand as a generic instrument for text input into any electronic device. Yet, despite its sophisticated electronic circuitry, without human energy and actions the keyboard cannot be utilised. While typing I concentrate on the formation of the text with only a peripheral awareness of the tool used in the writing. In the instance when the keyboard does not work, because a key may stick or the backspace does not delete, the operator becomes immediately aware that the keyboard no longer responds to the touch the way a functioning, ready-to-hand, keyboard does. It is only at that moment, Heidegger would argue, that the task at hand, in its entirety, is forced into the complete focus of the operator's attention. It is at that point that the operator fully understands the fusion of object, objective and action in which the equipment is encountered.

Learning from a Heideggerian perspective can be seen as the interaction between objects that are ready-to-hand but are not encountered as expected, which leads one to question what is present-at-hand. Tradition gives an entity meaning but at the same time this tradition can be difficult to determine. For Heidegger, discovering the world through practice is most noticeable when the equipment is damaged or some other lack of usability draws our attention to it as an entity. The analytical value of a lack of usability has been widely examined by design theorists, such as Norman (1988) and Tenner (1996) who would agree with Heidegger that the nature of technology is discovered when it is not working, or in Heidegger's words,

> … not by looking at it and establishing its properties, but rather by the circumspection of the dealings in which we use it. When its

> unusability is thus discovered, equipment becomes conspicuous. (Heidegger, 1962:102)

2.1.1 Placing the World under Human Control

From his analysis of authentic use and usability, Heidegger concludes that ordering the orderable is the true expression of a machine (Heidegger, 1977, p. 15). Machines transform the world into a new way of being, which Heidegger calls "*Bestand*." These are resources that exist solely for the purpose of human consumption (Heidegger, 1977, p. 17). The English translation of the concept of *Bestand* uses the military analogy of a "standing-reserve" to capture Heidegger's meaning of something over and above what would commonly be referred to as "raw" materials. *Bestand* includes the whole structure in which the resource components stand ready to be called into action. For example, in university teaching and learning, the classroom continually stands ready for learning. It is, however, far more than the present-at-hand physical resource of timber, brick and plasterboard or the ready-to-hand classroom-in-use. It includes all the elements that a university uses to formalise learning, including its employment policies, enrolment procedures, security, parking and so on. All of these elements work together to ensure the coming together of the lecturer, students and subject matter for the purposes of learning.

Heidegger calls the process of revealing nature as standing-reserve "enframing" (Heidegger, 1977:19). This is the active positioning of nature in the forefront of one's awareness so that it is exposed as an opportunity for exploitation. Enframing is like shifting a window over a much larger field of view so that each process of ordering brings certain elements out of concealment while at the same time obscuring others. Once some aspect of nature is ordered through enframing, it enters the standing-reserve where it can be used to pursue human goals. Perhaps one of the most adept illustrations of enframing actions is Mumford's (1963) identification of the clock as the most significant technology of the industrial revolution. By recording the hours and minutes of the day the clock has the power to control organisational processes and behaviour.

In summary, Heidegger's preoccupation with being-in-the-world is an attempt to understand authentic experiences and the arrangement from which these experiences originate. He turns to metaphysics to analyse the underlying structure of the world and the elements that influence its activities. By searching for an essence of existence Heidegger is seeking to discern whether there are any stable concepts that are permanent while everything else changes. In the case of technological experiences, Heidegger argues it is enframing that endures and, as a consequence, it is not fully under human control (Heidegger, 1977:32). In other words, in Heidegger's view, calculative thinking will become increasingly dominant until it conquers humanity itself. This is a view, as we will see in Chapter 3.1, that has been adopted by Habermas to describe strategic forms of action as colonising the lifeworld.

The attitude that everything in the world exists for human use reaches its logical conclusion when there is nothing that humanity cannot exploit for its purposes, including other human beings. For example, once the genetic information is quantified from the human genome, the pressure to exploit this knowledge that Heidegger foresees, steadily mounts. An illustration of an analysis of the enframing of humans through genetic engineering is provided by Habermas (2003), who warns against intervening in another's genetic code through human cloning. Habermas argues that consent is not an issue when conception is a result of chance. Wherever artificial clones rely solely on human intervention for their existence it is no longer possible to assume that the clone is a party to the dialogue whereby they can provide their consent for decisions made on their behalf. This, according to Habermas (Habermas, 2001b, p. 170), fundamentally changes the relationship between human beings, whereby the clones are now treated as an object to achieve another's goals, for instance by producing life-saving transplantable organs.

2.2 Dewey's Pragmatic Technology

Heidegger's phenomenological philosophy plays a prominent role in describing the expression of human action on nature as an important manifestation of human ways of being-in-the-world (Dreyfus, 1991). Heidegger also outlines a hierarchy of technological actions that begins with the awareness of nature and advances to the

application of the human will on the world. For Heidegger, modern technology differs from older technology because humanity itself is caught up as an object to be exploited as a resource. Heidegger outlines two ways of being-in-the-world, one that is technological and the other that is caring for things in their context. Despite the power of his analysis of our experiences with technology, Heidegger's ontological critique is ultimately inclined to become deterministic. Those working with Heidegger's distinctions have a tendency to characterise technology as an uncompromising and pervasive force that is ultimately not fully under human control (see, for example, Borgmann, 1984; Ellul, 1964; or Langdon Winner, 1978). As a consequence, a Heideggerian analysis perceives that it is only possible to halt the desire for control of nature, which ultimately extends to other human beings, by renouncing our technological attitudes in order to engage in meditative contemplation.

Critical theorists, like Habermas, however, have tended to be critical of the Heideggerian position because Heidegger's theory is not practical in the sense that it does not address the problems of community life (McCarthy, 1991, p. 96). The analysis of being-in-the-world may have been rooted in concrete experiences but the end result is a theoretical solution of constructing a new vocabulary to describe our engagement with the world. Moreover, Heidegger's only counteractive action to humanity becoming a resource for exploitation is a conservative return to traditional values. Further, with his present-at-hand and ready-to-hand distinction, Heidegger maintains the separation of theory and practice that he had been attempting to overcome. This is where pragmatism, especially as John Dewey has developed it, can provide a more progressive understanding of technology committed to social change (Eldridge, 1998, p. 57). Rorty (1991) argues that the primary differences between Heidegger and Dewey come from a difference of politics rather than methodology. In politics, Dewey is a progressive in contrast to Heidegger's conservatism. That is, Dewey is a pragmatist who takes the view that philosophy can improve the social world while Heidegger takes the more aestheticist position that the social world is there for the poetry (or at least word play) behind every philosophy (Rorty, 1991, p. 9).

While there is no single doctrine that can be labelled pragmatism, Dewey is acknowledged as a key representative of its characteristic attitudes (Depew & Hollinger, 1995). Dewey stresses the importance of assessing knowledge in terms of its practical uses and taking experience as the starting point for reflection. Experience is defined as the interaction of living creatures with their environment (Dewey, 1925). In the case of human beings this interaction is by thinking, which Dewey described as an intentional endeavour to discover specific connections between something we do and the consequences that result (Dewey, 1933). Thinking, for Dewey, involves acting with purpose and having some end in view. Thoughts cannot be known in advance and are therefore always tentative and tested through application. Dewey conceives of the truth as "warranted assertability" (Dewey, 1938, p. 9), that comes from a group acting in the world as if that claim were true. Bernstein (1971) argues that this is often misunderstood as, "something is meaningful or true only if it works or is useful" (p. 173).

Dewey sought to bring the rigour of scientific thinking to all phases of human activity. To achieve this he distinguished between two methods of determining the subject-matter of inquiry. One was through observations of the existential material and the other through the use of symbols (Dewey, 1938, p. 15). This recognised that objects are both material and instrumental, by which Dewey means they consist of both tools and the techniques for using those tools. Dewey argues that tools act as a kind of language that provides a direct connection between human thinking and nature (Dewey, 1938, p. 96). For Dewey, the substance of an object is therefore a logical rather than ontological determination, which attaches itself to an object as a consequence of undertaking the process of inquiry. Contrary to Heidegger, Dewey does not see that it is always necessary that the same qualities adhere to the same object. Instead, an object has a set of qualities that are treated as "potentialities" related to certain consequences rather than set properties (Dewey, 1938, p. 129).

Dewey's project was to determine the common pattern to this process of inquiry. He defined inquiry as,

> *... the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent*

> *distinctions and relations as to convert the elements of the original situation into a unified whole*. (Dewey, 1938, pp. 104-105, italics in the original)

Inquiry flowed from Dewey's conception of a problematic experience. He observed that a great deal of life is routine coping with familiar situations. Some situations are problematic in that they are indeterminate, confused and unsettled, which makes them open to inquiry. Inquiry is the practical activity that transforms the problematic, indeterminate situation into something that is clear, unified and comprehensive, which Dewey called "determinate" (Dewey, 1938, p. 181). Change comes about by interaction between the situation and the person who struggles to bring the situation back to some kind of equilibrium. In Dewey's terms, technology is any tool, whether material or conceptual, that serves the process of inquiry (Hickman, 1990, p. 60). To operate as a tool a formerly taken-for-granted experience has to be opened up to generative inquiry. Following Dewey, this entire process could be characterised as a search for stability that is only completed with the cessation of the intermediate stages of generative inquiry.

To illustrate how technological inquiry can be a productive process of continual refinement of objects of knowledge that leads to stabilisation of a system I will employ Hughes' (1983; 1987) description of "reverse salients". This is a military analogy for the components in systems that have fallen behind or out of phase with the other components. In analysing the evolution of large technical systems like light and power grids, Hughes found a pattern of focal problem points that needed to be solved before further development could take place. Hughes describes these as the unresolved technical issues that remain a situation around which communities of problem-solvers congregate until the lagging components are altered. As a result they attract inventors, engineers, and financiers to develop new equipment (Hughes, 1987, p. 74). Through the focus on reverse salients technological systems are able to acquire a momentum that Hughes suggests makes it appear that the system is autonomous. A mature system has a quality which Hughes sees as analogous to "inertia in motion" (Hughes, 1987, p. 76). In Dewey's (1938, p. 111) terms, the process of inquiry ends when each reserve salient is unified into a secure control of the situation.

2.2.1 Appropriate Technology

Hickman (1995, p. 85) contends that Dewey called his instrumental method a technology because every successful inquiry involves the invention, use and development of tools and other artefacts to solve human difficulties. From Dewey's perspective, technology is a form of situated generative inquiry rather than any fixed procedure that is applicable to any situation. Like Heidegger, Dewey uses the word technology to characterise the search for effective control of an environment. However, Dewey describes technology as an active engagement with objects through generative inquiry rather than simply an awareness of our interaction with objects (Hickman, 1990, p. 44). Within Dewey's technologised theory of inquiry a tool becomes any instrument that can be used to resolve problematic situations. This includes ideas and concepts, as well as objects and artefacts, adding an omitted epistemological dimension to Heidegger's ontology of equipment.

Dewey's theory of technology also gives an indication of what is meant by "appropriate" in the context of generative inquiry. What is important in Dewey's account of technology is the generative process that is reliant on situated decision-making. Inquiry is appropriate when the technology is made specifically for that purpose, so that, should the ends change, so would the objects that perform the task to achieve those ends (Hickman, 1990, p. 53). Dewey recognises that there is an advantage in having conceptual and material tools on hand rather than needing to always start afresh for each situation (Dewey, 1938, p. 136). It is helpful to have as many meanings as possible to draw upon and to have them organised in well-defined arrangements that make them easy to recall and apply. Dewey proposed that these meanings are accumulated in a repository, similar to Heidegger's "standing reserve". These meanings, according to Hickman (1990, p. 53), are not stored as finished products to be applied unchanged from some earlier project. Instead they are stored in terms of their future uses, standing ready in Heidegger's terms, to achieve what Dewey calls "ends-in-view," (Dewey, 1938, p. 496).

The ends-in-view are an active projection of possible consequences developed in a continuous interplay with the means that are devised to create them. For Dewey, this

is an interpretative process in which all intelligent behaviour prompts some recognisable meaning to be included into the storeroom of meanings to serve in some later generative inquiry, even if that situation has not yet occurred. Conceptual or material tools are by-products of previous inquiries that need to be tested against the current problematic situation for which they have been created (Hickman, 1990, p. 21). The worth of a tool is measured by the kind of change it will generate rather than how close it is to a natural model (present-at-hand in Heidegger's terms). The way Dewey says we judge the appropriateness of our chosen tools is by means of their application to the specific problematic situations for which they have been chosen. Following Dewey, when materials and parts of a technology are drawn from the repository of possible solutions and through the application of inquiry prove to be just what is required, they can then be considered an appropriate use of technology (Hickman, 1990, p. 55).

2.3 Popper's Evolutionary Technology

From the Deweyian perspective, technology involves an active, on-going reconstruction of experienced situations. The appropriate tools for this process are those developed through the course of generative inquiry that, in the end, prove to create the maximum desired change in the direction of the goals. This is a Darwinian-influenced view of selection to meet changing contextual circumstances, where the goal of change is to eventually achieve stability through adaptation. Dewey also reinforces the importance of Heidegger's storehouse of resources as an epistemological concept. Both Heidegger and Dewey point to technology's influence in ordering the world into a repository of techniques ready for human actions. Margolis (1998, p. 249), however, argues that it would be a misunderstanding to see Heidegger's presence-at-hand and readiness-to-hand as corresponding to Dewey's indeterminacy and determinateness. Dewey may agree with Heidegger that nature becomes something to be intentionally controlled, driven by a human need to render the world more coherent and secure. However, for Dewey, this is a process driven by human goals that involves the experimental manipulation of tools to provide a range of alternatives to overcome those particular, unsatisfactory circumstances. Decisions are not directed by technological goals, but rather by the desire to resolve human

problems. It is only once a problem is satisfactorily resolved that the process of searching for an appropriate technology will end.

Dewey's characterisation of technology as an accumulation through situated decision-making, emphasises process over the product of technology. This concentration on the processes of technology, which Hickman (2001) shows links technology with inquiry, has the potential to overlook the material aspects of technology. While Dewey suggests that tools of inquiry include their material objects, his focus is on conceptual instruments. This is a criticism that might also be directed at Karl Popper's (1979) account of evolutionary epistemology. However, Popper's critical rationality applies his falsification thesis to conceptual objects in a way that makes their technological form obvious (Popper, 2002, p. 56). In this section I will argue that Popper's three-world concept of epistemology balances aspects of Heidegger's and Dewey's theories, which, when expanded by Levinson (1988; 1982), shows how the physical object of technology acts as a storehouse of human thinking identified by all three theorists.

There are numerous parallels between the later work of Popper (see, for example, Popper, 1969; 1979; 1980; 1977) and Dewey's theory of inquiry. Both have developed reconstructive forms of knowing that consider knowledge acquisition to be an evolutionary process of problem-solving that begins when we are faced with a problem situation. Like Dewey, Popper represents the growth of knowledge as corresponding to our understanding of the environment which proceeds from problems and our attempt to solve them. Additionally, they perceive the pattern of problem solving as the same for all forms of problems. Dewey's tools are for Popper tentative solutions (TS) which through the process of error elimination (EE) in turn identify a new problem (P2) (see Figure 2.1 below).

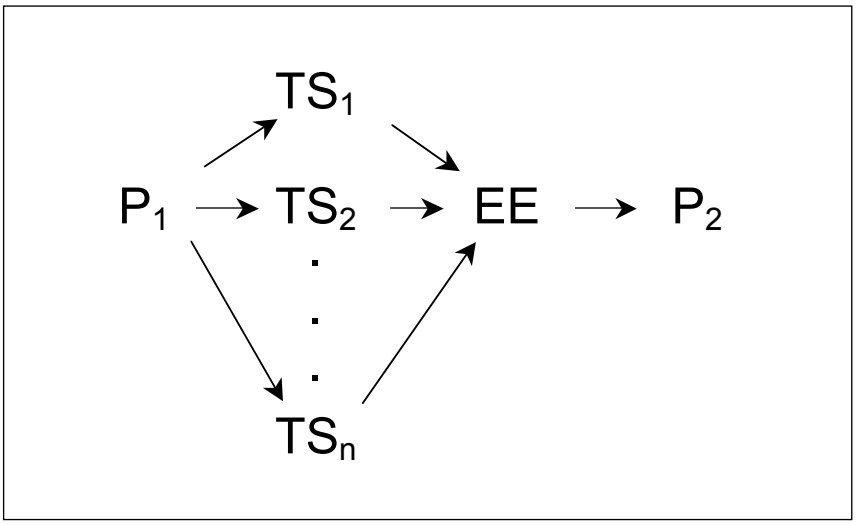

Figure 2.1. General schema for problem-solving (Source: Popper, 1979, p. 243)

Significantly for Popper, this feedback process is non-cyclical as the first problem and the second problem are always different, chaining together a series of provisional solutions, like Dewey's intermediate steps of inquiry. For Popper, all learning processes follow this same pattern of problem-solving and therefore learning can also be looked upon as a form of evolution. While there are many basic similarities between Dewey and Popper, their most striking difference comes from the prominence they apply to the status of ideas. Dewey argued that what is logical must be separated from what is purely mental or physical and stored for later use in subsequent inquiries, but that no idea is disembodied. Popper makes the same general observations regarding the components of knowledge, which he arranges into three separate worlds (Popper, 1979). Specifically, each has a unique kind of knowing and being, namely World 1 physical objects, World 2 mental states and World 3 concepts and theories. Significantly, he describes the tentative solutions as only semi-autonomous, as they exist beyond any specific individual in the conceptual World 3.

It is the partially autonomous internal structure of ideas that is the main difference between Popper's conception of World 3 and Dewey's storehouse of ideas. For Popper, ideas are not only stored as mental projections but as physical manifestations as well (Popper, 1999). In the broader sense, World 3 objects are all the products of any cultural activity including all creative human works such as the content of books, theories, scientific problems, art and ethical values. Popper's proof of these objects'

semi-autonomous nature is that should any single individual perish, the object would still remain behind. Yet, in the case where all objects are destroyed, humanity would have to start again from the beginning to rediscover World 3 objects. Museums, for example, are full of the objects from ancient civilisations whose World 3 use can still be interpreted today even thought their World 1 usefulness has long past.

Carl Bereiter (2002) argues that it is the semi-autonomous nature of World 3 objects that makes them so useful to education. Bereiter calls World 3 objects "conceptual artefacts" (Bereiter, 2002, p. 64). They are human creations that are fallible but improvable, which have a life of their own that is separate from their creator. Bereiter argues that the importance of World 3 to education is that they give educators the ability to identify "knowledge work" which consists of activities that create or add value to conceptual objects (Bereiter, 2002, p. 69). Through knowledge work theories and plans are made public so they are amenable to study and discussion. For Bereiter, teaching for understanding involves cultivating the learners' relationship with objects of knowledge. Having a deep understanding of the topic means the student has the ability to work with the topics underlying values, dispositions and recurrent patterns. Following Popper, this depth of understanding is demonstrated through insightful solutions to problems. The first step in this process is to understand the problem that the solution is intended to resolve.

For Bereiter, the purpose of formal education is the enculturation of students into World 3 so they have the ability to work with conceptual artefacts. In Chapter 5, we will see another variation of Popper's framework that has become highly influential in higher education research through the method of "phenomenography" (Johansson, Marton, & Svensson, 1985). That students experience higher education in its World 3 form is illustrated by Entwistle and Marton (1994), who found that students described understanding as a feeling that the material was so tightly integrated that it was an entity with form and structure. Some students indicated that facts were stored separately from understanding which was perceived more as an organised whole (Entwistle & Marton, 1994, p. 165). Entwistle and Marton describe the knowledge objects as experiential entities that exist in their own right. According to Entwistle and Marton, the most essential feature of these knowledge objects is the awareness of

tightly integrated bodies of knowledge that came from the rehearsal and reconstruction of the material being learnt. They argue that knowledge objects are structured in ways that are most readily accessible to the students, so that they are a way of making sense of personal experience of learning and studying (Entwistle & Marton, 1994, p. 175). Educational technologies, therefore, help students to create and manipulate knowledge objects.

2.3.1 Technology and Popper's Three Worlds

Before understanding the relevance of Popper's worlds to technology it is necessary to appreciate the relationship that he represents between these different worlds. Popper argues that the three knowledge worlds are only partially autonomous as they represent three aspects of the same phenomena. He describes this relationship as the second, subjective world standing between the other two worlds so that the first two can interact, and the last two can interact, as shown in Figure 2.2 below. Although Popper (1994, p. 7) implies a hierarchical arrangement of the three-world framework, as there is a broad chronological distinction in which the physical World 1 was known before the psychological World 2, followed by the conceptual World 3, I have chosen to represent the three worlds horizontally to emphasise that they are analytic distinctions with a degree of overlap between the different spheres.

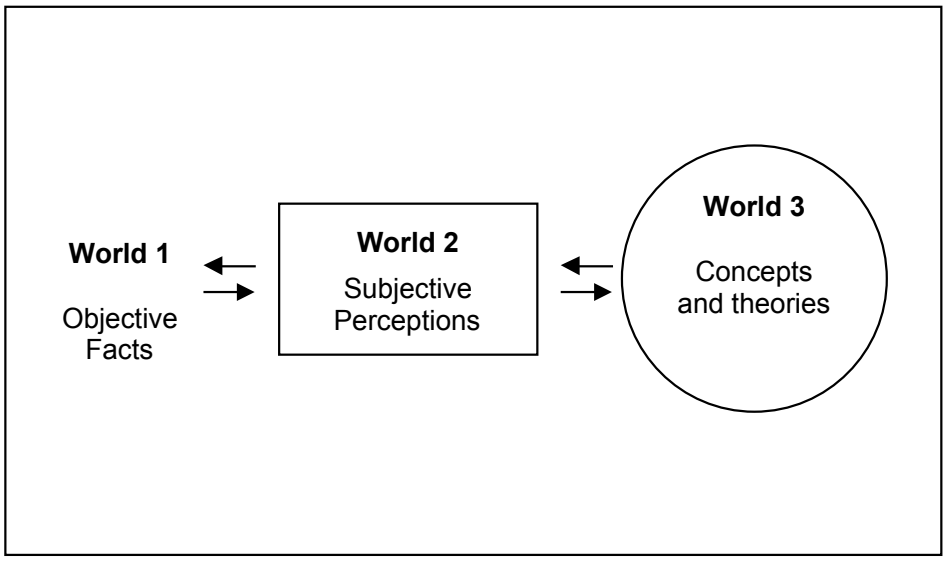

Figure 2.2. Interaction between Popper's three worlds (adapted from Popper, 1994, p. 7).

In Popper's model the World 1 and World 3 can not interact, except through the mediating intervention of the second world of subjective or personal experiences (Popper, 1979, p. 155). In this scheme World 2 is important because it filters input from the physical world to provide the source of ideas drawn from desires, convictions and memories. Further, World 3 can only have an indirect effect on World 1 through the mental objects of World 2. In practical terms, conceptual artefacts have a close relationship with material things (Bereiter, 2002, p. 65). Concepts, theories and principles can be thought of as tools to be worked with. Following his metaphysical turn, Popper unequivocally identified his three-world framework with technology. Nevertheless, it is Levinson (1988; 1997; 1982) who has most systematically developed the technological implications of Popper's three levels of reality. Levinson suggests that the Popperian system furthers our understanding of technology by showing the relationship of human ideas to the evolutionary process (Levinson, 1982, p. 161). Popper's evolutionary epistemology argues that humans adjust to their environment through the interaction with World 3. It is both faster and safer for humans to evolve conceptual artefacts than to wait for subsequent generations to experience environmental changes first hand, a distinction Popper describes as, "the difference between Einstein and the amoeba" (Popper, 1979, p. 25). The provisional nature of theories, among the most significant inhabitants of World 3, suggests that their respective merits can be raised, discussed and, if found wanting, rejected or modified without needing to also reject the entire organism.

While some might argue for the recognition of a fourth technological sphere, for Levinson, the question of where technology fits into Popper's three-world schema underscores how technology differs from the formation of ideas. Popper describes the function and development of technology as analogous to the performance and evolution of biological organs. That is, the products of the human mind are realities of the physical environment in the same way as biological organs. Both develop by the same method of tentative solution and error elimination in which solutions only survive when they are publicly tested and shown to adequately match the environment's requirements. As technology moves from its natural state it begins to incorporate an increasing number of human ideas and decisions to become

progressively more obviously an example of World 3 (Levinson, 1982, p. 161). This transformation from World 1 to World 3 does not dilute the World 1 properties as technology is simply, as Heidegger would agree, the rearrangement of physical material according to human specifications. Technology is thus the contact point between the human mind and the material universe though the physical embodiment of human theories and ideas (Levinson, 1982, p. 159).

Popper is not alone in characterising technology as an extension of our biological organs. Kapp (1978), for example, developed one of the most complete concepts of an anthropological basis for technological objects. From descriptions of bodies as machines to McLuhan's (1964) description of electronic technology as an extension of the nervous system, the interplay between technical metaphors of how we think the body operates has reflected the dominant thinking of the day (Rothenberg, 1993). This continues with the contemporary use of the computer metaphor as a model for the human brain (for a discussion on the limits of artificial intelligence see Dreyfus, 1979, 1992). Almost as frequently, the view is expressed that technologies evolve like the organs they extend, in some variation to the Darwinian pattern (Basalla, 1988; Ziman, 2000) Levinson argues that Popper's contribution to our understanding of technology has been to clarify the nature of technology's already recognised evolutionary qualities by placing these features on a continuum along with the biological Darwinian evolution with the figurative Darwinian evolution of the ideas humans produce (Levinson, 1982, p. 158).

From Popper's perspective World 3 objects are the human equivalents of exsomatic tools. These are the tools used by animals that are not one of their own organs, such as a spider's web or bird's nest. Levinson suggests that from a Popperian perspective, technology clarifies the balance between the mind and matter by providing an embodied arrangement of our experiences of nature that combines human intellect with the materials of nature (Levinson, 1982, p. 163). Technology manifests itself in the physical world but is dependent on theories inhabiting the objective mind being applied to material objects in a way that makes them appear to transcend their individual creators. The successful ideas survive while the less adapted are

eliminated. Popper argues that surviving technologies are still provisional as they have only been shown to be the best solution for the moment (Popper, 1979, p. 260).

2.3.1.1 Meta-Cognitive Technologies

Levinson observes that there are some technologies that have been directed towards the growth of knowledge itself. He calls any technology focused on improving thinking a "meta-cognitive technology" (Levinson, 1995, p. 126). Levinson describes three classes of meta-cognitive technology: enhancers, extenders and distributors. It was suggested in Popper's analysis of knowledge above that the development of tools, like spectacles or hearing aids, enhances our already given human abilities. Levinson points out that other technologies, like telescopes and microscopes, extend human abilities into new areas. As a result they help the production of knowledge by augmenting direct experience beyond our natural capacity to experience and comprehend. A third type of technology, like writing, permits the greater exchanges of information than could have occurred in purely oral cultures. This additionally expands the ensuing mechanisms for criticism that effectively tests ideas and ensures that only the soundest continue.

Levinson uses the classification of meta-cognitive technology to argue for considering computers to be a special case as they combine all three classes of action into one machine. An illustration that computers are not unique as a meta-cognitive technology is aptly provided by Popper's own example of the interaction of his three worlds found in lectures (Popper, 1999, p. 32). Popper argues that the objects of lectures belong primarily to World 1 and World 3, which, following Levinson's discussion outlined above, is the characteristic combination of technology. Hence, the lecture exists physically as paper, ink and sound, which are plainly part of World 1. The content of the lecture, unmistakably, belongs to World 3. Any two presentations of the lecture are different in the sense that they belong to World 1 but are the same in so far as they have the same World 3 content. A student in the lecture who does not understand the language of instruction can still experience the World 1 sound of the lecture but will be unable to achieve any understanding. To understand

the lecture it is essential to follow the arguments of the lecturer, which belong to World 3. As Popper describes it,

> My own lecture here remains the same in a World 3 sense, whether my delivery is fast or slow, loud or soft. It can be translated fairly precisely into another language. And a book may be printed very differently in various editions. Of course, the different printings and translations all have something in common; but there is no one-to-one correspondence, and therefore no real parallelism. (Popper, 1999, p. 31)

2.4 The Experience Of Technology

The implications that a concept of learning involving the use of academic conceptual artefacts has for the study of technology in higher education will be explored in greater detail in Chapter 5 of this thesis. For now it is sufficient to follow Popper and acknowledge that this framework is metaphysical, by which Popper means his speculations cannot be falsified, and accept that this theory is a useful analytical device because humans react to these epistemological objects *as if* they existed as physical objects (Popper, 1979, p. 163). For Levinson, the evidence of World 3 is the incontestable influence of technology on the physical world. In Popper's terms the real world is what can be causally acted upon, therefore even theories are real when they have the capacity to interact with material objects (Popper & Eccles, 1977, p. 10). For Levinson, it is the relationship between World 1 (the material world) and World 3 (products of the intellect) that pinpoints the importance of technology's interactive character. While Popper argued that World 1 and World 3 cannot interact in the mind, Levinson argues that technology creates a unique hybrid that is a union of the material of World 1 with the ideas of World 3 whose very existence constitutes a continuing test of the theories it embodies (Levinson, 1988, p. 78). This hybridity comes about because of the social interaction that lies behind all World 3 objects.

Within Popper's three-world framework World 2 and World 3 represent the two sides of human consciousness, what he calls the subjective thought processes and the objective thought processes. World 2 has the role of generating different states of

mind while World 3 permits those states of mind to be experienced by others without the need for direct access to our subjective minds, as illustrated as in Figure 2.3 below.

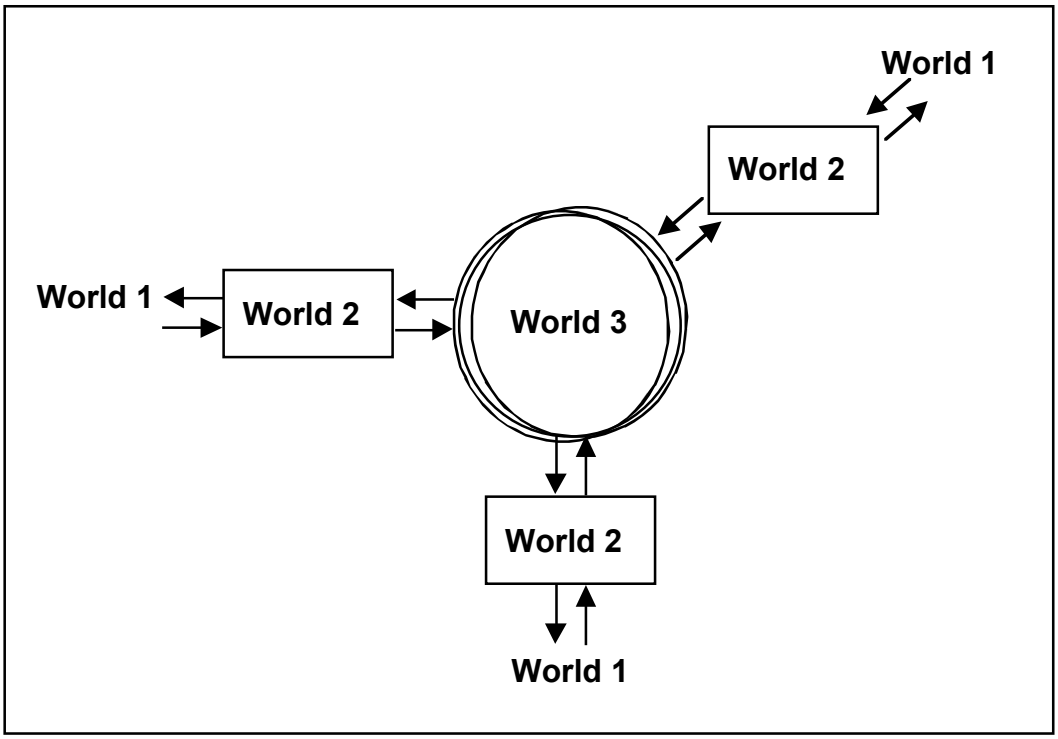

Figure 2.3. The exchange of ideas through Popper's World 3.

Human beings are partially constructed by the shared linguistic exchange that Habermas calls the "lifeworld" (Habermas, 1984, p. 335). Popper's framework also demonstrates that human experience is partially constructed by technology which is a fusion of material objects with products of the human intellect. The objects of World 3 are already objective and autonomous from their individual human creators before they gained embodiment in technology (Levinson, 1988, p. 79). The objects of the third world are semi-autonomous in that they confront the subjective mind but do not reside within it. That is, they are dependent on human interpretation but are independent of any specific individual. Once the objective products of the human mind enter the public domain by becoming World 3 problems that are made freely available and discussed, they continue to exist long after their creators have ceased to think about them. They take on a life of their own whereby their creators no longer control or even know everything about their own creations.

The value of using Popper's situational analysis to discuss technologically embodied ideas is that it indicates that many more things are socially constructed than might first be considered. However, Popper's strong individualistic perspective fails to explain the essential motivation that drives actions in his epistemological framework. Popper may have anticipated the social turn in critical theory but he refused to investigate this aspect of his own theories (Jarvie, 2001). This causes his theories to run up against the same limitations in a philosophy of consciousness experienced by Habermas (1987a) in an early attempt to apply similar epistemological concepts to social evolution.

Habermas' solution was to make a linguistic turn to develop a concept of the communicative lifeworld that synthesised many of his earlier themes while overcoming their limitations for social inquiry (McCarthy, 1978). For Habermas language is the privileged aspect of communication. Discourse, as in the argumentative form of language that must be supported by good reasons, is the privileged form of language. The epistemic goal of discourse is a consensus understanding that approximates the pragmatic concept of truth. Collective understanding is established through the collaboration of individuals and their ability to come to similar conclusions. Habermas analyses the lifeworld's need for this collaboration through a reconstructive understanding of the way in which competent language users employ sentences in order to relate to three domains of reality that correspond with Popper's three worlds. It is reconstructive because it tries to reconstruct the rules that constitute this competence.

What Habermas provides in his theory of communicative action is a synthesis of the themes explored by Heidegger, Dewey and Popper. He does not adopt these positions uncritically but appropriates them for his own ends by using them as conceptual tools for thinking with. It is therefore worth making a few remarks about the strategy adopted by Habermas before dealing with their implications to the study of technology in the next chapter.

Habermas acknowledges that his early work was deeply influenced by Heideggerian hermeneutics (Habermas, 1986, p. 150). Although he ultimately made a break with

Heidegger's philosophy of consciousness, the influence of Heidegger is still visible in Habermas' work. From Heidegger Habermas takes the theme of the world disclosing use of language that Heidegger originally takes from the German Philosophy of Language tradition. Habermas, however, is trying to use existing language to explain social interaction rather than invent one. Heidegger's phenomenological philosophy plays a prominent role in describing being-in-the-world which involves a collectively binding pre-understanding which Habermas also describes in his version of the lifeworld (see Habermas, 1987b, p. 124).

Habermas also shares with Heidegger the view that human science cannot be comprehended from its appearance alone but requires a hermeneutic understanding. Heidegger outlines two ways of being-in-the-world, one that is technological and the other that is caring for things in their context. These are reconstructed by Habermas into two forms of action, in which an undistorted communicative action is valued over a technologically strategic one. Habermas takes up the theme of a degradation of human beings to the level of mere objects in his colonisation thesis. I will explore the implications of a society becoming more technological and correspondingly less humanised in Section 3.1 of the next chapter.

For the most part Habermas is critical of Heidegger's work and searches for an alternative to counteract the residual components of influences from National Socialism which Heidegger never renounced (Habermas, 1989b). As a result Habermas accuses Heidegger of linguistic relativism whereby he favours linguistic world disclosure over practical action (unfairly in Kompridis, 1999 view). Habermas has been highly critical of Heidegger's conceptions of intersubjectivity, communication, propositional truth and scientific-technological development. Yet Habermas is able to retain some features of Heidegger's thinking because of his affinity with American Pragmatism. Habermas also shares many of the common interests with Dewey (Antonio, 1989) and while he is largely engaged with the social pragmatism of Mead, some argue it is possible to describe Habermas as a thoroughly Deweyian social theorist (Ryan, 1995, p. 357). Both Habermas and Dewey are champions of democracy requiring forms of inquiry that proceed out of the shared background of norms and values. Their shared interest in learning and societal

evolution draws out the educational significance of their "critical pragmatism" (Biesta, 1994; Young, 1992). Putnam (1990) argues that Habermas rediscovered Dewey's argumentative strategies of epistemological justification. Hickman (2000) agrees that there are many similarities between Habermas and Dewey, particularly in their rejection of scientific realism. On the other hand, Hickman also sees some significant differences regarding the application of scientific method to the human sciences and their descriptions of scientific technology (Hickman, 2000, p. 506).

Like Dewey, Popper is another figure who has been intensely criticised by critical theorists for failing to recognise the relationship between scientific method and instrumental rationality. With such strong similarities between Dewey and Popper it would be expected that there would be common ground between Habermas and Popper. Both use a procedural approach to knowledge based on mutual criticism and fallibility. Stokes (1998) finds that a common heritage of Kant and Weber makes a reconciliation between Habermas and Popper possible. In particular, Stokes argues that Popper's methodological shift to the problem-solving method shows an assimilation between his arguments and critical theory (Stokes, 1998, p. 148). To summarise, Habermas sees communicative rationality as reaching an understanding in terms of three-world relations of actors, in which respective claims of prepositional truth, normative rightness and sincerity have an internal validity. The concept of rationality is based on criticism of these validity claims and the concept of reaching an understanding through cooperative negotiation of common definitions of the situation. The universality of these processes is provided by the rationality of the internal structure of communication.

Habermas acknowledges that his concept of rationality carries a heavy burden of proof that can never be conclusively proven. He suggests that this is not a transcendental deduction but a hypothetical reconstruction that must be checked against speaker intuitions across as broad a socio-cultural spectrum as possible (Habermas, 1984, p. 138). Habermas is interested in an applied critical theory that develops standards which allow modernity to be understood in a way that is self-critical so as to provide guidance for modern life. He analyses the implications of rationality involving relations between actors and the world which are clarified by

examining Popper's theory of three worlds as three forms of action in terms of actor-world relations (Habermas, 1984, p. 95). Popper's third world, as we have seen in Section 2.3 above, contains the products of the human mind, of which language is the most important. Popper describes these as the symbolic formation still waiting to be discovered and therefore having the status of independent mental acts (these are described as "fore-conceptions" in Heidegger's (1962, p. 150) terms).

Habermas describes Popper as criticising the fundamental empiricist conception of a subject that confronts the world in an unmediated way. The difficulty that Habermas has with Popper's formulation is that it is too one-sidedly physical-scientific to be of much use to sociology. Habermas argues that the aim of sciences is to test the validity of problematic items of knowledge, not coordinate actions to reach an understanding. To apply Popper's worlds to the sociological concept of action Habermas argues that the model of scientific theories is not to be taken literally. Instead he argues for an expanded version of Popper's third world that includes the process of establishing truth claims, norms and values. This raises the question of how components of cultural tradition that are relevant to social integration can be understood as systems of knowledge and constructed with validity claims analogous to truth. This will be expanded on in the next chapter.

2.5 Experiential Technology

To conclude, this thesis takes the position that to provide sound advice on what is educational about technology, it is necessary to start with an understanding of technology. In this chapter I have shown how an experiential perspective on technology enables us to rethink some of the fundamental dimensions of a previously one-dimensional understanding of technology. An experiential view of technology has implications for education and its use of technical objects. Ideas are embedded in technology to influence experience in the wider sense. Technology is amenable to anthropological study because it is the physical storehouse of socially constructed human ideas. Anthropological explanations see technology as a representation of a society, where historical objects are not only distinguished from nature, but are also

the trace of the culture that made them. Decisions that are made as humans adapt to new circumstances become visible in the resulting artefacts.

The examination of the experience of technology by Heidegger, Dewey and Popper raises a number of methodological questions. Each in their own way point to the importance of language in understanding technology but they have not accounted for the social interaction among individuals and their environment. This is the theme that Habermas picks up in order to make his analysis politically useful. To focus on the coordinating nature of communication Habermas replaces the ontological concept of world with the linguistic version of the concept, to which he applies the phenomenological term, "lifeworld". As a progressive theorist Habermas asks, does language do more that just disclose the world as it is and can it be used to disclose the world as it could be? In the next chapter I will argue that a similar shift to a communicative social inquiry is necessary to explore the contextually situated character of technology in higher education. It is only then that we will have the necessary conceptual tools to answer the central question of this thesis: what is educational about technology?

CHAPTER 3

INQUIRING INTO THE COMMUNICATIVE ASPECTS OF TECHNOLOGY

The experiential perspective on technology discussed in the previous chapter demonstrates a range of perspectives human beings adopt towards the physical world. Significant to each of the perspectives outlined by Heidegger, Dewey and Popper is an underlying process of learning, whether learning from technology's objects, actions or meaning. The generative side of inquiry shows that technologies are only tentative solutions, appropriate when designed to account for the conditions of a specific situation, in the case of this thesis, within higher education. Just as importantly, the experiential view of technology suggests that there is no point in arguing for a single best way to teach with technology. The influence of context is too important for there to be any possibility of a mass-produced approach. This would suggest that a technology could only be said to be educationally productive when a learning environment provides the unique conditions in which the learner can reconstruct rich meanings into further significance appropriate to their learning. From this perspective it is the nature of the active inquiry undertaken by students that determines whether the decisions used in designing a learning resource have been appropriate or not. If all the productive skills go into the creation of the educational resource, which is so complete that it limits the students' experiences, then the learning is one-sided and only benefits the designers to the impoverishment of the students.

The implication that universities can draw from the experiential view is that their technology needs to be a way of using the world that results in learning consistent with the values of higher education. Modern universities are complex institutions in which there are four commonly agreed functions, namely teaching, research, administration and community service (most commonly in the form of paid consulting work). As Barnett (1992) illustrates, these functions represent the four

interests of the university's major stakeholders: the student, the academic, the administrator and the employer. With such diversity of interests, a common way of thinking cannot be expected to exist among all of the university's community members. Therefore, in this thesis it is the principal educational values of universities that are accepted uncritically. This is not to suggest that they represent the best values for student learning and should not be changed. Instead, consistent with a critical reconstructive method, these taken-for-granted understandings are critiqued in order to determine what alternative interpretations can be formulated. The three perspectives outlined in the previous chapter not only show that technology is a fusion of physical objects with human concepts formed through their use, but, they also demonstrate that as a theorist of modernity, the theme of technology can never be far from Habermas' critical theory. Understanding technology requires a theory of the conditions under which specific technologies are shaped (Brey, 2003, p. 34). However, the two main perspectives on technology, theories of modernity and technology studies, are rarely in dialogue. As Brey demonstrates, there is a tension between theories of modernity and technology that is largely the result of their different modes of inquiry. Research into modernity relies on highly abstract and general analysis focussing on the forces that guide technology's development rather than specific technologies. In contrast, while theories of modernity analyse the broader social context, technology studies are concerned with the particular cases of technology and their specific contexts. There are important methodological considerations from both of these perspectives and the aim of this chapter is to outline a method that brings together concepts drawn from specific descriptions of technology with concepts that come from a general theory of society.

Habermas discusses the application of theory to practical problems based on a process of learning compatible with the three systematic analyses of the logic of technology presented in the previous chapter. I will therefore begin in Section 3.1 with an outline of Habermas' social theory which blends cultural and epistemological elements with the institutional aspects of society to develop a critical theory of modernity. Habermas argues that the modern project is to build a rational society which in modern societies rests on the logic of scientific principles rather than tradition. Modernity is characterised by different kinds of rationalisation which

belong either in the sphere of the social "system" or in the everyday communicative interactions that take place in the social "lifeworld" (Habermas, 1987c, p. 150). The key component for a critical social theory revealing the distortions in society is the relationship between the social system and the lifeworld. Of particular interest to a discussion of new technology is Habermas' colonisation thesis, which provides the foundation for a fresh look at modernisation based on the differentiation of appropriate spheres of interaction.

The principles of communicative action have been applied to a broad range of social situations by Habermas and others (for example, in school education see Young, 1990; 1992). Habermas, however, largely restricts himself to questions of rationalisation and modernity. Even though Habermas describes the process of replacing dense, linguistic dialogue with simplified interactions and calls it the "technicization of the lifeworld" (Habermas, 1987c, p. 183), he does not concern himself with any specific instances of technology. In this regard I will follow Feenberg's (1991; 1995a; 1999b) application of critical theory to the rationalisation of technology in society in Section 3.2. Feenberg argues that the social construction tradition of technology analysis provides the evidence required to identify the normative nature of technology on which he bases his critical theory of technology. In Section 3.2 I will take each aspect of Feenberg's theory in turn, beginning with the hermeneutic dimension of the cultural background of technology. This is followed by the cultural horizon which is the historical record of pre-understandings of our interactions with technology. Finally, I will discuss the steering mechanism of technical codes that influence our selection of technology and thereby limit human actions. In Section 3.3 I will reconstruct Feenberg's theory of instrumentalization in relation to Habermas' discourse ethics to reveal the relationship between the two. Feenberg has applied his critical analysis to a number of specific technologies, including medical, environmental and communications technology. Of particular relevance to this thesis is Feenberg's critical analysis of the dual nature of computer-mediated communication, which I will outline in Section 3.4 before moving to a more complete application of the critical theory of technology to the specific context of student learning in higher education in the next chapter.

3.1 Social Evolution as a Theory of Rationality

Habermas' theory of communicative action presents a new way of looking at modernity that provides the basis for understanding the coordinating processes of communication in society. According to Habermas, the integration of a society is a continuously renewed compromise between two kinds of imperatives. One is the efficient functioning of social institutions (system) and the other is the construction of meaning in society (lifeworld). Modernisation involves the progressive uncoupling of an originally integrated society into different spheres of action. In the premodern society the social system and the lifeworld were fully intertwined and language is the only coordinating medium. In a traditional society, customs and ceremonies have the pragmatic purpose of integrating society and permitting its continuation. As a society enlarges and modernises it stratifies and requires institutions to maintain and bind the society together. Traditional law, for example, becomes judicial law with systems such as police, courts and jails. Similarly, customary learning processes develop into the formalised education of schools, teachers and pupils.

It is the expansion of society that, Habermas argues, is driving the social system into separating from the lifeworld. Systemic structures come into existence so that a social system can function efficiently as a society once it can no longer operate on traditional bonds alone. The lifeworld meanwhile maintains the role of social integration to ensure that there is meaning to people's lives. The lifeworld is an important concept for Habermas because it demonstrates that there is more to life than just subjective and objective experiences as there is also an intersubjective reality. In Habermas' theory the lifeworld provides the background context for communication. He defines the lifeworld as the context-forming horizon of social actions that are taken-for-granted in social functions (Habermas, 1984, p. 335). Habermas concentrates on the communicative aspects of the lifeworld which comprise the sum total of interactions between individuals and their environment.

The lifeworld has particular analytical importance to Habermas because it contains a history of our coming to agreement that is implicitly drawn upon in communication.

In other words, the lifeworld described by Habermas is the cultural sphere where cultural values dominate, which, in turn, socialises others into the norms of society. The lifeworld is systemic in the sense that the pragmatics of communication produce a consistent pattern of behaviour. That is, there is a structuring of these agreements through the socially accepted open-ended rules in language which people unquestioningly accept when their goal is to arrive at an understanding (Habermas, 1984, p. 337).

The key aspect of the social system is the processes of power and exchange that allow a society to steer itself while remaining anchored in the values of the lifeworld. The social system develops as norms are released from customary patterns of behaviour to be coordinated by what Habermas calls a "delinguistified media of communication" (Habermas, 1987c, p. 154). By this he is referring to any alternative form of communication that is more efficient in coordinating people's actions because it does not need to continually build a consensus to develop an understanding. In place of consensus building is a pattern of rewards and punishments that are already encoded symbolically in the different media and the social system consists of normative understandings that are embedded in a medium. The mediatization of communication makes it possible for individuals to coordinate their behaviour while still pursuing individual success. The two key media Habermas concentrates on to illustrate this delinguistified integration in a social system are power and money, which in turn have shaped social institutions like governments and markets.

From his analysis of rationality as communicative interaction, Habermas was able to construct a two-level concept of society that would then provide the basis for a critical theory of modernity. Constructing a theory of communicative action involved joining the lifeworld perspective with systems theory so that societal rationalisation is a developmental process. Society can develop to ever-greater levels of complexity though objectified interactions that are only partially under direct human control (Habermas, 1987c, p. 233). Social integration of the lifeworld is defined by the testing of claims aimed at reaching an understanding about the goals of society. The joining of system and lifeworld is possible as they are different names for different

qualities of a single phenomenon involving the same actors that inhabit both realms. They are only distinguished by their different forms of rationality. There is in essence no unbridgeable differentiation between systems and lifeworlds as they are two sides of the same entity, qualitatively distinct perspectives of society rather than quantifiable, different forms.

3.1.1 Colonisation of Lifeworld by System

For Habermas, lifeworld and system are purely analytical constructs that differentiate two very different forms of social activity that co-exist and overlap. It is only for the purposes of social theory that they are better separated so that it is possible to shift perspectives to understand each form of activity in its own terms. From this perspective, looking at society through the lens of functional integration provides a better understanding of how institutions process information and make subjectless decisions.

Habermas uses Weber's concept of rationalisation to argue that lifeworld is being colonised by system (Habermas, 1987c, p. 333). Weber saw that a characteristic of a modern society was to become increasingly institutionalised and bureaucratic and he cautioned against the two spheres in society becoming confused. For Habermas this confusion is exactly what has happened in contemporary society with the social system taking over interaction in areas that should be left to the lifeworld (Habermas, 1987c, p. 355). Habermas argues that the effect of uncoupling system from lifeworld is a gradual take over of lifeworld interactions by interactions that essentially belong to system. In other words, actions that should legitimately have been arrived at by a consensus among the participants involved are dealt with administratively or by the market.

The methodological consequence of rationalisation is that while system processes initially allow for more complex societies, at some point in the expansion the social system itself becomes too complex to be understood. The problem for Habermas is to distinguish the elements of system differentiation required for a functioning modern society from those that are pathological. Habermas argues that a crisis in a society

arises whenever the integrative functions of the lifeworld are interfered with so that the society undergoes a major questioning of its values, or worse, disintegrates into anarchy. The pathology of a modern society is where systematic mechanisms drive the means of social assimilation out of the lifeworld. An economy, as a system that creates itself communicatively through the medium of money, and a political system that regulates itself through the medium of power, are not of themselves pathological unless they inhibit the formative development potential of society and the processes that create the background of values that underpin interactions within the system and so begin to destabilise the society.

For Habermas, the multi-dimensional concept of the lifeworld provides the way of putting agency back in the hands of social actors. Systems theory allows him to talk about social development as a learning process for the evolution and improvement of society towards a generally agreed better end. He proposes that the alternative to colonisation is an appropriate rationalisation of the social world. This involves expansion of communicative action in areas coordinated by communicatively achieved agreement. It is Habermas' hope that the unconstrained decision-making of communicative rationality will help cure the pathologies of modernity. He wants to identify false understandings through reflexive action so they can be exposed to debate. The purpose of this debate is for everybody involved to arrive at a broadly accepted consensus.

3.2 Critical Theory of Technology

With the concept of an information society now replacing the earlier industrial society, Habermas' colonisation thesis is becoming even more relevant to an understanding of society. In the systems world, interaction has, for the most part, involved money and power, but in modern societies it is also increasingly mediated by technology. Habermas has described the conditions that led to a more complex society and emergence of the communicative sphere of the lifeworld. In the previous section it was suggested that technicization of the lifeworld only turns into colonisation of the lifeworld when symbolic reproduction is at stake. Technicization of the lifeworld is not a problem as long as the lifeworld continues to function

properly and reproduces itself. In the case of higher education the technicization is appropriate as long as it contributes to students' and academics' self-understanding. An example of colonisation would be where administrators, rather than teachers, make decisions about teaching. The lifeworld contracts whenever systemic mechanisms drive out mechanisms of social integration, such as discourse and coming to an understanding, from domains that should logically be coordinated by language.

Most theories of modernity, like the one presented by Habermas, do not provide an account of technology as a major force for change in society. While there has recently been some discussion between modernity theorists and technology studies (see, for example, Misa, Brey, & Feenberg, 2003), this has not generally been the case in the past. Instead of recognising technology as an integral part of social institutions, many modernist theorists consign technology to a background condition and concentrate on the abstract global conditions in which technology develops. It is only in technology studies that technology is placed centrally in the discussion. Brey (2003, p. 58) argues that modernity theory can learn through an engagement with technology studies that modernity not only shapes technology but is also shaped by it. Feenberg (1991; 1995a; 1999b) is one who believes a synthesis between modernity theory and technology studies is possible. He sees that the primary error in modernity theory is not recognising that technology is a social creation and he sets out to use the themes of norms, coordination and socialisation to formulate a critical theory of technology in a manner similar to Habermas' critical theory of society.

In presenting Habermas' reconstruction of modernity in Section 3.1 above, I have endeavoured to show how the concept of communicative action provides him with new insights into the processes of social learning that underpin rationalisation. It is this process of communicatively coordinated rationalisation that Feenberg uses as the basis for a meta-theory of technology. Feenberg has come to see the discarding of technology from Habermas' analysis as a major flaw in his theory of modernity (Feenberg, 2003, p. 82). However, it needs to be recognised that Habermas' early writing was explicitly located in technology studies, although not addressing specific technologies, and he returns to similar themes throughout his writings. But it is also

true that Habermas has moved away from the explicit engagement with technology of his earlier writing to a tacit understanding outlined in the previous chapter (this is a similar view to that presented by Krogh, 1998). In Feenberg's view, by overlooking the social character of technology at a time when technology has become so pervasive, Habermas has isolated his theories from the primary sources of development in society (Feenberg, 2003, p. 83). Feenberg, on the other hand, presents a critical theory of technology that is both largely compatible with Habermas' theory but is also able to analyse specific instances of technology.

Feenberg has also undergone an evolution in thinking due to an exploration of the themes of social constructivism in technology (for examples of this tradition see Bijker & Laws, 1992). His critical theory of technology has progressively moved from a Marcusian-inspired call for a new socialism as a response to capitalism, to an analysis of societal pluralism and the development of a social philosophy of technology that synthesises the themes of his earlier work. In the process Feenberg has progressively moved away from his earlier engagement with the ideas of Habermas to incorporate more cultural contributions into his theory of technology. While social constructions of technology do not normally contain political or normative claims, Feenberg uses them to provide the empirical basis for a theory that does. Feenberg expands Habermas' critical theory to technology by arguing that the social construction view shows how the normative dimensions of technology operate, providing the explanation of how technical devices become incorporated into the technical lifeworld. Feenberg goes beyond the underlying methodological symmetry in social constructivism to make evaluative claims. In so doing, his approach continues to be similar to Habermas' (1996) more recent incorporation of constructivist views of thinking into social theory.

While Feenberg has moved his own analysis away from explicitly engaging with the ideas of Habermas, his investigation of technology as social theory brings him to many of the same conclusions, albeit by a different route. Feenberg's analysis reinforces and extends Habermas' theory by demonstrating that technology legitimises human actions in the same way as power and money. The difficulty with drawing on any theorist, such as Habermas, for a research study such as this thesis, is

in generalising the direction of their ideas from a few specific instances in an evolving body of work. The same can be said of Feenberg's growing collection of writings about technology. Developing a meta-theory of technology is an on-going project for Feenberg and his thinking continues to evolve. To explore the implications of a critical theory of technology I will introduce three of the founding concepts of Feenberg's on-going project. Feenberg argues that three aspects of technology these concepts address require three separate critiques. Before applying his methodological insights to the question of online learning I will briefly introduce his theory which broadly follows the development of his thinking from the synthesis of critical theory to his mature theory of instrumentalization.

3.2.1 The Social Construction of Technology

Like Habermas' theory of society, Feenberg's critical theory of technology is structured around two manifestations of rationalisation, one hermeneutic and the other systemic. His first technological critique accepts Habermas' argument that the inner life of social groups must be studied in a hermeneutic process of the shared beliefs that have led to group formation and stable organisations in a modern society (Feenberg, 1995a, p. 91). Influenced by Heidegger, Habermas saw understanding in the lifeworld as a hermeneutic process which he argued can only be reached through interpretive analysis of the lifeworld and its narratives. In a similar approach, Feenberg offers a methodology that develops an understanding of technical objects' hermeneutic dimensions that leads to an acceptance of that technology. This involves a two-pronged analysis of the technology's norms and their interpretation in the historical perspective of a technology. To develop this kind of understanding Feenberg turns to the constructivist sociology of technology which undertakes the analysis of specific technologies in relation to their social context. These studies demonstrate that technology development is a selective choice that is ultimately determined by the beliefs of the social group (Feenberg, 1999b, p. 79).

Constructivist theories of technology typically consider technology and society as a form of an integrated web and employ the principle of "methodological symmetry" in their analysis (Pinch & Bijker, 1987, p. 18). This is a principle adapted from Bloor

(1976) to argue it is not necessary to make any claim about the true nature of technology but merely to map the stabilisation of technology systems through their human interactions in social contexts. Stabilisation results when a technology is no longer a site of controversy and there is an agreement reached between different social groups on an approved interpretation of a technology. Critical to this view of analysing technology is the concept of "interpretative flexibility" (Pinch & Bijker, 1987, p. 27) in which technology is seen as possessing no fixed properties, but allows for the construction of multiple interpretations. Any technology that has reached a position of agreement as the outcome of social negotiation can be said to have reached a state of "closure" (Law, 1987, p. 111).

The strong version of this social constructivism is represented by studies such as Collins (1992) and Woolgar (1991) who hold the view that technology is only social and no properties of the technical object can be attributed to the technology itself. From the opposite perspective, actor-network theory criticises social constructivism for giving special preference to social elements and instead studies stabilisation processes that result from a heterogeneous network of human and non-human "actants" (Callon, 1987; Latour, 1987; Law & Hassard, 1999). Feenberg's own view presents a more moderate form of social constructivism, arguing that technology is socially shaped rather than socially determined (for a similar approach see MacKenzie & Wajcman, 1999). Feenberg argues that the strong and weak constructivist perspectives surrender critical reason to the prevailing technical standards. They are both too ready to submit to the authority of tradition, which, according to Feenberg, has conservative political implications. From Feenberg's perspective the two forces, social and technical, are more evenly balanced, so that the non-social factors are socially negotiated with these properties progressively built into technologies.

3.2.1.1 The Delegation of Norms to Technology

The social constructivist approach to technology assists Feenberg in incorporating the socio-linguistic character of technology into his analysis. Observing that the strong constructivist perspective ignores technical elements altogether, Feenberg

does not resort to a literal view of technology as "text" but sees technologies as built up from a collection of loose parts that are realised into a physical device. He calls these components 'technical elements', of which examples would be wheels, levers, cogs, pulleys and circuits that combine to construct the final physical artefact (Feenberg, 1991, p. 81). Feenberg conceives of these elements as similar to the vocabulary of a language in which the technical elements are strung together into a collection of different meanings, creating the unique configuration of a specific device, much as a combination of computer parts can be nominated as a "student", "multimedia", "office" or "gamer" PC.

To explain how normative components become constructed into a technology Feenberg turns to Latour's actor-network theory concept of "delegation" (Latour, 1992, 1995, 1999). Latour suggests technologies become simplified linguistic elements through the norms the designer transfers into a technical device. This is not an intentional process but the goals of the creator are incorporated into technology as a by-product of transferring human labour to a technical device (Latour, 1999, p. 187). Technical objects are created to substitute for a human actor by doing the work that a human would ordinarily do. The technical object, however, is never able to fully remove the need for human action but instead creates a shared collection of actions. Simple tasks are delegated to a technical device with the corresponding effect of delegating complex actions to humans (Latour, 1992, p. 231).

Feenberg (2002, p. 123) suggests that this process of delegation can be observed in a number of interactions with technology, including the teacher's use of a textbook to organise information. The textbook acquires the straightforward action of "telling" so that a human lecturer no longer needs to present information for a student to learn the discipline's declarative knowledge. This, however, does not free the lecturer from the far more complex requirement of teaching. The simple action of telling may have been delegated to a non-human object but what remains in the classroom are more complex pedagogical tasks delegated back to a human actor. As a result of using a textbook the teacher strips down education to its core functions, reserving for themselves the difficult activity of managing the highly variable communication

processes of the classroom, while standardised information can be delivered in textbooks and through computers (Feenberg, 2002, p. 123).

The concept of delegation recognises that humans and objects are two sides of the same system and hence require reciprocity in their interactions. Between them, the lecturer and textbook represent all the "pedagogical content knowledge" (Shulman, 1987) required to complete a course of study. Latour perceives that human existence is based on a chain of mutual obligation that alternatively involves a two-way process of reduction and amplification as properties are progressively exchanged between human operators and technical objects (Latour, 1999, p. 71). By showing that there is crossover between humans and non-humans, Latour demonstrates that the boundaries of non-human elements are not fixed but evolve over time. Further, that it is the digression from the normal course of those actions (that is, the work that would normally be done by one of the actors) which reveals whenever one agent enlists another agent to accomplish some action. It is at the point of detour that Latour argues it is possible to perceive a third, hybrid agent emerge as a fusion of the other two. To use Latour's striking example as an illustration, a gunman (agent 1) who sets out to kill another person but detours from this action to get a gun (agent 2) to achieve his goal of murder (agent 3) can be said to have interrupted his first goal of killing another person. It is this detour to get a gun that shows the action of murder is a composite agent which corresponds with neither the gun's nor the gunman's "program of action" (Latour, 1999, p. 179). In this manner technologies can be characterised as co-constructed entities whose unity is not permanent but can broken or disarticulated and then recombined with different elements (Slack, 1989, p. 330).

3.2.1.2 The Collective Agreement on Technology

Feenberg argues that the social agreement of shared values about technical objects creates the unquestioned background of the technological lifeworld that is the second hermeneutic dimension of technology. From Feenberg's perspective, a second hermeneutic dimension recognises that modern technology can only be understood against the historical background from which it was developed (Feenberg, 1995c, p. 17). This collaboration between the social and the technical takes place in what

Feenberg describes as a "cultural horizon" (Feenberg, 1999b, p. 86). To clarify the processes involved in the fusion of social and technical horizons it is worth considering Gadamer's (1989) account of how interpretation involves the integration of different cultural horizons, since this formed the basis for Habermas' own formulation and also seems to be compatible with Feenberg's ideas. Gadamer sought to clarify the conditions under which understanding took place, which he describes as a "fusion of horizons" (Gadamer, 1989, p. 306). Different horizons are formed by the history of the individual person and collective culture in which they function. Gadamer maintains that interpretations always refer to previous judgements made prior to the current circumstances being fully known. These prior understandings link together to create a horizon of understanding without beginning or end (Gadamer, 1989, p. 277). Understanding occurs when something unfamiliar challenges us to question a particular historical circumstance in the light of our personal experiences. As interpretation has no original meaning to reproduce, this questioning of the unfamiliar merely reduces the distance between the two different horizons. Understanding, for Gadamer, is achieved when an individual's personal history becomes fused with the historical horizon of what they are seeking to understand (Gadamer, 1989, p. 304).

Following Heidegger, Gadamer considered interpretation to be an active process which can never be thought of as complete as it is always open to further interpretation. In other words, the fusion between the personal and the historical moves towards a unity, although the two never fully fuse. This makes the historical horizon an active region that is in a continual process of being formed. Feenberg draws on this principle to argue that the analysis of technology involves the interpretation of meaning in which it is necessary to have some familiarity with the object being understood before new interpretations are possible. It is a hermeneutic merging of the past interpretations with the present where the present interpretation brings into question the assumptions of the past.

The concept of a cultural horizon presented by Feenberg represents a process of integration through which the various socially agreed norms in technology are incorporated into the technical lifeworld. Instead of a logical linear progression from

one technical advance to the next, Feenberg describes technological development as a process whereby each innovation is fixed into place by the interpretation of the social and technical environment (Feenberg, 1999b, p. 85). The adoption of a design involves a collective decision in which different technical elements are combined through a dialogue with the historical perspective that ensures congruence between technology and the values of society (Feenberg, 1999b, p. 205).

The cultural horizon represents the selection process by which some technological innovations are accepted and others are rejected (Feenberg, 1999b, p. 87). Feenberg observes that technology is "underdetermined", because there are many more innovations created than are needed. This produces an evolutionary pressure that builds through the social interaction with different technical elements. It is the concept of underdetermination that Feenberg finds offers the greatest hope of influencing the direction of technology. All interpretations are fallible as they change with the course of history. If interpretative flexibility offers a free choice between technical alternatives then ordinary people can participate in technological development (Feenberg, 1999b, p. 86).

An illustration of the forming horizon of educational technology can be seen in Cuban's (1986) observation that the use of technology in classrooms creates a site of conflicting cultural requirements. Cuban reviewed the use of technology in American school classrooms since the 1920s to discover that over this time there had been a paradoxical interplay between technology and the classroom teacher. While schools are often accused of following fashions, Cuban found that teachers were just as likely to be singled out as resistant to change (Cuban, 1986, p. 1). Yet, he was able to document a succession of technologies, from the textbook, chalkboard, radio, film television and the computer that have been tailored for use in the classroom. This contradiction is the result of what Cuban calls "situationally constrained choices" (Cuban, 1986, p. 63). Teachers will be indifferent to changes that are not relevant to their teaching practice as they either increase their workload without adding to student learning or diminish their control in the classroom (Cuban, 1986, p. 71). In Feenberg's terms, as design is technically underdetermined in the classroom, the objective of increasing learning or increasing control will result in any number of

equally appropriate solutions without any clear technical reason to prefer one to another.

3.2.2 Technology as Steering Media

Throughout the history of technology there have been numerous examples of technically superior devices not being selected because they did not fit with the beliefs or values of the various social groups that impacted on the design process. Perhaps the two most commonly cited recent examples of this are the Betamax versus VHS battle in video formats, or the ongoing clash between Macintosh and Windows in computer operating systems. In both cases the degree of technical innovation is not represented in their level of market share. Other technologies break with established conventions, like "Post-it Notes" glue that does not stick, and are able to fuse past interpretations with current circumstances to become widely accepted. Feenberg's hermeneutic analysis explains how, through processes of delegation and underdetermination, normatively determined technical objects elements develop their meaning in the interaction in the cultural horizon. However, it is still necessary to go a further step if we are to understand the criteria used by teachers, for example, to select the technology they use in their classrooms.

To maintain the critical edge to his theory, Feenberg proposes a second level of analysis that captures the meaning institutionalised by the dominant interests of a community. This has a similar explanatory function to Habermas' media theory which provides for a second level of coordinated social interaction that takes place within systematic processes. As with the technicization of the lifeworld, Feenberg argues that the fusion of technical and social interpretation revealed through hermeneutic analysis leads to the establishment of an authoritative tradition that steers future developments in technology. It achieves this by permitting the awareness of technical objects to recede into the background where their meaning is no longer questioned but simply taken for granted. The institutionalised inner meanings of technology become a network of structures which Feenberg calls "technical codes" (Feenberg, 1991, 1995a, 1999b). It is the technical code that provides the background of a technical tradition that determines the preference for

certain future technological interpretations. Each new instance of a technology needs to conform to its defining code for it to be recognised as socially acceptable by its intended users.

All technology has technical codes, which are features of the design that reflect the choices of society. The technical code would be enacted in the choice of materials or in the way those materials are put together during the design of an artefact. It is these material properties that material scientists investigate as the major factor in determining the performance of artefacts, which includes the role of effective symbolic performance of materials such as gold, porcelain or glass (Kingery, 1992, p. 175). Acknowledging the social meaning in these basic materials recognises that even in the most utilitarian object, aesthetic and symbolic elements become intermingled with the material throughout the construction phase. As technical codes are socially constructed, they can also be changed even after material design is completed. Feenberg offers a number of examples where social groups have devised new social meanings for technology through their use, such as teletext, medical treatment and computer-mediated communications.

Feenberg's goal is to understand the systemic distortions created by these technical codes. In Habermas' formulation, media do not eliminate communication altogether but merely provide an alternative form of interaction to communicative action. By relying on media-steered interactions, communication becomes simplified and codified in the search for more successful performance. Success-orientated actions are the result of the structure of the mediation rather than conscious decisions by the discussants. Consistent within this formulation, Feenberg argues that the social bond is mediated by technical objects as well as by intersubjective communication (Feenberg, 1995b, p. 84). Feenberg finds that Habermas' concepts of system and lifeworld are useful distinctions for technology analysis because this theory argues that some things belong in one sphere while others belong in another (Feenberg, 1999b, p. 170). In this way Habermas' media theory provides a framework for judgment and evaluation. As we saw in Section 3.1.1, system involves those regulated rational institutions where media steering is central. The dominant

pathology facing modern societies is the colonisation of the everyday communicative interactions that take place in the lifeworld by the social system.

Feenberg puts forward a compelling reason why technology should be considered a form of steering media, along with power and money. Feenberg takes Habermas' general framework of media theory and observes that technology has social consequences similar to the other two media central to Habermas' analysis (Feenberg, 1999b, p. 169). Habermas distinguishes media as ideal types, each of which, Feenberg argues, enforces an obligation. Money has an exchange value, power demands obedience and technology enforces actions (Feenberg, 1999b, p. 170). While Habermas does not rule out other forms of steering media, Feenberg insists that it is only an oversight that he concentrated on power and money because technology coordinates human action while minimising the need for language, just like any other medium (Feenberg, 1999b, p. 167).

The main concern Feenberg has in enlarging the media theory to include technology is that technology involves both the physical and social spheres, not just the social, as is the case with both money and power (Feenberg, 1999b, p. 168). It is here that Feenberg once again draws on the research into the sociology of technology to demonstrate that while technology appears to interact in a physical rather than communicative manner, it actually has multiple layers of communicative content (Feenberg, 1999b, p. 168). Not only does technology communicate symbolically about status and privilege but many technologies also have a form of interface which can be directly manipulated by their operators. As we will see in Section 3.4, this effect multiplies when technology is also a channel for communication, as the Internet is.

3. 3 Analysing the Technical Codes of Technology

The main insights that can be drawn from technical studies for a theory of modernity are that technology and society influence each other (Brey, 2003, p. 36). Technical and human actions are not separate structures but they are co-constructed and deeply interwoven. To uncover these deep structures Feenberg's critical theory investigates

three dimensions of technology—normative, cultural and codification. The first two of these require critiques that examine the hermeneutic dimensions of technology while the last considers its systemic elements. This creates a structured model of analysis encompassing a variety of forms of rationalisation that receive differing emphases to get a holistic picture of varying interpretations of technology (Feenberg, 1999b, p. 179).

Habermas has embedded theories of technology in his social analysis, but, he does not recognise technology's social character. This persuades Feenberg to undertake the process of unifying the cultural theories of technology in a similar fashion to Habermas' unification of critical theories through the linguistic turn. Feenberg achieves this synthesis of theories by drawing on the research that demonstrates the normative basis of technology and using Habermas' media theory to reconcile the differences between seemingly dissimilar positions. For Feenberg it is obvious that in a modern society technology must be included in the list of steering media suggested by Habermas and he finds within the theory of communicative action a place for technology without collapsing Habermas' original two-level framework of society.

Feenberg's social constructivist view of technology stresses the interpretative nature of technology and challenges us to see that any use of technology requires developing an understanding of technology. This understanding might be very different from how the creator intended it. Behind all technical objects lies a tacit acceptance of certain social practices as a normative consensus becomes embodied into the device. Feenberg argues that the technical code is the structure that is left over from the technical and social interplay. Technical codes describe the values and beliefs that prevail in a design process. In giving preference to one among many possible configurations of technical elements, technical codes act like the rules in a game. These rules coordinate the future design of an object in strictly technical terms, based on the shared goals that legitimise a device's function acquired through earlier interactions in the cultural horizon. (Feenberg, 1999b, p. 88). This is not a slavish imitation of previous technologies but compliance with the technical rules of whatever technology the creator wants to construct or use. Like all rules, technical

codes are not permanently fixed but are open to interpretation, defining the players' range of actions without determining their moves.

Technical codes provide a pre-structured horizon of experience for designers and users to draw upon. In this way Feenberg suggests that social meaning and functional rationality are inextricably intertwined dimensions of technology. Functional rationality isolates objects from their original context in order to incorporate them into a functional system. The institutions that support these procedures select among different possible configurations using social codes established by the cultural and political struggles that defined the cultural horizon for the technology (Feenberg, 1995a, p. 12). The act of choice appears technically justified as long as the current social order remains hidden.

In any game, it is disputes over the rules that bring the rules' existence into question. As Heidegger, Dewey and Popper similarly argued, since technical codes are part of the unquestioned background of the lifeworld, it is only when they break down that the fact of their existence becomes obvious. Feenberg agrees that controversy only exists where codes are still in a state of flux. Once resolved, a technology's technical origins are quickly forgotten. Take, as an example, the use of two-digit dates in early computer programming. While it was originally an unquestioned practice that saved programmers time and money, in the year 2000 two-digit dates created near panic as it was speculated what the unforeseen effects of the year "00" would have on a highly computer-dependent society. With the controversy now past the question of computer control of vital systems in society has receded once again into the background.

3.3.1 The Parallels between Instrumentalization and Discourse Ethics

Feenberg recognises that there is significant common ground between his perspective and Habermas' around the role of interpretation (Feenberg, 2003, p. 91). He sees his enlargement of the media theory to include technology as compatible with Habermas' most important advances. In particular, Feenberg's enlargement of media theory recognises that the system is not itself a social institution but refers to those

institutions in which media-steered interactions predominate. Feenberg uses Habermas' media theory to demonstrate that technology is a "legislative force that shapes our lives" (Feenberg, 1995a, p. 5). Technology contains compelling technical rules that shape the kinds of actions that can be taken. In this way it is an alternative to coming to an understanding, much like the two other media discussed by Habermas, power and money.

Habermas' and Feenberg's theories are also compatible because they both fit with social constructivism. In Chapter 2 it was argued that Habermas developed a theory that is compatible with constructivism by making learning one of the foundation disciplines of his theory. Feenberg demonstrates the benefits of incorporating social constructive views into the philosophy of technology and locating this within Habermas' colonisation thesis. However, while Feenberg is at pains to work out his position in relation to Habermas, he does not rely on Habermas' theories. Instead, Feenberg develops a meta-theory of technology that posits that there are two levels of instrumentalization, one primary and the other secondary (Feenberg, 1999b, p. 178). Primary instrumentalizations are the relations to nature embodied in technical devices. These can be critiqued through analysis of the social dimensions of technology, which Feenberg calls secondary instrumentalizations.

Feenberg acknowledges his debt to Habermas' two-level critique of society and has adapted the procedural conditions required for the outcomes of social interactions to be considered a guide to legitimate human actions through technology. Habermas argues that the justification of human actions involves two steps, a principle of universalization (U) that serves as a rule of argumentation in a practical discourse, and a universal validity, which Habermas calls (D), that extends beyond the perspective that can be found in (U). Habermas' principle (U) suggests that decisions are legitimate as long as the procedures that produced them are also legitimate. He formulates his principle thus,

> (U) For a norm to be valid, the consequences and side effects that its general observance can be expected to have for the satisfaction of the particular interests of *each* person affected must be such

> that all affected can accept them freely. (Habermas, 1990, p. 120, italics in the original)

The procedural equivalent to Habermas' principle (U) directed towards the controlling characteristics of technology becomes, in Feenberg's theory, the concept of a primary level of instrumentalization. This level of instrumentalization involves recognising nature as a resource for exploitation that identifies objects for decontextualisation and use, which, following Heidegger, was defined as "enframing" in Chapter 2. The "deworlding" of a technical object, as Feenberg (2003) now calls this principle, is the first step in making practical use of an object, in the same way that the universalization principle formulates a rule of argumentation that enables discussants to reach a consensus on the procedures that produced them. Primary instrumentalization is similar to (U) in that it depends on formulating an actable ideal, even if it is far more artificial than those imposed in a verbal exchange. It follows that anyone taking part in designing or using a technology is able to reach the same judgements on the acceptability of the technical norms of action. In this way technology eliminates the value orientations that can be found in particular instances of social interaction so that technical actions can transcend their local conditions and be applied elsewhere.

As a primary instrumentalization, (U) enables us to reach agreement about which norms need to be included in technology but does not say whether those norms are valid. For Habermas, uncovering false consciousness involves the discourse principle (D) in which actions are valid because all possible affected could agree as participants in discourses. The principle (D) postulates,

> (D) Every valid norm would meet with the approval of all concerned if they could take part in a practical discourse. (Habermas, 1990, p. 121)

In this way discourse ethics establishes a course of action based on presuppositions and is designed to guarantee the impartiality of the process of judgement. Obviously, it is a process for testing norms, not for producing them. Similarly, Feenberg's

secondary instrumentalization recontextualises technical objects to include localised ethical and aesthetic dimensions. Like everyday discourse, technological actions are informed by the circumstances of the participants. There are always limitations in time and information, so the best that can be hoped for, as with discourse ethics, is a provisional validity through the process of attempting to reach the ideal.

Technology's tendency to support self-deception comes from participants not having sufficient understanding of their own circumstances, or the necessary skills to undertake a deep analysis or societal distortions of their understanding. In Habermas' terms, as long as all relevant voices are heard, the best argument available is brought to bear, and only unforced responses receive a yes or no from the participants, then the validity of the norms does not need to be ideal to be legitimate. For Habermas, the test comes from the principle that all the participants, given all available information, would have adopted the same decisions (Habermas, 1990, p. 93)

3.4 The Double Definition of Communication Technology

Feenberg proposes his instrumentalization theory to effect a synthesis that explains the social and cultural impact of technical rationality without losing sight of the concrete embodiment of devices and systems (Feenberg, 2003, p. 95). He develops a contextualised understanding of technology that brings to our awareness the embedded norms of technology so that they can be identified and challenged. Feenberg has applied his critical theory to determine the design bias in a number of specific technologies. He provides concrete examples of how users have influenced the design of medical, environmental, telecommunications and computer technologies. Feenberg argues that as technologies are related to power and money, their selection from the great many possible configurations by technical experts only goes to serve the dominant interests of society. In Feenberg's analysis of technical bias it is the non-professionals who force technology to serve their own goals while the actions of professionals serve the goals of technology. That is, professionals have a self-interest in the technology expanding and thereby strengthening their position as technical experts. The over-arching goal for Feenberg is a society in which there is greater participation of ordinary people in technological design. Feenberg points out

that that this participation takes place all the time as people learn to create and respond to the meaning in technology.

Feenberg suggests that an example of this process is evident in the evolution of computers to become instruments of communication. Feenberg recognises computer-mediated communication's unique position as a technology because of its double definition as communication technology. By this Feenberg means that communications technology goes further than simply relaying information from one computer to another, but also conveys meaning through its technological design. Communication technology is therefore a communicative medium whose social meanings can also be read, and to which a critical communicative analysis also applies. Examples of competing technical codes can be seen in the ongoing development of the Internet (Flanagin, Farinola, & Metzger, 2000). The Internet is the system of cables and communication protocols that enables a worldwide network of computers to be physically connected together. It is not a single code but a collection of codes that can be seen from the range of metaphors that have been used to describe the changing interests in its design (Ratzan, 2000). The Internet has at different times been described as the frontier of experimentation for academic research, the information superhighway and, more recently, the electronic market place driving the new economy.

As a technology of meaning formation computer systems have become a favourable site for social experimentation (Feenberg, 1995a, p. 160). Networked computers permit greater communication since discussions do not need to take place at the same location or time, and because of this, there is not the risk associated with face-to-face encounters. Free from group pressure, individuals are able to explore the limits of personal freedom. As others have also pointed out, this creates a new social space that has a weakened level of social control, permitting discussions that are less real, with high levels of experimentation and identity games (Turkle, 1995).

Feenberg (2002, p. 116) observes that the value of communications technology in education has been questioned since the advent of writing. The use of writing in teaching was originally criticised for its inability to maintain a dialogue, something

that computer-managed communications is said to overcome (P. Levinson, 1990). For Feenberg it is clear that this is a social rather than technological influence as the criticisms of different technology often use that same technology that they denounce, that is, writing about the dangers of writing (Feenberg, 2002, p. 115). He argues that a more optimistic analysis of computers would be formed by recognising the potential for creating new communication communities, something that the deworlding analysis of modernity theory overlooks (Feenberg, 2003, p. 98).

Feenberg argues that online education undergoes the same processes of deworlding and disclosure as other technologies (Feenberg, 2003, p. 101). The use of communications technology in education therefore requires special consideration from critical theory. Online learning has the potential to expand the definition of education by providing a new type of interaction between students and their teachers (Feenberg, 2001). Through the use of course management software, students are deworlded as technical subjects controlled through menus, exercises and questionnaires. The secondary instrumentalization of the experience of participants in online environments discloses a richer social world with a more democratic conception of networking. Feenberg accepts that there can be an extreme deworlding through the computer that is used by some for control, but argues that modernity theory overlooks the areas of controversy in which users are struggling to appropriate the medium for their own ends (Feenberg, 2003, p. 99).

Computers are complex devices consisting of multiple technical codes. Feenberg argues that now is the time to observe the codes of the Internet before it becomes a standard feature of everyday life and recedes into the background of our awareness. Feenberg identifies the use of the Internet in higher education as a highly relevant site for a critical theory of technology and he has spent some time formulating the implications of online learning for higher education (Feenberg, 1993, 1999a, 2001, 2002). For Feenberg the call for more advanced computer systems for teaching is unlikely to change, even though most of the learning with technology involves writing, which has very low bandwidth requirements (Feenberg, 2002, p. 125). Of particular concern for Feenberg is the co-constructive forces in technology changing our views of education away from academic values. Any application of technology

that alters the involvement of a teacher would, according to Feenberg, also fundamentally change the nature of education. Of the two technical codes Feenberg discusses, control through automation or the exchange of ideas, automation of learning has the greatest potential for redefining what it means to be educated while greater interaction strengthens the traditions of higher education (Feenberg, 2002, p. 114).

3. 5 Integrating Technology Studies with Critical Theory

This chapter has demonstrated how the development of an effective critique of online learning, which is the goal of this thesis, matches the aims of both Feenberg and Habermas who want to encourage appropriate rationalisation in society. To achieve this rationalisation they have both based their theories on a version of democratic proceduralism in which Habermas seeks to open public administration to public input, while Feenberg looks to expose technology to public participation. For Feenberg, communication in design is the hallmark for democracy in the technological age. The purpose of analysis and critique of technology is to make it more democratic. The answer is not less but more technology, as long as the development of that technology is guided by moral principles. This requires incorporating as many people as possible in participating in the decisions about technology.

Feenberg argues that the contest for control and communication needs to be the focus for studies of innovations (Feenberg, 2003, p. 100). He observes that students and teachers want tools for increased interaction and reject savings made by economies of scale and reuse that result in the isolation of the learner. The response by many academics to new technology has been to oppose the computerisation of education out of principle. As the Internet can conform to either the logic of automation or increased participation, Feenberg argues that we should encourage a degree of amateurism in online learning. It is the designers and the users that he argues have the most significant influence on technology. This has the effect of enhancing the interaction between teacher and students without requiring the intervention of computer professionals (Feenberg, 2002, p. 129)

To this end, this chapter has argued that a critical analysis of technology requires a theory of the social context, and that Habermas provides an extensive theory of modernity which is compatible with technology studies. Feenberg makes the synthesis of these two theoretical positions an explicit aspect of his project, but like Habermas, the emphasis of Feenberg's ideas have changed over the evolution of his thinking. By reviewing the foundations of Feenberg's theories it can be seen that his critical theory of technology still rests on a number of critiques of technology. Firstly, a product critique to discover the purpose particular technologies are employed to accomplish. This is an investigation of the meaning of technical objects as they are socially defined and how they become embedded in technology. The second is a process critique of how the normative elements of technology are employed, whatever their purpose. These historical studies show that traditions impact profoundly on the direction of technical development. Finally, a design critique investigates the way in which technical principles are employed in their assembly in the first place.

The next chapter is the first of these critiques. Its goal is to identify the underlying theories that influence educational practices so that they can be exposed to the proposition that there may be alternative approaches available. The critique in Chapter 4 is an examination of the kinds of actions delegated to learning spaces constructed by universities to assist student learning. Empirical evidence can then be used to discern the extent and form of the implementation of these theories. To determine the norms built into educational technology the next chapter reconstructs the lecturers' experience of classrooms as technology. Far more than school education, higher education is perceived as the environment for conceptual, World 3 thinking. I will therefore confine my discussions to the two classrooms concentrating on conceptual thinking: lectures and tutorials. To determine what pedagogical problems they solve, these classrooms will be subjected to the same kind of communicative analysis outlined by Feenberg in this chapter. After a brief introduction to the character of lectures and tutorials to come up with some of the general rules of learning spaces, I will explore the consequences of eliminating the classroom from student learning in an attempt to determine whether these rules also apply to learning on the Internet.

CHAPTER 4

THE EXPERIENCE OF TECHNOLOGY IN HIGHER EDUCATION

In the previous chapter Feenberg identified online learning as a fruitful area of investigation for his meta-theory of technology. Educators are currently facing the early stages of face-to-face interaction being affected by the Internet and this raises critical questions of whether replacing localised face-to-face talk with online talk is concretising the characteristic distortions of talk structures in the classroom that largely undermines the quality of lecturer and student interactions in general. Feenberg's critical theory recognises that the validity claims required to reach an understanding are also embedded in technology. Technology is a social agreement about the actions of technical objects created by a process of decontextualising and delegation. Feenberg demonstrates that this is a process that can be distinguished from the technology itself, so that the evolution of a device outlines its historical horizon that is fused with the cultural understandings to create interpretative understandings of technology.

To explore the implications of instrumentalisation in higher education I will now undertake the first of three critiques recommended by Feenberg, as outlined in the previous chapter. The setting for these critiques is online learning in Australian universities. Being aware that Feenberg does not explicitly draw on a model of student learning in his discussion of computer-mediated communications, I will apply his macro-level theory of technology to the micro level of classroom teaching. The norms of education that will be critiqued come from the advice given to academic staff on teaching with technology in higher education. While this advice can come from a number of areas, this chapter reviews advice offered by teaching manuals on how to act in classrooms. This is followed in Chapter 5 by the research findings on student learning in higher education. Together, the technical codes of

classroom and the norms of student learning represent the first hermeneutic analysis of the norms of educational technology.

Feenberg has argued that over time collective agreements become realised in technology through a series of interpretative processes that fuse cultural horizons through the influence of under-determined technical alternatives. There is no single linear development to technology but a contingent process that involves disagreements and controversies. The deviations in design produce technological changes that are multi-directional, with some designs disappearing, while others have a good fit with their social context and therefore survive. By acknowledging the social construction of technology Feenberg offers the potential for ordinary people to affect the design and use of technology with the interpretative flexibility of technology continually open to re-negotiation by their users and others. These agreements manifest themselves as primary and secondary instrumentalization. Primary instrumentalisations are the rearrangements of the material world to meet human specifications.

There has been a long tradition of attempting to codify the qualities of primary instrumentalisations for educational media. For example, in Dale's (1969) "cone of experience" media varied with regard to the concreteness of the learning experience they provide. Most of these attempts to categorise media strive to provide guidance for curriculum development by identifying a technology's primary characteristics (Gerlach, 1980; Reiser, 1983; Romiszowski, 1988; Rowntree, 1982). These researchers attempted to identify the critical attributes of media that affect learning. For example, Lee and Boling (1999) develop specific guidelines for how communication will be improved by enhancing the clarity of the message through screen design. Laurillard (2002) has made a recent attempt to examine different media attributes from a pedagogical viewpoint. Like many of these media characteristics studies, Laurillard searches for technological solutions that can deliver the same outcomes as classroom learning, only more efficiently. This list of characteristics can then be used to guide the appropriate mixture of media in instructional design (Laurillard, 2002, p. 81).

Media characteristics studies imply that the distinctive coding or structural elements of the media may have unique effects on related mental skills. This research is focused on those external attributes of the media that interact with internal cognitive processes to influence learning. The challenge that Laurillard and others highlight is that of describing the character of technology in a way that does not run into the difficulty of highly detailed classifications. Technologies are continually changing and any list of technical characteristics quickly becomes out of date. The most influential theory of a holistic interpretation of technical elements is Gibson's (1977; 1986) concept of "affordances". In essence, affordances are the contextual factors that determine what will be given attention by an observer. Gibson describes these values as both physical and experiential (Gibson, 1986). Affordances are characteristics that are perceived directly from the object by the observer, who can discern how things work from the visual cues in the surface appearance of an object.

Gibson's ecological approach to classifying technology has found many followers in education, some of whom accept the term without reference to its original meaning. This approach is particularly common in the "visual literacy" movement, in which students learn how to decode the signs and gestures of media's different attributes. As students become more skilled at interpreting visual communication, affordances have the potential to contribute to the learning activity as students learn to exploit the contextual resources for their learning (Hartley, 1996). The theory of affordances, however, is ultimately a conservative concept, with Gibson considering an affordance to be a permanent characteristic that does not change with the observer. The limits to Gibson's theory of affordances become clearer in a representational world like that of computer technology. In this environment there are no physical affordances as the actions of input devices, such as the keyboard and mouse, are only weakly linked to the actions of the computer's software or to what is depicted on the screen. The mouse, for example, has no visual affordance as a pointing device and the relationship between its movements on a table and the cursor on the screen need to be learnt (Cooper, 1995, p. 196). Representational environments rely on visual conventions involving abstractions and symbol-using rather than cues from their physical appearance (Norman, 1999). Interface designers play with these conventions to give the appearance of an affordance, but, as with all World 3 conceptual artefacts,

these abstractions are learnt, cognitively-mediated reactions, rather than responses perceived directly from their physical arrangement. Considerable ambiguity continues with the use of the term (see McGrenere & Ho, 2000), and Norman (1999) argues that it is a misuse of the concept of affordance to say elements on a computer screen afford anything. Images on the computer screen are visual feedback for the user that is independent of the actions that can be performed. This is a purely cultural constraint and it is only possible to know if people share its conventions by watching them in their natural environment (Norman, 1999, p. 41)

In the previous chapter it was argued that rather than the surface characteristics of technical objects, designers and users respond to technical codes that steer technical decisions. These rules are clearest on the edges of the technical lifeworld. For instance, it is when things go wrong that we are able to recognise the underlying features of technology which contribute to the distortions in communication in different learning settings. In the academic environment, the term "classroom" is reserved for the collection of technologies used specifically for teaching students by a teacher. This is the main context within which technical and social aspects of student learning interact. The classroom is the physical manifestation of university teachers' ideas of student learning that have survived long enough to become a physical reality. The material artefacts of learning can be considered to be a type of physical memory of the interaction between students, teachers and conceptual artefacts when little else remains to describe the history of those interactions. While there are a number of university spaces in which learning may take place, the classroom is unique in that it is the only technology made and used exclusively for teaching and learning. Classrooms are solely pedagogical in intention, and this influences their design, development and use. As classrooms are the archetypical university learning environments it is possible to start with classrooms as a model for comparison to discover what makes learning spaces conducive to learning.

In Feenberg's terms, the classroom is the system of formal and informal rules that govern student learning within the macro-structure of higher education. Each classroom has a different methodological premise behind its structure. These premises construct a different epistemological world in which the students and

lecturers can interact. Universities commonly provide three formal environments used for teaching: teaching laboratories, lecture theatres and tutorial rooms. The structural dimensions of these classrooms differ to the extent that the pedagogical actions they encourage are distinctive from each other. The purpose of analysing the deep structures of classrooms is to explain the kinds of specialised learning actions lecturers intend their students to adopt when they elect to use different kinds of educational technologies.

Despite being the most important location for student learning for the vast majority of higher education students, classrooms are under-theorised as a technology. Few people other than educational planners place any great importance on the choice of material aspects of the classroom as affecting the interaction between students and university teachers (for the planning aspects of classroom design see Allen, 1991; Castaldi, 1987; Robertson, 1973). A deep structure analysis of technology is an alternative to these attribute comparison studies that focus on the individual elements of technology. It begins with the decision to use technology and then determines what framework influenced the decisions that were made.

There is one form of advice to academic staff that proposes a major factor in the success of teaching is careful consideration of the physical environment. This advice comes from a range of books that draw on generic principles of higher education pedagogy and apply them to the use of different pedagogical spaces. These teaching manuals have become a standard part of academic development precisely because they represent the approved methods of pedagogy in universities. Tight's (2003) analysis showed that over half of all research-based books published in 2000 belonged to the "how to" category. They describe the practical problems that face teachers in different learning spaces and present a range of potential solutions to overcome these difficulties.

In documenting what can go wrong in classrooms, manuals of teaching demonstrate the technological nature of teaching and learning. Vick (1996) argues that manuals of classroom teaching method are far more than descriptive accounts of teaching, as they specify the boundaries of pedagogy and in so doing map the topography of

teaching and learning interactions in ways such that educators can compare themselves against the ideals to which they can aspire. Manuals of teaching have both symbolic and pedagogical roles that assist academic staff to recognise the legitimate practices that reinforce the values of the dominant group (Wong, 2002). They challenge those existing practices that are considered to be undesirable and, as such, they effectively represent the technical codes of higher education teaching and learning.

While there may be differences between what the manuals prescribe and what actually happens in classrooms, manuals of university teaching provide a useful vehicle for exploring the contested spaces within which lecturers and students teach and learn, and to help to bring out the deep patterns of those interactions. The following analysis of educational technology in higher education primarily draws on three such manuals of university teaching. I will use each text as the basis to analyse the classroom ontology, teaching problem and influence of student learning that underlie the pragmatics of different learning environments. Starting in Section 4.1 with the lecture theatre, I will examine the features that have evolved to deal with information overload. This will be followed in Section 4.2 by an analysis of the tutorial room and how it tackles the problem of tutor dominance. Finally, in Section 4.3, I will compare both classrooms with online learning which provides no physical cues for student learning.

The two texts that I will use to represent physical classrooms are from the "Interesting ways to teach" series. The first is *53 interesting things to do in your lectures* in which Gibbs, Habeshaw and Habeshaw (1987) draw on the first edition of Bligh's (2000) review of the experimental research evidence of what lectures can achieve. The second is *53 interesting things to do in your seminars and tutorials* in which Habeshaw, Habeshaw and Gibbs (1992) review small-group teaching to make the distinction between a seminar as the small group version of a lecture where the students adopt the lecturer's role to make a formal presentation of a paper, and the tutorial where groups discuss issues chaired by a tutor. The third is Rehberg, Ferguson, McQuillan, Winburn, and Riley (2001), *The ultimate WebCT manual*. This manual of online teaching was developed after Georgia State University reviewed

five competing course management systems and selected "WebCT" for its initial 12 online courses at the University. At the time of publishing their manual, the University offered over one thousand and two hundred courses each semester as well as training other institutions in the use of the WebCT system.

4.1 Lecture Theatres for Information Transmission

Lectures, and moreover lecture theatres, are the taken-for-granted technology of higher education. As a meta-cognitive technology, lecturing dominates teaching in universities like no other teaching method. No university subject, from creative arts to pure sciences, is considered unsuitable for lecturing and some subjects have no other form of teaching. In their introduction to activities in lectures Gibbs et al. (1987) define a traditional university lecture as,

> …50-55 minutes of largely uninterrupted discourse from a teacher with no discussion between students and no student activity other than listening and note-taking. (p. 9)

The expectation that one lecturer is responsible for a whole group has dictated the architecture of university teaching spaces to such an extent that lecture theatres are the most recognisable classroom in higher education. They are made distinctive by the fixed podium in front of rows of tiered seating for large numbers of students, frequently located in a window-less auditorium. A space is left between the podium and the tiered seating to mark a clear separation between the lecturer's work area and the students' work area. The separation between teacher and student is also maintained by classroom convention. Students are rarely welcome at the front of the room, nor do they sit in the front row, just as lecturers rarely venture out among the students (Gibbs et al., 1987, pp. 19-20). The front of the lecture theatre is restricted to lecturers to ensure enough room for their teaching materials and audio-visual equipment. The dominance of the lecturer's position at the front of the room is reinforced by the tiered seating that has students sitting as close as possible to the front of the room and as a result receiving the best carriage of the lecturer's voice. This separation is further strengthened through the introduction of high-technology

theatres that tie the lecturer more securely to the devices at the front of the class (Edwards, Smith, & Webb, 2001, p. 2).

The lecture theatre represents the pedagogical solution for presenting large amounts of information in relatively short periods of time. Rather than encouraging more learning, large amounts of information have a tendency to result in information overload. Gibbs et al. (1987, p. 101) argue that the hour allocated for lectures has been shown to be too long for educational purposes. To allow the maximum attention to a large quantity of information, the design of lecture theatres has evolved into an exercise in ensuring predictability in the students' experience. Lecture theatres enhance student learning by ensuring an equal visual and aural quality for all students in the classroom. The arrangement of fixtures in lecture theatres acts to deter fluidity and flexibility by restricting the lecturer's movements to the position of the electric power sockets, screens, whiteboards and the students' view of the lecturer, boards and screens from different parts of the theatre. More recently this has been supported with audio-visual aids, which Bligh (2000, p. 114) depicts as propelling the lecture towards greater permanence.

The emphasis on permanence to assist in the accumulation of knowledge is evident in the changing role of writing in lectures. For a long time chalkboards were the most widely available tool within lecture theatres, providing a semi-permanent record of the lecture. Increasingly they are being replaced by whiteboards because of the better perception of writing against a white background and the more effective use of colour to emphasis key points (Bligh, 2000, p. 115). Overhead projectors are essentially an electric version of the whiteboards, improving both sight and sound as the lecturer is able to stand and face the students while writing. Unlike writing on the whiteboard, lecturers use an overhead projector by writing on acetate film, allowing them to take away a permanent record of the lecture. Overhead transparencies are usually prepared in advance of the lecture and, as a result, tend be more detailed and accurate than whiteboard illustrations (Bligh, 2000, p. 117). Since the advent of cheaper photocopiers the production of overhead transparencies has become so easy that there has been a tendency for an over-reliance on transparencies. This overuse has intensified with the replacement of overhead projectors by computer displays,

which make the production cost of new slides negligible. This is in spite of the limitations experienced by all electronic projectors, such as the distortion of the image and the difficulty for students to see around fixed machinery, the fan noise and the tendency for projectors to malfunction (Bligh, 2000, p. 117).

4.1.1 Student Learning in Lecture Theatres

Writing has developed into an important complement to lectures that prevents the students' experience from becoming totally detached, passive and solitary (Gibbs et al., 1987, p. 107). Whether a combination of reading and listening or pure oral presentation, the students' main activity in lectures is to select information from what has been said and write it down. Reviews of student notes show they are seldom comprehensive or accurate with a preoccupation with factual detail at the expense of broader themes (Gibbs et al., 1987, p. 95). As a result of the passive nature of lectures, student attention drops dramatically after twenty minutes, prompting Gibbs et al. to suggest fighting the trend to predictability in lectures by breaking the time-tabled sessions into various activities to restore student performance to previous levels. This, according to Gibbs et al. (1987, p. 101), would only succeed if lecturers relinquished their beliefs in coverage, and substituted written material for dictation.

According to Gibbs et al. (1987, p. 17), it has never been the shortage of information that is the problem with lectures. Rather, the main problem in lectures is that the reason why lecturers do things is not obvious to students. The technical codes that construct lectures help the students orientate themselves to the information by reminding them of why they are there and the link with previous work. Gibbs et al. (1987, p. 71) argue that one of the most difficult tasks for students is to perceive and learn the conceptual artefacts that structure the subject matter of the course. What needs to be revealed to students is not more information but the structure of the topic. As a great deal of thought and planning has gone into the structure of most lectures, it is critical that not only is the lecture well structured, but that the students can identify the key structuring elements.

Lecture theatres represent a technical code that is the technological response to information accumulation. Lecturers will continue to use lecture theatres as their main form of educational technology as long as they believe that students learn by covering the subject matter. Within lectures, students are only ever likely to gain a sense of familiarity with the material, and this is unlikely to lead to long-term student learning without further application and practice. Repetition, in the form of encountering the material more than once in lectures, or revising the material outside lectures, is helpful in this regard (Gibbs et al., 1987, p. 73). Nonetheless, note-taking places a heavy demand on the students' attention, being too much for the students to do when they should be making sense of what was said, and giving them little time to think about what is being explained (Gibbs et al., 1987, p. 27). Gibbs et al. argue that thinking and writing need to be separated, with note-taking for understanding occurring only once the lecture is complete, to take advantage of the students' undivided attention and the opportunity for them to ask questions.

The accumulation technical code in lectures indicates to students the overall function of the lecture and reveals what an appropriate response by students might be. The fear of speaking out and the dominance of lecturers have students confused about the appropriate time to ask questions (Gibbs et al., 1987, p. 21). Some types of questions can inhibit further interaction, such as the ubiquitous "are there any questions?" at the end of the lecture, which is so routine that it is ineffective. A departure from the accumulation code would require that whenever questions are asked, time was also allocated to formulate answers, or these invitations to participate will not be taken up in large formal settings.

4.2 Tutorial Rooms for Student Discussion

In contrast to the lecture theatre, which is designed for permanence, lecturer control and the accumulation of information, the classroom designed for developing student understanding is the tutorial room. Tutorial rooms are general-purpose learning objects that have multiple identities in the sense that any room could be a tutorial room, and a tutorial room could be arranged to accommodate any form of university teaching. Tutorial rooms do not exclude lecturing, but the rooms have some ideal

requirements not found in lecture theatres. Being free from permanent structures, tutorial rooms allow for continual re-organisation. In contrast to the lecture theatre, the defining feature of the tutorial room is its ability to accommodate the formation and functioning of small-group learning. Habeshaw et al. (1992, p. 57) suggest that the arrangement of the furniture in the tutorial room is the single most important factor in determining the success of a tutorial. It physically positions group members so that re-arrangements of the furniture reiterate the activity of the group, making the transition to sub-groups easier. The arrangement of the physical environment is so important that Habeshaw et al. (1992, p. 59) recommend that tutors get into the classroom before the class begins to pre-arrange the furniture into helpful arrangements, such as circles where students can see everyone else or else are seated together when working in syndicate groups.

Habeshaw et al. (1992) portray the role of the teacher as relatively small in the tutorial, virtually a total reversal of the arrangement in lectures. In tutorials students are active and Habeshaw et al. (1992) argue that it is usually the tutor who listens and raises questions. The tutor's pedagogical actions are to manage the students' construction and use of conceptual artefacts through classroom organisation. Common methods of managing the tutorial group, such as "buzz groups", "pyramids", "syndicates" or "jigsaws" provide students with the opportunity to try out new ideas, get exposure to alternatives and receive immediate feedback (Habeshaw et al., 1992, p. 50). Indeed, student discussions may be sufficient in themselves for student learning and do not require any direct participation by the tutor. Habeshaw et al. (1992, p. 55) argue that, whatever the arrangement, it is important that the time in tutorials is used for debate. There may be some degree of coverage of content as the tutor introduces the topic, however, the primary pedagogical task of the tutor is to organise a series of activities that encourage the students to speak about the topic under consideration.

The main problem in tutorials suggested by Habeshaw et al. is the dominance of the tutor who has a tendency to take over and inhibit students from participating, either because students are afraid to expose themselves publicly or they simply have a sense that the teacher wants to do all the talking (Habeshaw et al., 1992, p. 63). For

Habeshaw et al. a tutorial can proceed solely by explaining what is expected of the students, as long as tutors firstly find out what each student can achieve on their own and the problems they might encounter in the process. They suggest preparing the students for the possibility that tutors might not participate in the discussion so that students do not feel abandoned and practise what to do if the tutor is not in the tutorial. Habeshaw et al. (1992, p. 83) suggest that the way to get students to take responsibility for their own learning is to entrust to the group the role of running the group discussions. Habeshaw et al. (1992, p. 45) argue it is the tutor's role to recognise when the group is not functioning effectively because it is too big and when sub-groupings are required to mix the students, build up relationships and increase the likelihood of full participation (Habeshaw et al., 1992, p. 45). They caution tutors against abandoning their students and recommend meeting them periodically as well as providing support structures such as consultation times and requiring students to keep written records of all their meetings.

4.2.1 Student Learning in Tutorial Rooms

Where there is no clear idea of the learning actions there is no determinant architecture that can be built to steer student choices. The technical code for tutorial rooms is one of participation. Physical proximity has a powerful effect on learning (Jaques, 2000, p. 185). Students come into classrooms confused and believe that more learning is likely to occur in the personal presence of others than by studying alone. They like the sense of belonging to a group and testing their understanding against other students'. Bligh (2000) reviewed the evidence on different forms of teaching and found that discussion is more effective than most for stimulating thought, changing attitudes and just as good as lectures at transmitting information. Information by itself is not enough for learning and students need practice in improving concepts and principles by being placed in a situation where they need to think, spend time in trying to solve problems and observing the interconnections between information (Bligh, 2000, pp. 10-11). The generation of an idea can be solitary, but criticism and dissemination are by nature social and communicative.

Tutorials require a reversal of the pattern of pedagogical actions (between students and the tutor) compared to that found in lectures. For example, Habeshaw et al. argue that it is almost impossible to participate in discussion and keep a written record at the same time. Written texts are a useful focal point for discussions rather than the goal of student actions. They argue that there is a strong view among students that tutors have no right to compel them to participate (Habeshaw et al., 1992, p. 63). Instead, tutors need to organise a series of activities to get students to speak, as once students have spoken for the first time, they are more likely to continue to speak in unstructured discussions. The free-flowing technical code of participation leaves the ground rules for contribution unspoken. To overcome any false assumptions regarding participation in the tutorial Habeshaw et al. (1992, p. 23) recommend starting group sessions with a clear explanation of what is expected in class discussions. They suggest this should be reinforced by the kind of actions made by the tutor and put into practice as soon as possible in the tutorial. For example, Habeshaw et al. (1992, p. 64) argue the assumption that only the teacher can invite others to speak is a waste of the specialised knowledge students have of each other's interests and it should be clear that students can call on each other to contribute. Habeshaw et al. (1992, p. 71) suggest encouraging students' interests by tutors showing their enthusiasm for the subject, providing plenty of choice in the selection of topics and by giving time to individual students' interests in tutorials.

4.3 Learning Online

Students pick up vital clues for their actions from classrooms that in turn have come to reflect certain ideas of academic learning. Lecture theatres do not afford coverage of information and tutorial rooms afford participation, they improve sight and sound or bring students together in small groups, which sends a clear signal of what is expected in the class. This reflects lecturers' beliefs on whether students learn from information or from activities. Both the lecture theatre and the tutorial room are authentic, activity-centred learning objects of higher education. Classrooms continue to evolve to incorporate more technology devoted to finding the optimum conditions for study. For example, in response to the dominance of the "accumulation" technical code, lecture theatres are incorporating advances in building technology to address

concerns about the lecturer being seen and heard by activating equipment, such as whiteboards, video and computer projection, from a lectern to provide the lecturer with greater control over the teaching environment. The more advanced lecture theatres come equipped with a computer console with control capabilities for all equipment in the classroom, from lighting, projection screens to audio-visual equipment that may include elaborate communications technology that permits Internet connections, video conferencing or video recording of lectures. This computerisation ensures predictability but restrictions imposed by the software mean that it is not possible for lecturers to make immediate adjustments to their pedagogical actions and may limit their ability to introduce their spontaneous personal interactions into the presentation.

Increasingly computer technology is used to wholly replace physical classrooms with representational ones. Based on the ethereal nature of the participation code described above, this would suggest that computers are introduced into student learning to replace predictability and the dominance of the tutor to make the students more active and responsible for their own learning. However, we saw that tutorial rooms are already indeterminate and resist computerisation while lecture theatres have incorporated computers to give lecturers greater control over the classroom. This raises the question of what happens to learning when computers substitute for the classroom and students lose the physical cues that Habeshaw et al. argue are useful for group formation? In this section I will review the advice offered for using a course management system called "WebCT" to clarify which technical code influences the design of the technology for learning online. A review of advice to staff intending to teach online will be used to determine whether these designs increase permanence through writing and greater control for lecturers or, conversely, increase discussion among student peers through reorganisation of the learning environment.

4.3.1 WebCT

There are a number of companies that provide computer-based course management software that allows academics to build and maintain course-specific Web sites.

Although all course management systems have the potential to fully replace the classroom for distance-learning classes, their creators say the programs are aimed at classroom instructors who want to add a Web component to their course quickly and cheaply. Rehberg et al. (2001, p. 63) describe WebCT as a suite of educational tools around which the online course is structured. It is the combination of these tools which creates the virtual classroom in which the instructor teaches. A straightforward course would include the use of the syllabus tool, calendar, discussion tool, email, and online grade book. A more advanced course could add more tools, include the use of more complex media such as audio, video and graphics files, make more advanced use of the same tools, and organise them in a way that can simplify the students' navigation through the materials (Rehberg et al., 2001, p. 84). The choice to incorporate any of the WebCT tools into a course is always up to the instructor and students use the tools selected on their behalf to learn the course subject matter. In WebCT, the choice of alternative tools open to the instructor falls into two distinct groups. One is to organise the students' learning, while the other manages the lecturer and students' writing. Each group of tools will be described in greater detail below.

4.3.1.1 Managing the Students' Learning

The purpose of the greater part of the course management tools is to organise the student's learning. Retention rates in online classes are rarely as good as conventional face-to-face classrooms (Simpson, 2003, p. 1). With low levels of commitment, small technical issues, such as faulty usernames and passwords, can have a big impact on student attrition rates. Guidance is needed on how many times a week students are expected to log in and how much time they need to spend each week on the course activities, including specific deadlines by which they must complete certain elements of the course. To ensure that the students meet the course's commitments WebCT provides a series of advanced organisers such as calendars, descriptions of the syllabus and the learning goals of each page which combine to establish for the student the expected pattern of study. The software makes this information readily accessible to students, however, Rehberg et al. (2001,

p. 231) argue that students can easily ignore it unless they are also made aware of the information's significance.

To ensure that this information is not disregarded, a combination of instructor and student monitoring of the students' progress throughout the course is needed. The software collects statistics on how much of the course students have viewed and the time they accessed the course and discussion postings (Rehberg et al., 2001, p. 311). The display of the course statistics demonstrates to students how much of their activity is tracked by the system, which some students will find motivating while others require reassuring that this information is not used for spying (Rehberg et al., 2001, p. 312). Rehberg et al. caution instructors against using the statistics in WebCT to make assumptions about students' performance based on their level of activity (Rehberg et al., 2001, p. 229). The significance of the statistics and performance are yet to be determined, as it does not include essential information on how long students spent on an actual page or whether the students actually read any of the material (Rehberg et al., 2001, p. 361).

To measure student progress at meeting the course objectives WebCT provides "quiz" and "survey" tools which automatically process the students' responses to closed response questions (Rehberg et al., 2001, p. 277). It is intended that instructors build large banks of test questions, or import questions that come with text books, which can then be randomised to minimise the chances of students cheating (Rehberg et al., 2001, p. 278). All information about the students, including personal information and grades, is stored in the "gradebook" tool. Rehberg et al. (2001, p. 307) nominate this as the most popular tool with students as they can check their grades at any time without the need to contact the instructor.

4.3.1.2 Learning Through Writing Online

The second category of WebCT tools exists for working with instructor- and student-produced texts. Rehberg et al. argue that writing for the web is not the same as writing for printed materials (Rehberg et al., 2001, p. 37). The formatting of online documents is far more important as people tend not to come to the Internet to read

but only scan documents visually. As a web-based system anything that can be achieved on the Internet with Hypertext Markup Language (HTML) can also be realised in a WebCT course, although Rehberg et al. (2001, p. 89) argue that a common mistake by instructors is to use HTML coding to add too many features that do not improve the learning experience. The different writing tools offered by WebCT can be grouped into the three different time periods in which students can expect a response. Texts in WebCT receive either an immediate, short duration or long duration response from its reader. This, in turn, influences the size and style of the textual discourse. Some tools provide an immediate response but, due to the pressure to participate, require a short, highly stylised form of writing. Others have an expectation of a reply within hours or days, limiting the text to approximately a screen in length and providing a combination of conventional writing style and computer conventions, such as HTML coding. The third style of text is constructed over a period of weeks, and is correspondingly longer in length, conventionally written and formatted.

The "chat room" tool, for example, is the most Internet-specific text which allows for an immediate response from students and their instructors. Rehberg et al. argue that "chat" favours good typists and those who participate in "chat" need to be encouraged to use abbreviations in their messages so they do not become intimidated by those who can enter the text the quickest. To facilitate the flow of messages each item is written as a short, meaningful chunk, linked with ellipses to show when sentences continue onto the next message. In contrast, the "discussion" tool is nominated as the primary tool for communication (Rehberg et al., 2001, p. 125). This is a hybrid writing tool that organises messages based on its subject line and stores them publicly so that it is possible to get a visual representation of the sequence of messages in the discussion. As the system does not require an immediate response, students are able to compare ideas and make choices based on what they read in the postings (Rehberg et al., 2001, p. 125). The instructor controls the discussion by adding and monitoring the topics. There is good evidence that some students using online discussion tools are more likely to add their thoughts to an online discussion than they might in a traditional classroom setting (Rehberg et al., 2001, p. 125).

Rehberg et al. caution that there is nothing inherently motivating about these writing tools and students who do not feel that their participation is valued will not participate in online discussions (Rehberg et al., 2001, p. 129). In order to keep discussions lively Rehberg et al. suggest it is necessary for instructors to engage in a number of coercive practices to gently prod the direction of the discussion. These include requiring a certain number of postings from students, or the instructor can create an alias and participate without the students knowing that the comments come from the instructor. They also suggest setting a rule that the instructor will not answer until at least two students have replied but intervening to discourage discourteous comments. Participation could also be encouraged by having students select the posts they want to have graded or having the students grade each other's participation. Rehberg et al. recommend reserving email for administration and encouraging student participation, such as sending private messages for congratulations. Otherwise the use of email to communicate with students places a large burden on the instructor due to the high level of repetition in student enquiries (Rehberg et al., 2001, p. 121).

Not all online material is written using WebCT. The course content and student assignments are often written using other software, like a word processor, and distributed through the system. WebCT has a series of tools for the management of this material which organises and manages computer files on the WebCT server so they can be easily located. Instructors can decide to control the pacing of the course by selectively releasing pre-written material based on a range of criteria, such as time and date (Rehberg et al., 2001, p. 319). There are tools for searching and organising these files, including hyperlinks, indexing and footnoting (Rehberg et al., 2001, p. 245). When documents are managed in this way students can search for specific terms and concepts, although they may need assistance in developing their information management skills to make good use of it. There is a companion set of tools available for students to create and distribute course assignments, although the administration of these tools, such as due date, cut-off date and reminder notices, are set by the instructor (Rehberg et al., 2001, p. 269).

4.3.2 Student Learning on the Internet

A brief example may help to clarify the nature of being an online student in a course management system like WebCT. Rossett (2000) provides a short diary account of her experiences of being an online student enrolled in an online class in financial investment. As a professor of educational technology her intention was two-fold. Firstly, to learn to take care of her family's finances and secondly, to learn how e-learning fits into her life (Rossett, 2000, p. 100). After her initial enthusiasm, Rossett began to analyse her experience as a student and was immediately surprised by the depth of the course's reading materials compared to the shallowness of the course's assessments. She evaluated the materials as friendly, simple and effective, including a good range of study options. The assessments mainly involved drill and practice of the main concepts in the module. After two days of being dedicated to online learning her commitment gradually began to slip, despite scoring highly on the first online test. Following a four-day break away from the materials Rossett discovered that she needed to begin the module again. However, as the modules were well designed, she found it was easy to quickly return to where she had previously ended.

Rossett's main complaint with the course was the quality of the exercises, which tended to focus on calculation rather than the implications of difficult concepts. Her performance in the assessments began to drop. She disliked that after a week she could not remember anything about the class. When she was unable to attend the scheduled time for the synchronous chats with the professors, Rossett was concerned that she was losing her way in the module and began to have feelings of guilt about the course. She also found it was not possible to do any study on the road while she was travelling, as she had intended. At the end of the scheduled time she only managed to complete three of the required six modules and she was dropped out of the course.

Given her background, Rossett should have been a successful e-learner but was not. These were not problems that increased bandwidth or cheaper computers would overcome. Her assessment of the course was that it was competently designed though not outstanding,

> Lacking a dynamic instructor, powerful incentives, links to the job and fixed schedulers, Web learning is at a dramatic disadvantage in capturing and holding attention. (Rossett, 2000, p. 99)

When reflecting on why she, an expert in the field, was unable to complete the course, her reasons are those familiar to many online teachers.

> The things that made me dropout are the same things that make the Web so compelling. The beauty of "anywhere, anytime, whenever you want," too readily turns into not now, maybe later and often not at all. (Rossett, 2000, p. 99)

Even experienced students, such as Rossett, underestimate the time necessary to learn. Students generally find that the flexibility of studying anywhere is more difficult to manage than expected. When attending a class in person, time is put aside for the activity but when working at home or in the workplace there are constant interruptions. Although students are told they will have to invest a certain amount of time in study, in the end many, like Rossett, complain that they had trouble meeting that commitment. If time is not scheduled, the online classes go down the list of priorities compared to other things in the students' life (Simpson, 2003, p. 28). It is easy to ignore and avoid in the online environment, especially once performance drops. Eventually, students drop out because they fall behind in their work and the other aspects of their life become more important.

4.4 Can the Internet Be a Classroom?

One could conclude from Rossett's article that web-based learning will not deliver all of what is hoped. There appears to be a loss of cues from the classroom that is fatal to high-level learning. The hybrid learning space created by teaching on the Internet is one in which disseminating information is structured through activities like tutorials and discussions become formalised in written texts like lectures. Without the social interaction of face-to-face encounters there is a loss of commitment and lack of incentives to continue to learn, even for someone

experienced in the principles of e-learning. The increased computerisation of online teaching leads to less predictability for the teacher, who is no longer the focus at the front of the class. In the online environment the teacher can never overcome the lack of physical embodiment which stabilises the lecturer's identity, making it possible for the teacher to become confused with their audio visual aids (Rehberg et al., 2001, p. 9). The only way for them to make their presence felt is through the scheduling of learning activities in the online classroom or contacting students directly through email. Students in physical classrooms believe that because they are in the lecturers' personal presence they can learn more from a personal delivery than they can learn from reading a written text (Frank, 1995, p. 29). Lecturers find that students do not behave in the same way online as they do in their presence. As a consequence, the students' presence in front of the lecturer is still needed for high-stakes activities, such as preventing cheating in examinations (Rehberg et al., 2001, p. 103).

Teaching and learning online reverses the codes of the physical classroom. Student learning is reduced to process of self-expression, in which students follow their own inclinations and take on activities of student writing of their own accord (Bereiter, 2002, p. 267). In contrast to tutorials, communicating in the online environment results in an increased permanence in discussion through student writing. Rather than the spontaneous interaction of face-to-face discussion, the most common problem with online writing is dealing with excessive detail rather than the broader aspects of the course, which was outlined in Section 4.1.1 above as also a common problem with note-taking in lectures. The focus on details leads instructors in online environments to have a tendency to be concerned with changing the appearance rather than the substance of the course (Rehberg et al., 2001, p. 82). Similarly, there are problems relating to too much content on a single page and spending too much time on interactive features rather than content (Rehberg et al., 2001, p. 186). These are all features that we saw in Section 4.1 are also common to lecture theatres, suggesting that the classroom for online learning comes closer to what Habeshaw et al. (1992) call a seminar, "a session during which a student (or students) presents a prepared paper to the class" (p. xiii) than the group discussion of tutorials.

4.4.1 Learning Online Learning, Online

It is the lack of physical affordances that limit the online environment's capacity to provide cues for learning. The only option available to students is to regulate themselves in regard to the necessary learning activities. In investigating the students' experience of skill acquisition, Dreyfus and Dreyfus (1986) found the important difference between novices and experts was their large repertoire of situational discriminations. Dreyfus and Dreyfus argue that mastery only comes from watching the expert because on top of the skills required to successfully complete a task, the expert has learnt to distinguish those situations that require one reaction from those that require another. This is what Bereiter (2002, p. 141) classifies as "impressionistic knowledge", which he argues is critical to creative activity and connoisseurship. When considering whether the Internet can be appropriate for higher-order learning, Dreyfus (2001) argues that students need to be more than intellectually involved and online learning would need to capture all that is essential about a situated understanding required to acquire skills in various knowledge domains. For straightforward, information-centred use, Dreyfus agrees that the Internet works as well as any other medium, so that students do not need to be in the classroom to learn with a teacher or other students. To go beyond decontextualised information consumption requires learning the situational analysis skills of experts which determine what aspects in a particular situation are important (Dreyfus, 2001, p. 31).

What concerns Dreyfus (2001) about learning on the Internet is that computers remove interpersonal risks but replace them with other risks, such as the risk of staying with low-level learning outcomes. Dreyfus argues that there are instances when removing risk, and with it commitment, does not provide a genuine alternative to all the things required for high-level learning characteristic of higher education. His concern is that by adopting online learning we could end up with educational decision-making that is a version of Beck's (1992) "risk society" where risks or hazards produced by the growth of industrialism come to dominate modern life. In the risk society small-scale risks are removed by the expanding knowledge that comes from scientific and political efforts to minimise potential hazards. As a result,

what remains are globalised risks in which any mistake that occurs is at a scale that increases the potential for error and widespread harm. Similarly, attempts to control student learning without a physical presence makes the Internet an environment for learning that is excessively ordered and rule-based. Rehberg et al. (2001, p. 349) agree that the closer teaching is infused with technology, the greater margin for problems and embarrassment. This creates the paradox of a risk-adverse educational system placing increasing amounts of educational experiences online to gain greater control of student learning and, in the process, exposing students to the much higher risk of not experiencing meaningful learning opportunities. Noble (1998) reports that students already perceive online learning as "cyber-counterfeit" with not all courses appropriate for the online learning format.

Patently, critics of the Internet such as Dreyfus (2001) are not arguing that students cannot learn online, rather that online experiences are not credible substitutions for face-to-face experiences. That is, technology may provide wholly new learning experiences but it cannot replicate the embodied experiences of the topic of study, as Alexander and Boud (2001) would have us believe. At the centre of Dreyfus' arguments is the theory of embodiment and its centrality to human identity. He argues that there are profound consequences to the inhibitions that have developed from our interactions with others. Without a physical presence students lose a sense of what is relevant. In the absence of others, there is a lack of that emotional investment that builds trust, responsibility and commitment, and it is difficult (although not impossible) to achieve the most advanced levels of human knowledge through online interaction alone.

However, there have been some reservations about Dreyfus' strong emphasis on physical form. Slater (2003) argues that conclusions drawn by Dreyfus are only possible if there is an assumed separation between online and offline that creates two separate identities. For this to occur Slater believes that Dreyfus has had to over-emphasise the differences between online and face-to-face interaction by taking the extreme experiences of a few Internet fanatics to be commonplace. This does not take into account the fact that different cultures have different expectations of accountability which they take with them online (Slater, 2002). In spite of having the

appearance of being a different social sphere, there are many of the same consequences to interactions that take place online as face to face. For example, regulations rarely make a distinction between the medium of the interaction, with legislation for taxation, copyright and child protection still applying to the Internet. Slater's own analysis shows that what is more likely to occur in current uses of online technologies is for people to write about what they want to achieve in the real world rather than to display a desire to live in cyberspace (Slater, 2003, p. 135).

Collins (1996) argues that Dreyfus' concentration on the individual rather than the social group within which the individual is located leads to a failure to acknowledge the potential of the Internet for self-reflection and participation. What is lost online is the ability to share localised experiences with others. Language permits sharing of vicarious experiences but writing has to stand in for the non-verbal interactions of face-to-face situations. However, it is still possible to be harassed, become embarrassed or have a deeply emotional response to what was written online. What is important from Collins' (1996) point of view is the question of who is able to contribute to the social interaction. Dreyfus, similarly, argues that machines will not replace people in informal arenas. He draws these conclusions because of the effort humans have to make to embed computers in our society. Collins argues that there are some areas where we are not willing to do the work of integration for computers. As computers cannot be social, in the sense that they cannot create an artificial society, it is up to human actors to repair deficiencies in communication. Computers can play an important role in micro-worlds, which provide a restricted artificial reality separate from the real world, and where humans provide the expertise in filling in gaps and misunderstandings in the computer's performance. Collins (1996, p. 113) argues that mechanising the part where humans mimic machines and become more machine-like (for example, rote learning) makes us more willing to accept that computers have a role in social interaction, even to the point of pretending that they have intelligence.

However, Dreyfus' challenge is to those who would substitute one domain of existence for the virtual without acknowledging its limits. His emphasis on the individual body might not emphasise the social and cultural but this does not

completely undermine his analysis of the Internet's impact on situated understanding. His conclusion that there are appropriate areas for the use of technology in learning resembles the argument by Habermas that rationalisation is acceptable as long as it is restricted to the appropriate domain. Trust develops from a continual testing of our relations with individuals who demonstrate a certain predictability in their actions. While new social conventions may yet overcome the limitations of the Internet or future technologies may provide appropriate contexts for advanced levels of learning, there currently remain limits to the substitution that can occur between online and face-to-face situations. This means that it is the way technology is used that needs to change if students are to make use of the participatory dimension of online education. Indeed, some of the more extreme claims for online learning have already been moderated with the emphasis on "blended" learning (see for example Thorne, 2003).

Working on the Internet suits some students, particularly those who are unhappy with the limitations of their body. In the online environment the topic becomes just another conceptual artefact that can only be represented through descriptions rather than understood through direct experience. Often, the only recourse for an online learner is to fall back on abstract rules and procedures, which Dreyfus and Dreyfus (1986) have shown to produce poor results in the real world. Were students expected to live their entire lives online rather than merely a small substrate of their life as a student, then learning online would be suitable for learning in all situations. This scenario highlights the transference problem that exists in almost all online learning. There are very few situations where the skills learnt online will be used in the future in an online environment. Journalism, web site design and e-commerce are among a handful of undertakings where students will eventually work directly on the Internet. Instead, most instances of higher education teaching on the Internet instruct on a different domain of knowledge, perhaps business, engineering or science, which will eventually be used in real-world domains, such as enterprises, factories or laboratories. While these fields all use aspects of computer technology, it is not in an embodied, situated way identified by Dreyfus (2001) and requires further translation to be transferred out of the classroom and into the workplace.

In the case of these transferred skills, at some stage the knowledge learnt will need to be tested in the physical world. By being asked to experience part of their life in the limited context of a micro-world students fail to distinguish the functioning of the tool from the actual work done with that tool, confusing the physical setting with the pedagogy (Rehberg et al., 2001, p. 392). Only in one particular case does online learning correspond to Dreyfus' conditions for an authentic Internet experience. This is when educators use online technologies to learn about online teaching. The observations, like those in Rossett's (2000) short paper, demonstrate the value of teachers experiencing things from a student's perspective before they design or facilitate online classes for students. In these circumstances, the students (who are all potential online teachers) purposefully reflect on their experience in front of the computer in order to understand what it is like to become disembodied as a student. In learning about online learning lecturers need to experience the limitations of the new technology first-hand to be in the position to comment on the suitability of these techniques for their own practices. The emotional response they have to being online is enough to understand what their student's experience is likely to be. It is this self-reflection that Habermas argues brings theory and practice together (Habermas, 1973). Self-reflection provides legitimate insight into one's own life history as well as serving as a guide for emancipated behaviour and action. In this way learning about online learning online is a form of self-inquiry that starts from the genuine problem of what it is like to be a student in this new environment. Participants are typically asked to notice their own reactions to the interrelationship between student and technology which is intended to construct a new identity specific to the Internet, namely the online learner. This contemplation on identity personifies the observation of experts and risk-taking that Dreyfus (2001) argues is required for genuine, deep-level understanding. Online students give up their old identity as classroom learners in order to watch an experienced online teacher demonstrate the impressionist knowledge of good facilitation.

4.5 The Online Classroom

The comparison of physical and representational classrooms in this chapter suggests that being in classrooms is critical to higher levels of learning. Classrooms are the

higher education technology for getting students increasingly involved in the learning situation. This is where students learn to collect or work with conceptual artefacts. The task of the classroom is to create an environment that makes student learning possible. Lecture theatres have evolved to assist students in processing information. Students have a range of responses to the vicarious experiences provided by their lecturers (Hodgson, 1997). In the context of the lecture theatre these vicarious experiences permit individuals to share experiences without having to be in the physical situation. In the accumulation code that is behind this learning environment, information itself is problematic. An accumulative framework that arranges the technical elements of lecture theatres encourages systematic approaches to educational technology that strive for predictability and teacher control. Tutorial rooms, on the other hand, do not see the learning environment as causing student behaviour, but influencing the students' construction process. Tutorials have students work with conceptual artefacts in order to build an understanding. The participation code of the tutorial room encourages flexibility and communication among students to support them in constructing concepts and principles themselves.

Dreyfus' analysis of online learning has been criticised for its naïve views of education. Most point out that he does not speak of the current realities of education (Blake, 2002), and he fails to recognise the different expectations between online learning and face-to-face learning (Burbules, 2002). They argue that Dreyfus romanticises current higher education practices and therefore fails to give sufficient weight to the potential of the Internet to improve poor quality teaching and learning (Standish, 2002). Nevertheless, in this chapter it has been argued that Dreyfus' analysis assists us to understand that educators use a wide variety of technological objects in enacting their pedagogical principles. The purpose of these technologies has traditionally been to bring students and teachers together to engage in teaching and learning.

In this chapter I have investigated the consequences of removing the deep structures of physical classrooms from students' experiences of learning. As teaching has modernised it has moved away from situations where the educational force is part of the physical structures of classrooms towards more indeterminate situations of

greater flexibility, student choice and enhanced teacher monitoring. Replacing physical space with cyberspace removes the physical association with teaching, so that students are required to learn in an almost entirely conceptual world. Traditional boundaries are broken down and student actions are in some ways liberated by a reduction in risk and involvement. This is not problematic for activities where identity exploration is the goal of the learning. However, in higher education these situations are limited and learning requires some minimum level of risk or else the level of change is constrained to lower-order skills, such as the transmission and sorting of information.

The analysis of educational technology in this chapter concluded that online classrooms draw on both accumulation and participation technical codes. The combination of features for lecture theatres and tutorial rooms strives to allow students to monitor their own progress towards the courses' goals to encourage participation in learning. The online classroom is an environment of self-expression that combines an aspect of each of the technical codes to construct the ideal learning experience. What the online classroom lacks is the physical affordance that encourages the accumulation of large amounts of information in lecture theatres or the discussion of ideas to develop understanding in tutorials. In its place is the constant re-evaluation of the role of the lecturer that occurs online, creating a distinctive combination of lack of permanence and greater reliance on textual communication that results in a blurring of teacher and student identity.

CHAPTER 5

THE CULTURAL HORIZON OF STUDENT LEARNING

Before discussing how online technology steers interaction in teaching and learning, it is necessary to establish the norms universities use to determine whether a technology addresses the problems of higher education. The experiential view outlined in Chapter 2 suggested that an appropriate technology for universities needs to embody a way of using the world that results in learning consistent with the values of higher education. It is the norms described in the different approaches to learning that will be used to justify the educational choices embodied in educational technology. The comparison of the deep structures of online learning with physical classrooms in the previous chapter revealed that the Internet can be used by students for educational experiences, and that these are not inferior to face-to-face experiences, unless the intention is to provide an environment for learning from the real world. The online world is a different context to face-to-face learning and removing physical risk does make the learning environment more open and free. However, a freedom without boundaries has been demonstrated by Popper to have the potential for totalitarianism (Popper, 1966). When there is unrestricted choice, an individual is free to choose anything including enslavement. In terms of the Internet, the lack of risk afforded by communicating remotely makes it easier to trust people, but this trust is just as likely to be misplaced, so that it is given over to others who will act strategically to turn that trust against us. The trust placed in students to control their own learning online tends not to be embraced as a freedom to further their learning.

Questioning identity, however, is a natural part of maturing in complex modern societies. In the context of higher education it raises questions of which student identities are normatively valid in university classrooms. This is the question we now turn to in this chapter, namely, how can decisions to use technology be made in

higher education that allow appropriate moments of student identity formation? I will introduce the analysis of student learning in higher education by starting with the theoretical assumptions of higher education research in Section 5.1. This will be placed within the specific context of Australian universities through a brief overview of the antecedents of research in higher education in Australia. This review reveals the kind of issues that have remained central to understanding teaching and learning in Australian higher education since the post-world war two period. Section 5.2 will present the arguments of Ference Marton (1981) whose research methodology has made a claim to special knowledge about student learning. This research method has become known as "phenomenography", which has been defined as the study of "description of appearances" (Hasselgren & Beach, 1997). I will argue that, under the influence of this method of analysis, phenomenographers thought that the structural components of student learning can be discerned from the statements students make about their learning.

Phenomenography's turn to linguistic analysis has the benefit of shifting the focus of educational research from teaching to student learning. However, the methodological inconsistencies discussed in Section 5.2.1 put it in danger of becoming a relativised return to research into externally observable student characteristics described in Section 5.2.2. In Section 5.3. I provide an example of the misconception that results from drawing on phenomenographic principles alone. To reconstruct the incomplete model of communication informing claims in phenomenography's student learning research I will discuss the principles of this model in light of Habermas' discourse ethics in Section 5.4. In this section I will elaborate on why discourse ethics is better suited to explaining the interactions of critically constructed learning found in higher education than phenomenography. By outlining the normative dimensions of higher education that are found in students' statements about their learning, I will proceed in the next chapter with a critique of the teacher's interactions with technology.

5.1 The Theoretical Assumptions of Research in Higher Education

To reconstruct an understanding of the history of educational research in higher education it is necessary to look at the questions being asked by educational

researchers, since the questions researchers ask are directed at a field's problematic conceptual issues. Therefore, this section provides a brief orientation to the changing questions in research in teaching and learning in Australian higher education during the post-war period. A process of critique often begins by placing the conditions that permit specific social forms of practice into their historical context. Discussions of the idea of a "higher" education, such as Barnett's (1990), suggest that the practice of university education is qualitatively different from school education. This is evident in the administrative structures of higher education. The quality of teaching and learning is not as highly regulated in universities as it is in other levels of education. Lecturers receive no pre-service training and are expected to teach based on their content knowledge rather than pedagogical expertise.

To some extent the lack of direct involvement in the quality of teaching in Australian higher education is a legacy of universities being initially funded by State Governments, which have traditionally emphasised primary and secondary schooling. The Commonwealth Government only became a significant stakeholder in Australian higher education following a post-war period of nation-building that was intended to result in intellectual independence for the country (Anderson & Eaton, 1982a). As a result, universities have evolved in what can be considered the typical environment of Australian federalism, in which funding is provided by the Commonwealth Government while control rests with the States. The result has been a system of largely self-governing universities that compete among themselves for the most academically promising students.

The relative independence of university governance when compared with schools is matched by a similar divergence in the traditions of inquiry associated with the two levels of education. Researchers in higher education have adopted quite different methods of inquiry to those employed in either adult or school education (Hayden & Parry, 1997). School education research has drawn on research paradigms from a number of different disciplines, with the primary influence being psychology. It is therefore common to describe much of the research in education undertaken during the period in question as undergoing a paradigm change that parallels a similar transition in psychological research. That is, a conversion from behavioural to

increasingly relativised cognitive theories (see for example Bruner, 1996; Driscoll, 1995; Eggen & Kauchak, 1999; Scott & Usher, 1996; Winn & Snyder, 1996). In the following situational analysis I will demonstrate that higher education research in teaching and learning did not follow the same paradigm shifts as psychology, but underwent a methodological shift towards linguistic ethnography, similar to the "linguistic turn" in the social sciences (Rabinow & Sullivan, 1979; Rorty, 1967).While psychology remained the dominant discipline in school studies, in higher education, research questions moved from an interest in observing the psychological characteristics of students to interpreting statements about student's experiences of learning.

A synthesis of the questions facing higher education researchers can be formed from four overlapping studies that reviewed research on higher education in the Australian context. Miller (1970) was one of the first to review the field of higher education research, beginning with the pre-war period and touching on the growing interest in teaching that pre-dated the turn towards research on student learning. Miller's study was followed by Anderson and Eaton (1982a; 1982b) who reviewed almost forty years of research in Australian higher education. In the process they revealed that the themes that emerged since the Second World War reflected the major social changes of the same period, namely post-war reconstruction, rising expectations of improved living standards, the search for greater equality and the beginning of dismantling the welfare state in the economic downturn of the late 1970s. Dunkin (1986) applied a conceptual framework adapted from school education to review observational research of the processes of university teaching and compared these processes with three other kinds of variables, namely, presage, context and product. Hayden and Parry's (1997) review of higher education research begins with the turn to student learning in the early 1970s and concludes with the recent structural changes undertaken by the Australian tertiary education sector.

5.1.1 The Australian University Context

Australian higher education research is largely a post-war phenomenon. Pre-war universities encompassed a small number of privileged institutions located in the

capital city of each State which replicated approaches to higher education largely imported from the United Kingdom. The Australian higher education system underwent the characteristic pattern of expansion and differentiation experienced by other large social institutions in the period of post-war prosperity. The consequence of an expanding sector, with the ensuing growth in diversity of its student and staff populations, was a continual search for a new basis for educational decision-making. When the results of higher education research were repeatedly criticised as inadequate or too simplistic for the growing complexity of modern higher education, a change in the justification of university practices occurred, gradually moving from one founded on student inputs to one based on learning outcomes. As a result, higher education research separated into two forms of specialisation, serving either higher education administration or academic practice (Hayden & Parry, 1997). Along the way the search for an appropriate methodology for teaching and learning research concentrated on different clusters of issues, starting with student characteristics, then the process of teaching and finally the experiences of student learning. Before discussing the most influential research tradition in greater detail, I will briefly introduce each of these issues in turn.

5.1.1.1 Presage in Student Characteristics

Miller (1970) characterised higher education research after the Second World War as concerned with selection, progression and failure rates. Of these interests the greatest emphasis was on selecting students with the greatest chance of success and thereby reducing the comparatively high Australian student failure rates. Attempts were made to measure academic variables by studying graduation and failure rates in relation to standardised psychological tests. It was soon found that selection based on an Intelligence Quotient (IQ) would also exclude as much as a quarter of the successful students (Hohne, 1955). Prior achievement was found to be the strongest indicator of future academic performance. The best forecaster of subsequent graduation success was the students' first year results, although no single variable proved to be accurate enough for individual student prediction (Anderson & Eaton, 1982a, p. 14). Hohne (1955) suggested that failure rates were more likely to be

determined by something other than academic ability, such as variations in standards, poor-quality teaching or inappropriate examinations.

By the 1960s it was accepted that academic failure could no longer be attributed to the innate characteristics students brought with them when they entered university study. Research supported the common-sense understanding that successful students were more organised and persistent than those who fell short (Anderson & Eaton, 1982a, p. 17). Research into the habits of successful students found that they managed their time more effectively (Flecker, 1959) and did more preparation for their tutorials and examinations (Pond, 1964). Universities responded to these findings by establishing academic study centres and assisting students to understand the techniques of successful academic study.

5.1.1.2 Process of Teaching

By the middle of the 1960s there had been a three-fold increase in the size of the higher education sector when compared to the start of the post-war period. A new, two-tier system of universities and Colleges of Advanced Education was introduced to consolidate much of the sector's earlier expansion (Anderson & Eaton, 1982a, p.91). These colleges were practice-focused, teaching-only institutions that would in time enrol more students than the universities. With higher levels of student participation in tertiary study, equity became a major issue for higher education research. Despite the major expansion up to this time, universities were widely criticised for continuing to serve the needs of the wealthiest sections of the community rather than meeting their social obligation to admit a cross-section of ethnic, gender and age groups that reflected society at large. Student protests further pressured universities to review their processes and provide opportunities for student participation in decision-making (Anderson & Eaton, 1982a, p. 95).

The lack of predictive success by research on entrance and psychological scores was responsible for a change in the focus of investigations towards more general aspects of student progress in their studies (Miller, 1970). The problems of student success and failure were not discarded but the search for their causes extended to include an

examination of the influence of the quality of teaching on student progression. That lecturers supported this research into teaching was an indication of their desire to increase their effectiveness in the face of continuing high failure rates and inadequate resources (Anderson & Eaton, 1982a, p. 97). Dunkin (1986) reviewed the research of this period, finding that, contrary to expectations, university teaching required more memorisation of factual material than complex intellectual processing of information. Higher-level verbal exchanges were found to exist only in inquiry-based practical classes (Hegarty, 1978). Further, it was discovered that the intellectual environment could be influenced by the kinds of questions asked by lecturers. Researchers found that teachers who asked high-level questions resulted in students understanding key concepts and consequently more favourable student evaluation of the lecturer's teaching (Dunkin, 1986, p. 772).

5.1.1.3 System Restructuring

The continuing concern over high failure rates led to the establishment of educational research and development units whose purpose it was to improve the quality of higher education teaching (Anderson & Eaton, 1982a, p. 96). These units spread to almost all universities and Colleges of Advanced Education by the early 1980s, largely created by amalgamating audio-visual facilities with offices of teaching research. The founding of these units led to the application of student evaluations to a range of facets of teaching other than lecturing (Dunkin, 1986). The academic development units encouraged the importation of innovative teaching methods from overseas, such as problem-based learning (for examples see Boud & Feletti, 1991) and the Keller Plan (Keller, 1968) and undertook research into student learning.

Just as universities began to consolidate the infrastructure for education research and discuss ways of improving teaching and learning, there was an unexpected decline in demand for university courses by school leavers (Anderson & Eaton, 1982a, p. 103). This has been attributed to a concurrence of an economic downturn, decreased migration and a reaction to the perceived lack of relevance of higher education (Hayden & Parry, 1997). Anderson and Eaton (1982b, p.108) see the research of the time as returning to questions of performance and wastage of the early post-war

period without the underlying belief in the usefulness of higher education to nation-building. In its place was an increase in university participation rates achieved by a significant restructuring of the higher education system. The binary system of colleges and universities was replaced by a unified system of universities created through a process of enforced amalgamation into thirty-eight publicly funded, multi-campus institutions.

5.2 The Relational View of Student Learning in Higher Education Research

The expansion of participation in higher education coincided with a shift towards researching student learning in its natural context as distinct from what were described above as "presage" features, namely the student's characteristics or previous learning experiences. Australian research studies since the 1980s have largely investigated the experiences of learning processes at a tertiary level ethnographically, although, writing at this time, Dunkin (1986) describes the ethnographic approach to higher education research as still very much in its infancy. This research stems largely from the seminal work conducted by Marton and Säljö (1976) which influenced research undertaken in a number of countries at about the same time, most notably in Sweden, the United Kingdom and Australia (for an introduction to the development of this research see Marton & Säljö, 1984). In particular, these researchers were interested in the way different models of information processing was understood by the learner and how those processing capabilities were developed. The result of the original study into these questions was to describe two approaches to learning, a deep approach and a surface approach (Marton & Säljö, 1976), although these categories have been greatly refined ever since. Adopting a surface approach to learning comes from students conceiving learning as the reproduction of texts (Marton, 1984; Marton & Säljö, 1976). Deep approaches describe the students' conception of learning as directed towards extracting personal meaning.

The "relational" perspective (Ramsden, 1988, p. 26) that formed around these observations about student learning viewed learning as an interactive process in which the contextual variables such as prior learning experiences, students'

perceptions of the learning task, teaching practices and assessment combine to influence how the students approach their learning. More importantly, it led to the finding that students adapt to the demands of the learning environment (Wilson, 1981). Follow-up research (such as Ramsden, 1984) went on to show the depth of the students' understanding of their learning and university teaching. These conceptions were not described as stable student traits but as responses to particular occasions. Surface approaches, for example, have been found to be encouraged by assessment methods that create anxiety or reward recall, emphasise content, lack feedback or otherwise create the perception of a lack of student control (Ramsden, 2003, p. 71). Deep approaches to learning were found to be encouraged by clear objectives, long-term active engagement with the content, lecturers who demonstrate that they care whether the students are learning, and the perception of choice and independence in learning (Ramsden, 2003, p. 146).

There is little argument that "conceptions of learning" research has become the most influential research tradition in universities to date. This research can be seen as the first step in the professionalisation of higher education teaching by providing a recognised body of knowledge separate from that used in school education, a condition which is often claimed as a requirement for professional decision-making (Eraut, 1994). The growing influence of interview-based analysis in higher education research is largely due to the methodological confidence brought about by a new concept in educational research known as "phenomenography" at a time when academic development units were increasingly engaged in educational research. In the following section I will outline the basic tenets of phenomenography drawn from an early paper in which Marton (1981) outlines its theoretical foundations. It is acknowledged that the conceptualisation of phenomenography remains an on-going project (see for example Marton, 1984, 1988, 1992) but it is these theoretical assumptions that characterise phenomenographic research as a turn towards linguistic analysis. Further, the strong reliance on observational studies leading from these theoretical assumptions has brought with it the methodological dangers of the "linguistic roundabout", first recognised by Rorty (1967, p. 10) in comparable forms of social science research.

5.2.1 The Philosophical Principles of Phenomenography

Marton conceives of phenomenographic studies as a distinctive form of qualitative research because of the claims that they make about human consciousness. In particular, Marton argues that phenomenology is different from phenomenography as phenomenology is concerned with basic questions of reality rather than just people's perceptions of reality (Marton, 1981, p. 178). While both phenomenography and phenomenology are studies of experience, Marton argues that a fundamental difference between the two methodologies lies in which aspect of experience is examined. Phenomenology takes as its objective the study of the pre-reflective experience of the everyday world while phenomenography investigates reflected, conceptually formed experiences. In the terms of the Popperian three-world structure introduced in Chapter 2, the focus of phenomenology studies (as Marton sees them) can be distinguished as the objects of subjective World 2, compared to the objects of the constructed World 3 for phenomenography. As an empirical method, phenomenography takes the Popperian line that, while it does not deny that pre-theoretical World 2 knowledge exists, it is not relevant to its analysis (see Popper, 1979, p. 170).

For Marton, research needs to come to terms with this distinction between reality and the perception of reality (Marton, 1981, p. 180). He makes it clear that the interest of phenomenographic research is not the lifeworld as such, but rather the way individuals speak about the lifeworld (which ethnomethodologists call "account giving", see Garfinkel, 1967). Marton presents phenomenography as a research specialisation that concentrates its inquiry on the statements about perceptions of reality, in the same way that a linguistic analysis investigates the sense in which the word "chair" is used in a passage of speech rather than investigating the characteristics of the chair itself. Out of this analysis phenomenographic studies create systems of classification that categorise the various perceptions of the lifeworld (Marton, 1981, p. 188).

The "categories of description" that result from phenomenographic research are not categories of experience but represent the researcher's mode of expressing the range

of different ways in which a particular social group describes a phenomenon. An important notion for Marton is the realisation that the categories of description are elements of describing phenomena that are relatively stable and rarely change. For this reason it is more appropriate to speak of an individual's way of expressing himself or herself as being characteristic of a particular point of view rather than to use these statements to classify individuals (Marton, 1981, p. 195). In other words, students can only be said to adopt a surface or deep approach to learning, rather than being surface or deep learners.

Through a turn to language analysis, phenomenography has been able to achieve a high level of stability regarding the concepts of student learning research for higher education. In contrast to phenomenology, the intention of phenomenographic research has been to make explicit the conceptual pre-understandings already possessed by participants competent in teaching and learning interaction. Further, what is presented as the outcomes of phenomenographic research is the researchers' experience of what is described as being experienced by their respondents. These are what Alfred Schutz (1973) called second-order constructs which the social theorists use to describe the underlying pattern in the phenomenon level of first-order constructs built by the participants. Therefore, a single interview could, in theory, yield all possible variations in describing the phenomenon under investigation. Further, phenomenographic researchers understand the meaning of statements only insofar as they understand why the interviewee felt justified in putting forward certain propositions as being a variation of their understanding of experience.

In this way, statements themselves become facts detached from their relationship to reality. Marton argues that what makes phenomenography distinctive is that it collects the statements of respondents for their own sake (Marton, 1981, p. 178). Phenomenographers see inquiring into the different ways people experience as an interesting end in itself. Ethnomethodologists, on the other hand, would argue that while this is true, what is of greater interest is the relationship between statements and the taken-for-granted level of the lifeworld. The aestheticism behind Marton's proposition provides interesting patterns of description, without any claim that anything more should be read into them than that.

5.2.2 Phenomenography as Linguistic Behaviourism

It is apparent from Marton's account of the philosophical assumptions of phenomenographic research that the study of students' statements about their experiences of learning is more a study of language than learning. Marton wants to be able to thematise the total combination of ways of viewing various aspects of the world that are aggregated into the basic categories underlying the various alternatives to describing the students' experiences (Marton & Booth, 1997, p. 196). Much like the behaviourist research tradition, which was restricted to the students' observable characteristics and behaviour, phenomenography discontinues its explanation at the level of the objective descriptions without further consideration of the meaning of those descriptions to the respondents or of their relation to demographic characteristics, lifeworld or culture. This is not to say that phenomenography is a form of behaviourism in the sense of adopting the behaviourist's methods of stimulus and response experimentation, but that it adopts a similar methodological self-limitation. It treats language in a cognate way as a symbolically mediated reaction to the environment whose outcomes can be represented along relative levels of sophistication in a hierarchy of descriptions, such as from simple to complex or concrete to abstract, external to internal, quantitative to qualitative etc.

Prior to the emergence of student learning research in the 1970s the majority of research in higher education was for policy development (Hayden & Parry, 1997). It took the methodological certainty of phenomenography to shift the questions of educational research from student characteristics to student learning. Kuhn (1970) argued that the strength of the natural sciences was to go beyond endless discussions of methodology by developing a shared paradigm, which defined the problems and procedures for research in a discipline. The change in the philosophical premise of social science research that has become known as the "linguistic turn" was an attempt to provide the same methodological certainty for the social sciences. Rorty (1967) argues that up to that time there was no such basic agreement on which to build the stability of a consistent paradigm. For Rorty, the great attraction of linguistic analysis for philosophy was that it held out hope for clarifying the

methodological questions that would eventually lead to paradigmatic agreement among philosophers.

In a similar way, the linguistic turn to phenomenography clarifies the methodological question in education research. It provides a straightforward empirical method for sorting out distinct meanings in ordinary language to convey the common concepts used to describe teaching and learning. The purpose of these categories is to make the language of teaching and learning more precise and in the process develop the criteria for rational agreement among educators. The search for an idealised language of higher education was seeking direct perception of phenomena without the need to debate the definition of every descriptive proposition. The risk outlined by Rorty (1967) was that without a firm realist ontology many of the linguistic philosophers attracted to a method of analysis like phenomenography would drift back to their empiricist roots in what Rorty calls a "linguistic roundabout" (p. 10). That is to say, the relations between the sentence and the world it represents may not be strong enough by themselves to prevent philosophers from preferring external observation to interpretation and building an understanding of the phenomena being studied.

That there are two deeply held values for how students approach their learning in higher education is not in dispute. As Marton takes the Popperian position of arguing that there is no possible access to unreflected experiences (see Popper, 1994), the experiences that lie behind these categories of description are never studied directly. Further, there is no interest among phenomenographers in whether these conceptions are correct or not, just that there is a range of ways in which experiences can be described. These accounts are not actual experiences any more than 3-D drawings on a computer screen are real objects. Without the anchor of the student's actual experience phenomenography becomes a descriptive method that falls back on the relativism of variation foreseen by Rorty. All forms of mental content are considered to express the same level of intentionality, which phenomenography considers to have no further implications for human consciousness (Uljens, 1996). There is no suggestion from phenomenography as to how and why individual students choose one way of understanding things in favour of another. All that can be claimed is that individuals exhibit some variation in the way they perceive the world. This amounts

to saying that the study of language should be limited to vocabulary and the collection of examples of sentences but that grammatical questions should not be pursued because grammatical rules are not directly observable.

Further, when all decisions are equal and based on artificially decontextualised conceptions there is no basis on which to discriminate and no active interest in advancing to a better situation. What Marton and others who adopt the phenomenographic method fail to realise is that in order to grasp meaning the researcher has to participate in communicative action that requires a double perspective that is both observable and understandable (Habermas, 1990, p. 23). Otherwise, it is solely the researcher's understanding of the descriptive language of conceptions they have isolated from ordinary language that determines the network of possible relevant statements. These conceptions are reported as lying within a range of descriptions without being associated with their original setting, or which may not directly relate to the student's experience (Ashworth & Lucas, 2000), even though phenomenographers would admit that the original context is vital as the source of experiencing.

In Section 5.2.1 phenomenography was presented as only concerned with the surface level of the external appearance of words used to represent a context. The relativism of this perspective is the result of phenomenography considering that there is no clarity gained by going beyond the descriptions of what people say. It relies, instead, on socially constructed conceptions of a situation to describe individual student agency. This is a view that, I will argue in the next section, is best summarised by John Biggs' concept of "constructive alignment" (Biggs, 1996). This synthesis of theories can be seen as an attempt to overcome the lack of causality that Uljens (1996) argues would be necessary for phenomenography to be able to explain why an individual prefers one way of understanding things over another. The concept of constructive alignment has been formed through the distillation of phenomenographic research evidence on student learning into three main themes. These themes form a systemic view of student learning called the "3-P" model in Biggs (1978) and Prosser Trigwell, Hazel, and Gallagher (1994). It is referred to as "learning in context" in Ramsden (1984).

5.3 An Information-processing Model of Student Learning

Biggs describes the unified model of student learning as concerned with the study "processes" which are between "presage" factors that exist prior to study, such as personal characteristics and institutional variables, and "product" factors that are the outcomes of learning (Biggs, 1978). Biggs does not see the same importance in the perceptions of context as others and it is his commitment to an individual constructivist approach influenced by information-processing theory that has led him to argue that it is a consistency between these three factors that results in successful study (Biggs, 1999). A university subject that achieves this consistency is considered by Biggs to be "constructively aligned" (Biggs, 1996). That is, the "constructions" of the learning outcomes by the student are consistent with the course's intentions.

The 3-P model originated from attempts to manage the vast literature on educational effectiveness. It was initially formulated as four broad categories of research—presage, context, process, and product—by Mitzel (1960) who sought a behavioural approach to assessing the research on school teacher effectiveness. Gage (1963) described this as the first step in variable clarification necessary for what later became called "process-product" research. This research compared the measures of teacher performance with teacher effectiveness, a feature that is retained in Biggs' 3-P model. Dunkin & Biddle (1974) later responded to the lack of a unifying model for observational research on teaching and used the same four categories to define variables in the process of teaching (Figure 5.1). To deal with the complexity of classroom learning, Dunkin and Biddle focused on specifying the processes of classroom interaction, as determined by pupil responses to teacher behaviour, rather than concentrating on the outcomes of pupil learning. Their model of classroom teaching emphasised the causal relationship between each of the variables, though they caution that these relationships were only hypothetical. Although beginning his research career in school education, Dunkin (1986) later transferred this process model to summarise research on university teaching, where again he emphasised the relationship between variables rather than the meaning of the variables themselves (Dunkin, 1986, p. 755).

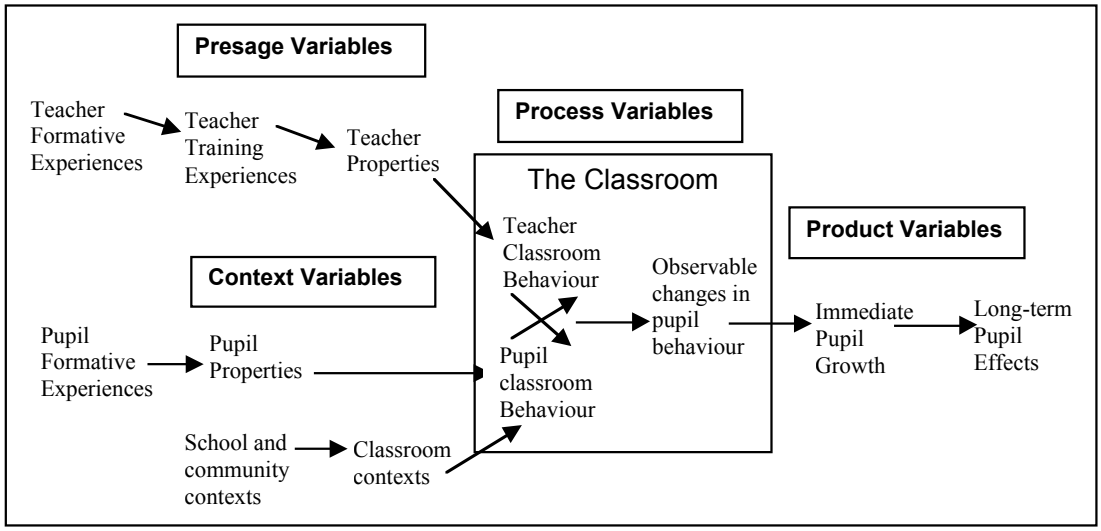

Figure 5.1. Dunkin and Biddle model for the study of classroom teaching (adapted from Dunkin & Biddle, 1974, p. 38).

Under the influence of phenomenographic research, Biggs & Telfer (1987) used what Biggs called the 3-P model to elevate their earlier information process model of learning (see Biggs & Telfer, 1981) to the level of student meta-cognition. Emulating Dunkin and Biddle's model of teaching, Biggs' original version of the 3-P model emphasised the process of learning with arrows that connected an eclectic collection of behaviourist and cognitive psychology concepts. The underlying linearity of the model is the result of retaining information-processing as its underlying causality, making it possible for Biggs (1999) to argue that alignment represents the most effective means of learning. In his most recent version of the model (Figure 5.2) Biggs accepts that information flows both ways, though emphasis remains from the input of presage factors flowing through to the learning output.

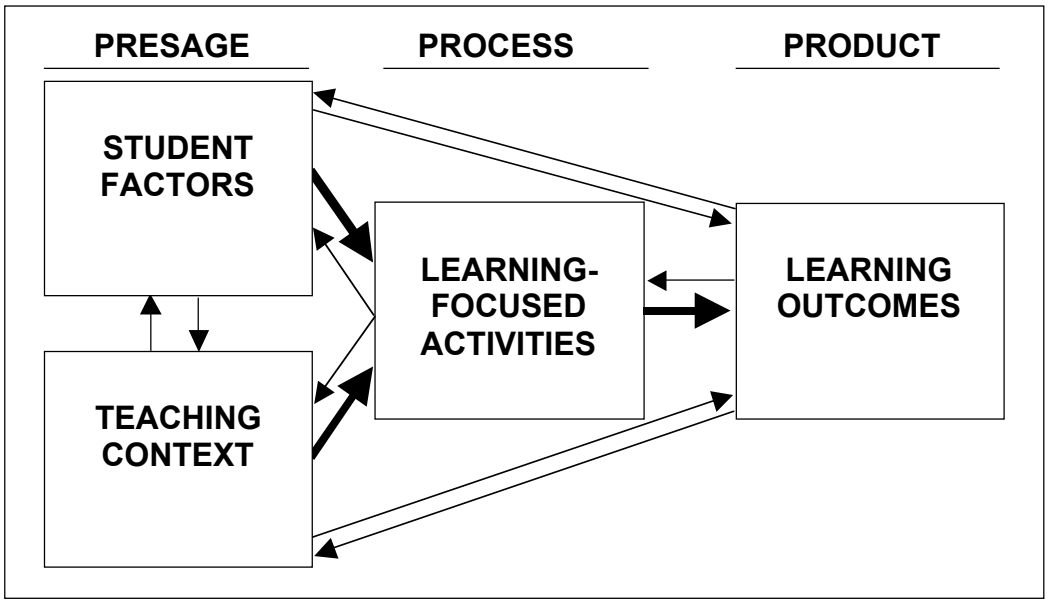

Figure 5.2. 3P model of learning (Source: Biggs, 2003, p. 19).

This brief genealogy of the development of the 3-P model describes a progressive increase in the emphasis on the interpretation of the network of associations in research over the observation of different variables. This is a shift from observation of behaviour to an observation of process provided by phenomenography's shift to linguistic analysis. Biggs' "3-Ps", however, are firmly embedded in the simple information-processing model that is still widely propagated in books on communication (for a range of examples see Fiske, 1990). These models suggest that there is nothing problematic about communication that cannot, in essence, be represented with mathematic precision (Shannon & Weaver, 1975). Biggs (1993) attempts to avert the charge of behaviourism by suggesting that in his interpretation of the 3-P model all the factors form an interactive system. As a system it needs to be understood as a whole, with each of the parts affecting each other, not acting separately or accumulatively.

5. 4 The Pragmatics of Learning

Through his engagement with phenomenography Biggs blurs the distinction between the social structure of the classroom and the individual action of students. Biggs mistakenly takes the ordering of empirical studies to explain the connection between phenomena for an ideal arrangement for the representation of student learning itself.

By taking the parts from the theoretical constructions of teaching and representing them as learning, Biggs turns a logical association into an ontological one without explaining the forces that bind these associations together. This unitary thinking ignores the productive force of individuals operating in a social world. In light of the argument above, the result can be seen is an accumulation model of student learning aimed at gaining greater efficiency by ensuring an increased flow of the right information. While this may be appropriate for the interaction that takes place in lectures, this view of communication fails to fully appreciate the active and interactive nature of learning. In overlooking the meta-function of language in the coordination of action, Biggs' theory of constructive alignment is not incorrect, just communicatively incomplete, remaining fixed at the level of only one form of action—strategic action. In Biggs' theory language is only conceived of as conveying meaning without recognising that learning is an interaction between two or more people, which requires these people to construct meaning, but which does not completely convey that meaning.

Biggs' information-processing model of communication and phenomenography's fixation on variation in language do not deal with the pragmatic aspects of language that are drawn upon when two or more people commit to coming to an understanding. Habermas has developed an alternative model of communication based on the mainstream of semantic philosophy developed during the last half of the twentieth century and consistent with most major developments in linguistics. It takes into account a theory of pragmatics that reverses the direction of analysis of phenomenography by prioritising social action as the site of meaning creation. Habermas argues that it is only the pragmatic dimension of speech that is orientated to action. He appreciates that natural language does more than describe the world but requires individuals to take a position on the conversation's validity claims. Habermas argues the model of descriptive statements is a false model, as norms cannot be tested in the same way as descriptive statements (Habermas, 1990, p. 54). Indeed, from the standpoint of the logic of languages, the meaning of descriptive statements is not contained within them, but in the relations between them.

What emerges from this critique of the processes of student learning is that the role of language in mediating social interaction is not in dispute. What is suggested here is that the method of analysis and the nature of the claims made based on that analysis cannot be taken for granted. Both discourse ethics and phenomenography are concerned with the question of how symbolic expressions can be measured as reliably as physical phenomena. By failing to take into account the practical implications of meaning, phenomenography has collected statements that represent students' responses to their learning environment, but has not provided the means by which these statements can be useful to lecturers. It is research that largely confirms what is already known and ignores the role of language in the understanding constructed by students.

For the reasons outlined above, phenomenography cannot provide a sound basis for educational decision-making without some reconstruction. By focussing only on the second-level "dictionary-meaning" part of language (as Donald Davidson might call it) and not on communication as a whole, those like Biggs who are engaged with the ideas of phenomenography are missing the productive dimension of acting through language. They fail to see that a dictionary description of the meaning of a sentence cannot encompass the meaning of that sentence when it is uttered by a particular person, at a particular time in a conversation and in particular circumstances. Any adequate theory of meaning must include not only second-level "dictionary" semantics, but also first-level pragmatic or "utterance" meaning. Biggs settles for a static framework which overlooks the critical dimension of ideology which occurs in the pragmatic using of utterances and in the distortions of communication where people purposefully challenge conventions.

5.5 Post-metaphysical Student Identities

Classroom interactions place an expectation on students to achieve a greater level of freedom of choice and autonomy. Habermas has outlined such an educational process for the whole of society. He addresses the question of how to balance individual consciousness with the responsibility to live in harmony with others. Habermas makes the link between the socialisation of individuals needed for

continuation of the lifeworld and the functional differentiation of society (Habermas, 1992, p. 193). As a society modernises, it becomes more complex and thus necessitates a release from the constraints of tradition that suppress constructive change. The binding forces of authority are exchanged for expanding opportunities to make choices that increasingly require individuals to provide their own justifications for their decisions (Habermas, 1992, p. 195).

In the post-metaphysical, modern society, where there is no external authority to arbitrate on decisions, society's problems can only be resolved through a the "post-conventional" type of identity which has the capacity for rational reflection and action. (Habermas, 1992, p. 188). The post-conventional consciousness is one in which an individual finally learns to question the validity of social roles and norms so that the actions of the symbolic world expand to include principles by which opposing views can be judged. Following Kohlberg, Habermas argues that the stages of moral development are the outcome of active learning. Identity is formed through socialisation with individuals acquiring their identity through successfully solving the problem of interacting with others. The extent to which this process develops depends on the degree to which students differentiate and integrate their views through communication.

Phenomenography documents the fragmentary nature of student identity in the modern university classroom. Säljö (1979), for example, identified five responses to the meaning of the word "learning". That these multiple approaches to student learning are adaptable is confirmed by Marton's insistence that students adopt different approaches to learning in response to their perceptions of the requirements of the learning situation. Habermas argues that the self develops its identity through being located in a plurality of meaning contexts, such as those reported by phenomenographic research, and through its relationships with others.

Boud (1985) found that autonomy as an approach to education rarely equated with people internalising or developing into autonomous beings. The authenticity of student learning is not the same as the "autodidaxy", which is a fusion of teaching and learning that occurs when adult learners teach themselves outside formal

institutions (Candy, 1991, p. 44). The goal instead is for students to take greater responsibility for their own learning and become more self-reliant in the classroom. The more institutionalised learning becomes, the more the two roles of teaching and learning progressively separate. Hence, gaining autonomy for students comes from an internalisation of the agencies for monitoring their own behaviour.

What has been described above as a surface approach to learning is an interaction with the lecturer about the conceptual artefacts of higher education. Students taking a surface approach try to find agreement with the teacher's world perspectives regarding the artefacts of education such as course design, teaching methods or assessment. Students who take a deep approach to learning tackle the process in a completely different way. They are not preoccupied with the requirement to answer questions later on but are asking questions now. Their primary objective is to negotiate the rules so that they can agree or disagree. To test whether this understanding is well founded it must be subject to authentic dialogue that includes all concerned in the classroom.

According to Habermas, the common goal of reaching an understanding involves the problem of interacting with others. The students encounter their learning identity through discussion with others, from which they can interpret their own reactions. For Habermas, an ethical understanding is developed through argumentation rather than agreement with a teacher's perception or contention. Habermas describes argumentation as the participants in communication adopting a hypothetical attitude, so that things and events, including socially accepted norms, are considered to be conditions that may or may not exist (Habermas, 1990, p. 159). In the process, validity becomes a matter for discussion rather than the event itself, so that discussants have to both participate and observe at the same time, in what Habermas considers to be the most advanced form of discourse.

For Habermas, discourse is an argumentative form of language that requires giving good reason to justify claims. In argumentation proponents and opponents engage in a competition with arguments in order to convince one another so that they can finally come to a consensus. They test the universality of the norm by submitting it to

all those effected by it for criticism. This is argumentation with a constructive purpose, not a strategic one intended to influence another person's actions (Habermas, 1990, p. 160). It is only through argumentation that students and teachers are in full participation in the classroom dialogue.

5.6 Moral Reasoning in Academic Technical Decisions

Students learn to adopt a deeper approach to learning through the increasing complexity in their interaction with the lecturer and their fellow students. This requires a procedural validity in which these claims can be defended but this defence does not depend on the content of statements, only on the commitment to provide reasons for their justification (Habermas, 1987c, p. 100). Habermas' discourse ethics assist us in understanding why it should be the case that once students become conscious of the desirability of a deep approach, they perceive it as an external impost to changing their orientation to learning. In Heidegger's terms, it enframes the learning into becoming another technique rather than an adjustment in how students interact with one another. What has been demonstrated in reconstructing the phenomenographic account of student learning in terms of Habermas' discourse ethic is that when phenomenographers argue that students need to strive to understand the teacher's conceptions of the world, they are describing an agreement that is fundamentally teacher-centred. In the 3-P model students undertake strategic action to have lecturers provide them with the answers they need to succeed in the course. This is a manipulation of the teacher for the students' ends, not for developing a shared understanding about the classroom and it does not advance the student's capacity for learning independently.

The distinction above also illustrates that in formal education a deep approach to learning develops from a freedom to act over the learning space. Autonomy is not the suppression of inclinations but is formed through undistorted communication (McCarthy, 1978, p. 328). Plainly, in an institutional setting an individual student is not totally free to act as he or she wishes. In the asymmetrical power relationship of the classroom, student-controlled pedagogy is only possible when the educator delegates control to the learner, allowing students to reverse the traditional roles and

exploit themselves as a resource for their own learning. Even if the educator grants almost total control to the learner, the vestiges of control remain that subtly influence the learner's choices and even the criteria used to make those choices (Candy, 1991. p. 18). Moreover, the more educators try to control the classroom the more they will determine the forms of learning that can occur.

Thus, to be morally just and provide students with the developmental opportunities that will serve them in their later professional and citizenship roles, the classroom needs to develop into an autonomy-supporting environment. Argumentation provides the critical standard by which we can test the discourse of higher education. Making decisions on the legitimacy of the use of technology in higher education requires a moral filter in order to be able to reject certain kinds of conceptions while still allowing a broad spectrum of possible ones. Habermas argues that in a world presided over by no criteria other than the individuals' own preferences, then only a post-conventional ego-identity could satisfy the demands of a socially integrated lifeworld. What is required in the course of progressive individualisation is a moral and existential self-reflection that takes up the perspective of the other. It is only when this also applies to the university setting that students can be said to be respected as individuals and not manipulated. Only then can they be prepared to deal with the system-influenced complications of late capitalist society.

An ethical decision seeks the best possible result for all concerned. For Habermas, this requires that everyone is allowed to speak and all interests are considered. In an institutional setting any member integrated in a communication community must also orientate themselves towards steering media that both individualise by tailoring choices to the individual and standardise because they only permit predetermined options (Habermas, 1992, p. 196). Following Feenberg (1995a), technology is one such steering medium. In Chapter 3 it was argued that technology consists of pre-determined norms that structure human actions through its design and use. In this regard technology behaves like the coordinating aspects of language described in Habermas' theory of communicative action. Technology that does not permit both participation and observation in argumentation only provides the student with an opportunity to skim across the surface of the material. Students who adopt a deep

approach, on the other hand, take a hypothetical stance to their validity claims in an attempt to come to an understanding about the material.

Habermas' discourse ethics demonstrate that both teacher and student need to ask whether they can accept the consequences of the learning validity claim presented by the use of technology. Clearly, technology is not appropriate for students who adopt a surface approach to learning, as they can do nothing other than accept the norms of the classroom. Students adopting a surface approach do not have an intention to reach a consensus with the lecturer about world perspectives. As they are unable to make informed decisions about their own learning, surface learners (that is, their being as a learner rather than just the approach they take) rely on distorted communicative processes based on the teacher's authority. In these circumstances institutional learning strategically manages the communicative opportunity by providing limited choice presented as opportunities in decision-making. A deeper approach is the only genuine form of learning as it is formed in a communicative discourse with the teacher. In particular, this requires the ability to engage in a discourse through dialogue as a learning mechanism that facilitates the autonomous learner. It is in these instances that it would be legitimate for learning to be mediated through technology.

In conclusion, this chapter has tried to determine whether different approaches to learning could be used to justify the educational choices embodied in educational technology. It was argued here that there are two commonly agreed norms for student learning in higher education. Of these the deep approach to learning is the only approach to learning appropriate for working with technology. In the complexity of the post-metaphysical classroom students cannot rely on the external authority of the lecturer's conception of the world. The ethical dimensions of the relations between students in the classroom lie within the performative structure of language involved in acts of reaching an understanding. Following Habermas, a performative attitude to a person comes from being increasingly aware of systematic aspects, including the choice to use technology. This is not the one-dimensional approach of the 3-P model described in Section 5.3, but a situation in which the students and teachers take turns adopting the role of participants and observers. Only

the incorporation of learning of this kind into educational technology can prevent further destructive colonisation of the academic lifeworld by technical codes that reduce opportunities for building a shared understanding about effective strategies for teaching and learning.

CHAPTER 6

COMMUNICATIVE APPROACHES TO CLASSROOM LEARNING

The situational analysis of higher education research undertaken in the previous chapter assists in building an understanding of the questions researchers ask about the processes of learning in the classroom. It also highlights a contradiction in the ambitions of phenomenography. Alongside its stated goal of identifying variations in approaches to learning is the desire to promote particular educative norms, preferring a deep approach to a surface approach to learning. It quickly becomes apparent that it is not possible to push this external agenda onto students as it breaks down the relationship needed for deep approaches to develop. When teachers adopt a strategic orientation to their students and attempt to force them to adopt a deeper approach to learning, students are more likely to respond by adopting a surface approach. That is, as students discern from the lecturer's actions that deep approaches to learning can be conceived of strategically as techniques, they adopt them in superficial approaches to their study. For example, when Ramsden, Beswick and Bowden (1986) attempted to teach study skills for a deep approach to learning to first-year undergraduate students the only discernible effect was an increased use of surface strategies when compared to the control group. As Ramsden (2003, p. 63) now accepts, it is necessary for students to learn to adopt a deep approach to learning but this is an approach that cannot be taught because it derives from the critical response of the student to what the teacher does.

In investigating the norms of student learning it was not my intention to argue that the shift to language analysis through phenomenography was a mistake for higher education research. In the course of higher education research the shift to language analysis by phenomenography was necessary for teaching to be perceived as a communicative inquiry into student understanding. It was needed to make the association between the student and the context for learning clear, and in the process

disconnect research from an exclusive focus on the administrative responsibility of selecting and retaining the students most likely to learn. While phenomenography was central to this re-alignment of research goals by researchers, it took language largely for granted, as if it were a medium without properties. Language was seen as simply giving names to things and semantic analysis remained at the level of the sentence, disregarding the active status of the students and their speech. For reasons of its incomplete conception of communication, phenomenography remains inconsistently at the surface of student learning. The consequence of reducing student learning to categories of description is that it overlooks any active acceptance or resistance by students towards the system of meaning. Not only does this fail to understand the nature of the relationship between language and meaning, it also denies students the possibility of choice or control over personal or social change.

A review of higher education research has been important for identifying the potential discrepancies between the aims higher education promotes for student learning and the underlying technical codes it relies upon in the technology it adopts for teaching. This chapter is the third critique of educational technology and it investigates how technology steers student interaction in higher education. If learning were just about information, we could simply tell students all they need to know, to paraphrase Mager (1968). That learning is about communication implies that teaching is not an alignment of perspectives into a simple linear model, but a decentring of student perspectives so that they can observe, participate and learn by taking the role of the other. Habermas' exploration of post-metaphysical thinking outlined in Section 5.5 demonstrates that in higher education an attempt is made to socialise students so that they control their own learning. Following this argument, the case was made in Chapter 5 that what is required to resolve the problems of learning in the modern classroom is a post-conventional type of student identity. It was further argued that there is a good ethical reason for valuing deep approaches to learning over surface approaches to learning. Modern universities largely provide pre-professional education that calls for graduates who are able to adapt to constant change through learning autonomously throughout their lives in order to manage the complexity of their professional roles. In a deep approach the students conform to

their own wishes or develop from them in an authentic rather than coercive way, as would be the case when a shallow ethical framework is imposed upon them.

This critique of the normative dimension of student learning suggested that, while certain kinds of teaching environments lead to different kinds of learning responses by students, they need to be judged by the quality of the participation of the students, described by Habermas in his discourse principle (D). Only students who can take alternative perspectives through argumentation are able to adopt a deep approach to learning. As with learning, there is a range of ways of viewing teaching (Kember & Gow, 1994). Each approach to teaching implies an underlying philosophical orientation inherent in the relationship between teachers and students (for three underlying theories of teaching see Biggs, 1989; or Ramsden, 2003). The phenomenographic view is that teaching consists of trying to modify or replace the student's descriptions of an experience that do not align with the teacher's (Marton, 1981, p. 183). Teaching from this perspective is the presentation of the range of variation in the conceptions of the world so that students have multiple representations with which they can compare their own ways of describing the subject area (Marton & Booth, 1997).

In this chapter I will show that a reliance on phenomenography for educational justification has led to one of the more restricted models of teaching with technology in which teaching is conceived of as "conversation*"* in a limited sense of the term. Further, that a potentially much richer model emerges if a communicative approach to educational social interaction is adopted, to which Habermas' term "discourse" might be attached. This chapter investigates how we can judge which approaches to teaching, and the learning environments they embrace, can steer students towards adopting deeper approaches to learning. Firstly I will outline a body of ideas concerning the situated nature of learning that has influenced teaching with technology through the concept of cognitive apprenticeship (Section 6.1). It is this concept that Diana Laurillard (2002) rejected when she developed her model of teaching as mediating learning (Section 6.2). Laurillard, however, provides very little detail on the theoretical premises of her proposition and therefore, to understand this

theory, it is necessary to turn to Pask's conversation theory on which it is based (Section 6.4).

Gordon Pask (1975a; 1976b) was a researcher into computer-based learning who produced a mechanistic model of a conversation domain designed to control the learning process through his experimentation with learning machines. The resulting conversational model of educational technology, outlined in Section 6.3, replaces teachers with technology as long as the technology can demonstrate that it achieves the same result as the teacher. However, Lucy Suchman's (1987) study of technological interaction shows that a limited conception of interaction, such as that found in conversation theory, will not lead to building an understanding (Section 6.5). Given the evidence for the need for a richer model of communication as a model of teaching, in Section 6.6 I reconstruct the theory of teaching as conversation through Habermas' theory of moral discourse. That is, I argue that a moral perspective of teachers' use of technology needs to be designed in such a way that it embodies recognition that learning is a result of socially situated communicative interaction. It is the interaction between teachers and students that steers students towards experiencing the classroom in a way that encourages them to adopt a deep approach to learning.

6.1 The Situated Nature of Learning

Phenomenographic research described the surface dimensions of learning but largely ignores the contextual aspects of education (Richardson, 1999, p. 58). An alternative explanation of how students learn comes from investigations into the situated nature of learning. Situated learning aims to address the recurrent problem of transferring theory to practice. It can be grouped into two main schools of thought depending on whether the emphasis is on the individual student or on students' intersubjective interaction. Barab and Duffy (2000) call these two different types of situated learning, psychological and anthropological. The psychological view was a response to a perceived failure in schooling to focus on the individual situatedness of meaning. The anthropological view developed from investigating learning in everyday practice. Ethnographic studies discovered that learning is qualitatively different away

from academic situations (Lave, 1988, 1993). Barab and Duffy (2000) suggest these two different views lead to two qualitatively different student experiences, which they call “practice fields”, after Senge (1994), and “communities of practice” after Lave and Wenger, (1991). Practice fields involve the construction of a substitute learning environment in which students can learn the concepts of practice before encountering the professional world. Communities of practice gradually introduce students to the cultural activities of the communities in their original, localised setting.

There have been numerous attempts to introduce the concepts of situated learning into educational practice (Bereiter & Scardamalia, 1993; A. L. Brown & Campione, 1994; Lipman, 1988; Roth, 1998). The notion of practice fields, in particular, has had a major impact on the development of educational technology in school education, primarily under the influence of the work by J. S. Brown, Collins and Duguid (1989). Communities of practice have increasingly become a justification for the use of technology in university teaching (for examples see Naidu, 2003). However, before moving to a major critique of the value of this view of educational technology for higher education undertaken by Laurillard (2002), it is first necessary to explicate more fully the three main processes identified with situated learning. These are the individual’s response to the situation that results in the internalisation of psychological concepts in situated cognition (Section 6.1.1), the structures that support a cognitive apprenticeship (Section 6.1.2) and the acculturation into a knowledge community (Section 6.1.3).

6.1.1 Situated Cognition

Situated cognition is a general theory of knowledge acquisition based on the individual’s response to the social and cultural components of a local setting. Whereas cognitive models of learning are concerned with the purely cognitive actions of disconnected individuals acquiring symbolic mental representations, and cognitive activity is manipulating these symbols, situated learning describes a move from individual thinking to the social nature of cognition (Resnick, 1987). The social view characterises knowledge as situated in practice, where theory and action are

reciprocal and interwoven. This takes the perspective of ideas and concepts being analogous to tools for thinking, with learning building an increasingly rich and implicit understanding of the world in which students use these thinking tools (Bereiter, 2002, p. 295).

The idea of situated cognition is largely informed by the social psychology developed by Vygotsky (1978). For Vygotsky, the mediation of action through artefacts has an important role in the development of the mind. He describes this as a process of being mediated through the use of tools that are comparable to Dewey's "storehouse of ideas" or Popper's "knowledge objects", as outlined in Chapter 2. The tools Vygotsky emphasises are called "sign systems", examples of which would be language, writing and numbers (Vygotsky, 1978, p. 19). Vygotsky saw this mediation through tools as creating a tripartite relationship of agent, respondent and artefact, represented schematically in Figure 6.1 below. In Figure 6.1 it can be seen that, where an artefact assists in the completion of a goal, such as to memorise some information, it functions as an intermediate action that lies indirectly between agent and its respondent (Vygotsky, 1978, p. 39).

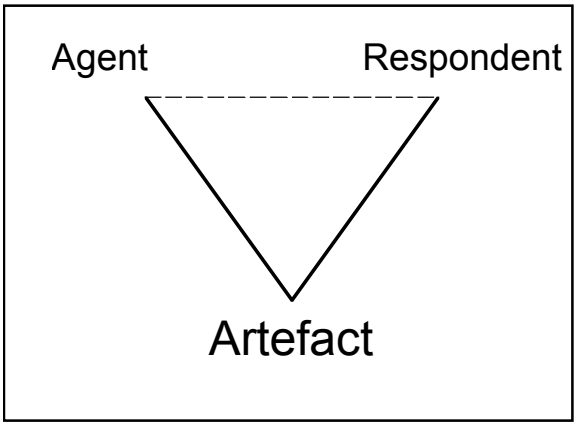

Figure 6.1. Mediated interactions (modified from Vygotsky, 1978, p. 40).

Vygotsky's scheme is comparable to Latour's "program of action" outlined in Chapter 3.2.1.1, where the agent also engages an artefact to attain their objective rather than addressing the objective directly. Vygotsky agrees that the invention and use of signs as a means of solving a given psychological problem (like remembering, comparing or choosing) corresponds to the invention and use of physical tools

(Vygotsky, 1978, p. 52). The basis for the analogy is the mediating function in both signs and tools, although Vygotsky argues that their difference lies in the way each is orientated to human behaviour. Tools, according to Vygotsky are externally orientated, leading to a change in physical objects. Signs are internally orientated, leading to the change of subjects.

The internal orientation of signs is perhaps most clearly represented in Vygotsky's experiments on memory which revealed that through the use of some artefacts (such as writing or numbers), memory could be taken beyond the natural limits of a subject's capabilities, as defined by their unassisted ability. An example would be the use of a mnemonic to recall a difficult phrase. The mnemonic lies between the agent and the memory of a difficult phrase so that the memory and the mnemonic become inextricably linked. In Vygotsky's terms, the artefact becomes an objectification of the goal acting as a recurrent referent in a dynamic, back and forth way between past experience (mnemonic and memory) and present representations (agent and mnemonic). This is a very simple example of what Bereiter (2002, p.69) described in Chapter 2 as knowledge work to add value to conceptual artefacts.

6.1.2 Cognitive Apprenticeship

Vygotsky maintains that the sign-using activity outlined above is the basis of all psychological evolution (Vygotsky, 1978, p. 46). Following Vygotsky's psychology the theory of situated cognition suggests that situations co-produce knowledge so that authentic learning only ever takes place if it is embedded in an appropriate social and physical context. The translation of these principles to learning in formal situations, like higher education, typically occurs within an artificial environment that has been called a "cognitive apprenticeship" (Collins, Brown, & Newman, 1989). Brown, Collins and Duguid (1989) argued that traditionally school-based learning did not have the characteristics of an authentic activity that assisted newcomers in a field moving from the margins of the knowledge base to its centre. They offered their model of cognitive apprenticeship as a method of achieving this authenticity in the classroom. A cognitive apprenticeship can be exploited by teachers by "scaffolding"

the students' cognitive activities to gradually acculturate them into authentic practices through social interaction similar to craft apprenticeship.

Bereiter (2002) argues that a problem for situated learning is identifying the "authentic" conceptual artefacts that students need to work with in order to develop the knowledge of an expert. An example of an approach to cognitive apprenticeship common in higher education is problem-based learning (see Boud & Feletti, 1991 for examples). Problem-based learning is a set of principles that integrates a series of open-ended inquiries to create a learning environment that permits students to explore questions from their own experience (Barrows, 1996). It relies on the formulation of questions from the professional setting that will promote student thinking. Through the process of working on these questions, students are not expected to acquire a predetermined series of right answers. Instead, they are active participants in understanding their own situations and perceiving how they learn, and how they see themselves as future professionals. This typically takes the form of a learning cycle (for example, Figure 6.2) in which students analyse a problem scenario to uncover its underlying issues, identify and undertake appropriate learning activities before revisiting the issues in a final feedback session.

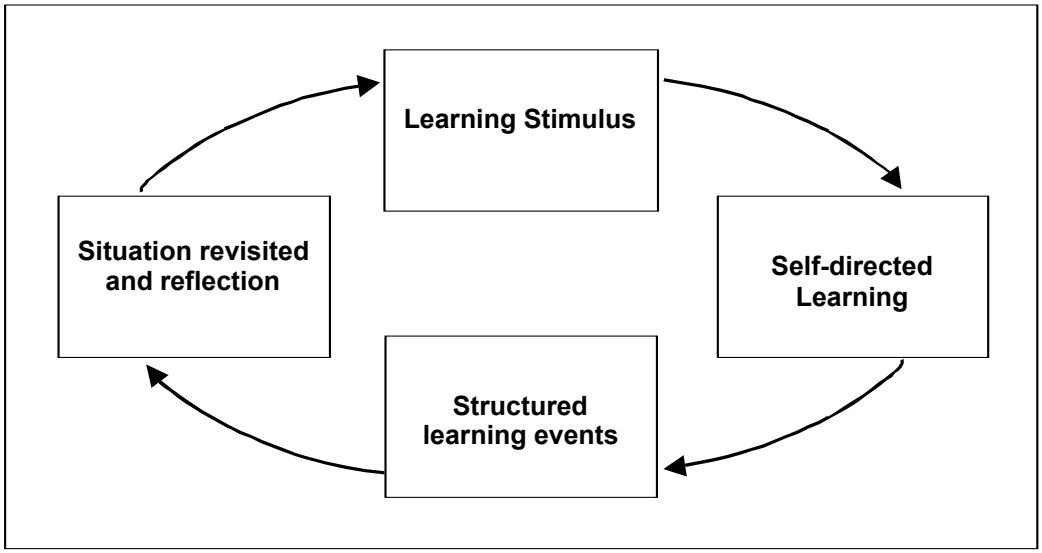

Figure 6.2. The PBL cycle in which students analyse a problem to uncover its underlying issues which are revisited in the feedback session.

The teaching in problem-based learning is structured around "real-world" problems, which are carefully crafted abstractions of authentic learning situations (Mauffette, Kandlbinder, & Soucisse, 2004). Problems are intended to substitute for the real world in supporting student learning and are the intermediate step between concepts and future authentic situations.

6.1.3 Communities of Practice

In the final stage of the problem-based learning cycle described in Figure 6.2 above, experienced tutors have the role of unifying the background culture of the knowledge domain with the "real-world" experiences of the students. The tutor's role is to act as a representative of the community of practitioners that the students wish to join. Lave and Wenger (1991) have called the kinds of learning actions that are recognised as legitimate by the rest of a community but are not yet its core activities, "legitimate peripheral participation" (Lave & Wenger, 1991, p. 35). Legitimate participation provides an entry point for those wishing to become fully fledged practitioners in the community. Legitimacy is provided by the community's agreement that these are activities that newcomers should be engaged in, even though experienced practitioners may never actually perform them. For example, apprentices may be expected to prepare the final products for dispatch to their clients even though they never participate in this task once they are fully qualified. Lave and Wenger (1991) argue that this is a similar concept to the interaction in Vygotsky's "zone of proximal development". This zone is the set of activities that cannot be accomplished alone that leads to the transition of knowledge from the social to the individual (Vygotsky, 1978, p. 86). The role of others in learning is critical as there is a need for support and assistance of peers to achieve mastery. By this, Vygotsky is indicating the critical role social interaction plays in learning as the potential ability of a learner is greater than his or her actual ability when facilitated by someone with greater expertise.

6.2 Teaching as Mediating Learning

The concept that distinguishes the anthropological, communities of practice view from psychological, practice fields view of situated learning is the notion of whether the inexperienced practitioner's move from the edge of understanding towards the centre requires observing the accepted practices within a community, or whether the construction of an artificial learning environment that is an approximation of the "real-world" is sufficient to provide a transitional point in student learning. Laurillard, (2002) presents a comprehensive critique of both forms of situated learning as the basis for educational technology from the point of view that there is little observable teaching behind the apprenticeship model of learning. Laurillard agrees that teaching must emulate the success of everyday learning by contextualising knowledge in real-world activity, especially for the kind of pre-professional training that makes up the majority of university teaching. However, Laurillard conceives of academic learning in terms of phenomenographic descriptions of the world. These are examples of Popper's conceptual artefacts that are learnt in a formal education. As academic teaching is dealing with conceptual artefacts, it has no alternative other than to create an artificial environment that promotes a mediated form of learning. In Chapter 2 academic knowledge was described as having, by its very nature, a second-order character that relies heavily on symbolic representation as the medium through which academic knowledge is known. Laurillard argues that communities of practice have little place in formal learning situations because students are learning to handle both the representation system of academic knowledge as well as the ideas they represent.

Like many critics of situated learning, Laurillard addresses herself to its principal concept, situated cognition, outlined in Section 6.1.1 above. She argues that situated cognition is not wide-ranging enough to account for the development of academic learning in universities (Laurillard, 2002, p. 16). Laurillard accepts that many of the conditions that gave rise to the demand of situated cognition in schools, such as the widely recognised failure by students to apply theory to practice, also encourage an interest in the idea of situated learning in higher education. However, Laurillard sees a paradox for academic knowledge created by its emphasis on the situated nature of

knowledge. Academic knowledge, according to Laurillard, is abstracted from the physical and social context precisely so that it can be transferred to different situations (Laurillard, 2002, p. 16). The critical distinction drawn by Laurillard is between teaching abstractions and enabling students to learn abstractions from multiple contexts. Laurillard accepts that situated learning is a powerful metaphor for student learning in higher education, demonstrating how the analysis of a natural environment's influence on learning can be replicated in an academic environment (Laurillard, 2002, p. 24). Laurillard's alternative to situated cognition is to nominate the conversation between lecturers and students as the framework at the centre of higher education.

6.2.1 Laurillard's Conversational Model of Educational Technology

For Laurillard, the processing of information needs to be central to academic learning. Her suggestion is to describe teaching and learning as a variation of the Socratic dialogue, although she recognises that this can be overly authoritarian for an academic conversation. To overcome these authoritarian tendencies, Laurillard proposes a combination of Pask's Conversation Theory (Pask, 1976a), which describes the nature of technological interactions, with the insights of phenomenographic research into student learning (outlined in Chapter 5). Rather than the linear flow of information suggested in Biggs' "3P model", the key to the process for Laurillard is reflection-on-action (Schön, 1983), where interaction takes the form of an experiential learning cycle in a teacher-constructed environment.

The "conversational framework", presented in Figure 6.3 below, describes Laurillard's (1999) view of the structure of a learning conversation between teacher and learner, with the teacher acting as external agent, mediating what is to be learnt. Laurillard suggests that a learning process complex enough to achieve the aims of academic learning must involve at least two participants, rather than the forms of self-teaching through internal reflection popular in adult education (Candy, 1991). The teaching and learning dialogue operates interactively on two levels, practice and discussion. Connecting these two levels are activities of adaptation and reflection. Students reflect on their experience, in dialogue with the teacher, so that they can

articulate the theoretical representation of that particular action, in order to generalise and thereby enhance their future actions. For the students' learning to go beyond that external encounter, the same structure must be mirrored as an internal conversation for the individual.

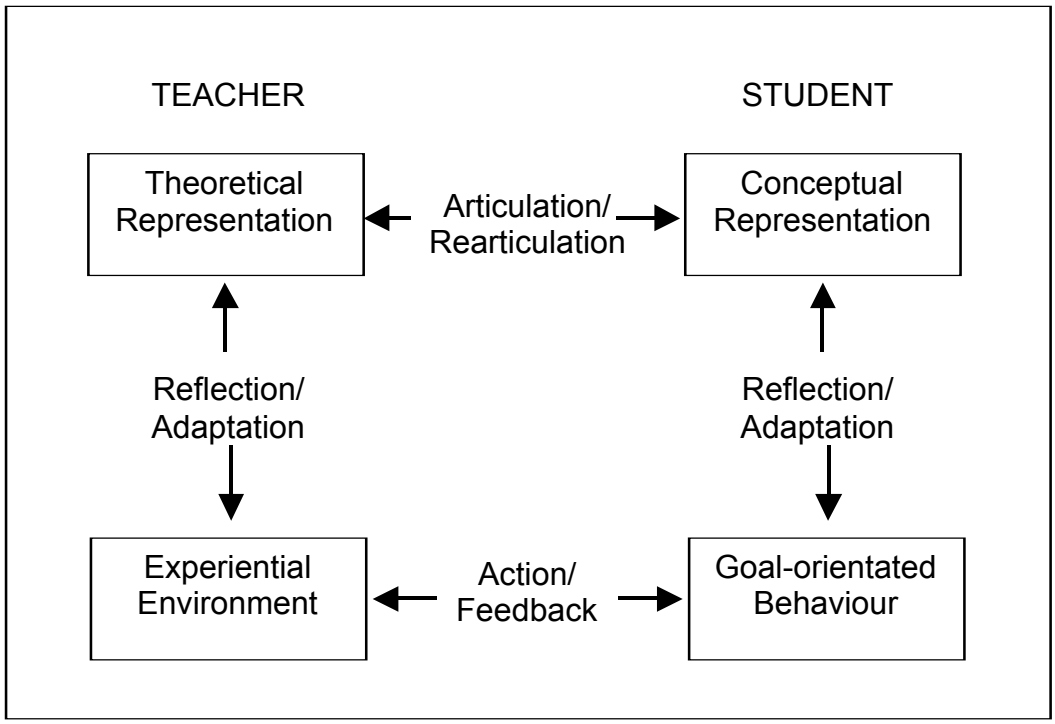

Figure 6.3. The conversational framework for individuals (Source: Laurillard, 1999).

In Laurillard's (1999) account, a second experiential cycle operates in tandem with the first cycle. The goal of the second cycle is to achieve congruence between the teacher and student, so that each may achieve a new or deeper understanding. For the conversational form to result in learning it must also take place within the individual, as a conversation between the externally situated individual and the internally persistent individual, which is common to all the experienced situations. If congruence is lacking, each participant can use the representations at the discursive level to have a meta-level discussion to provide alternative accounts of their theory.

From this brief account it can be seen that Laurillard subscribes to the phenomenographic view of language outlined in Chapter 5. Her framework represents the interaction that takes place between personal and public knowledge expressed in formal, public language or personal but private experience. This begs a

number of questions regarding Laurillard's views of authentic experience. Firstly, as Harley (1996) argues in his critique of Laurillard, she fails to recognise that even a classroom is a rich source of situating information for the learner. It provides both primary experience where the individual perceives the world directly, as well as mediated experience that has been co-produced by others communicating their interpretation of events outside of the classroom. Laurillard (2002, p. 87) recognises that the conversation framework would not be applicable to non-academic situations, such as learning through experience or training programs that focus on skills alone, because these only occur at the lower, primary level of experiential activity. Further, language, to a certain extent, provides its own context, because every utterance is multifunctional and gives information about the speaker's attitudes and feelings, and the relationship to the hearer, as well as being seen as either true or false. Additionally, while Laurillard adopts Vygotsky's concept of mediated learning, she does not go as far as applying his concept of cognitive tools to her notion of conceptions of the world. Nor does she recognise the social dimension of the zone of proximal development.

Instead, Laurillard maintains a materialist view of technology stemming from her reliance on phenomenographic research and its lack of recognition of social interaction. What Laurillard appears not to recognise is that to achieve authenticity (that is, to become "real-world") this artificial environment relies on both psychological and social modes of thinking. Reflection that is critical in a learning sense of reviewing and testing theories requires reflection to be social and shared, not just internal. Only at the psychological level is situated learning based on the notion of individualised situated cognition. How primary and secondary experience are linked in Laurillard's model and the nature of interaction remain just brief sketches. Other than the particulars outlined above, Laurillard's conversation framework suffers from a lack of detail about its founding principles. In order to determine the nature and limitations of the notion of conversation in Laurillard's model it is therefore necessary to examine the source of her conversational framework, namely Pask's (1975a) conversation theory.

6.3 Pask's Conversation Theory

Gordon Pask's (1975b; 1976b) conversation theory is centred on the representation of elements of a conversation in the form of a *conversation domain*[1]. He describes this as a complex data structure built up by a subject matter expert to represent the relationships between the basic concepts (*topics*) in the subject matter. Each *topic* can be described through its association to a rule or principle that constructs an idea (*concept*) that can be combined into an algorithm, which Pask calls a *procedure*. In order to run the algorithm requires an interpreter (*medium*) that can enact these *procedures*. Two examples of *media* provided by Pask include the human brain and the computer (Pask, 1978, p. 39). In this way Pask suggests it is possible to substitute one *medium* for another, as long as the *medium* can accurately interpret the *procedure*.

Pask calls the *medium* and *procedures* set in motion by a *processor* an *individual*. Individuals come in two types: the mechanical entity (*M-Individual*), which merely hosts the disembodied, psychological entity (*P-Individual*) (Pask, 1975a, p. 73). The self-replicating *P-Individual* is independent of the carrier medium in which it was realised and may "inhabit" a number of physical processors. It is testing the constructed ideas (*concepts*) in the *procedures* that Pask calls *understanding*. That is, *understanding* does not come from the physical transfer among *M-Individuals*, but rather from the *concepts* that have been committed to *memory* where they can be reproduced for further *procedures*. For Pask, an *understanding* represents a multilevel agreement between *individuals* regarding the *topic*. This would entail at the very least one participant in the process matching the explanation of the *topic* with the other participant, while acknowledging the other's explanation (Pask, 1978, p. 41). Pask suggests that these explanations do not have to be an identical replication but have a *coherence truth value*, so that they would be recognised by the other participant as equivalent to their *understanding*. Pask's conversation, then, is

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[1] Pask uses a highly specialised terminology to explain his theory, suggesting it can take up to five separate languages to comprehend the findings of his research. As it can be difficult to follow the meaning behind this terminology, specialised terms are italicised to assist in recognition and cross-referencing.

primarily directed towards the reproduction of the model that represents the *conversation domain*. Pask argues that the *conversation* can take place between two separate participants or a single participant holding an internal, tutorial dialogue with each *conversational domain* representing a thesis promoted by an *individual*.

6.3.1 Controlling the Learning Process

Pask conceived of teaching as control over a learning process. In order to construct the subsections of a task, it is necessary for the controller to have a model of how the learner solves problems (Pask, 1975a, p. 40). Pask suggests that subject matter experts or teachers are able to translate the entire *conversation domain* into semantic representations. Pask calls these model derivations designed to elicit understanding between participants an *entailment mesh* (Pask, 1978, p. 42). This created the minimal form of the *conversation skeleton* of two levels represented by Pask (1975a, pp. 184-185) as depicted in Figure 6.4 below. The learning *conversation* takes place across the *interface* that separates the student and the teacher, and requires a formalised language, which can be written, spoken, graphic or mechanical, as long as it is rich enough to accommodate fairly sophisticated transactions that go beyond simple yes or no responses (Pask, 1975a, p. 72).

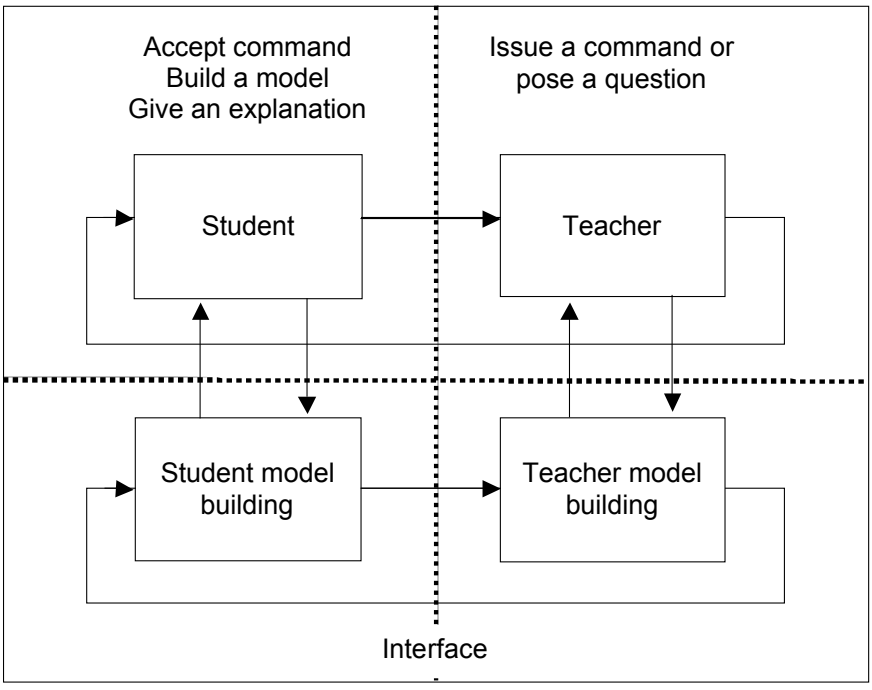

Figure 6.4. The conversation skeleton (adapted from Pask, 1975a).

The result of implementing Pask's conversation theory is a teaching environment that allows students to discover relations within the subject matter that correspond to the *entailment mesh* by accepting the teacher's commands, building a model through an internalised conversation with themselves and giving an explanation back to the teacher. The students' explorations consist of testing their own analogies to find the exact structures of knowledge that should be acquired to construct a corresponding *entailment structure*, which is a simplified, teachable version of the original expert's view. In other words, students are attempting to discover the complex model of a field of study recognisable to an expert in the area (who in universities would also normally be the teacher). To determine whether learning has occurred requires a representation of knowledge and a method of detecting understanding (Pask, 1975b, p. 292). This involves both a *mesh* at the level of the model and also one at the level of the explanation of how they arrived at that model (Pask, 1975b, p. 294). In this way Pask's conversation is like a Turing test (Turing, 1950) in which an expert should recognise the student's description of their model of a field of study as equivalent to their own. The student can be said to have understood only if it was not possible to determine which *understanding* was reached by which process, the teacher's or learner's *procedure* (Pask, 1975b, p. 296).

6.4 Plans and Situated Actions

Pask's conversation theory has largely been discredited because, while it is logically consistent, without working examples it has little empirical support. Laurillard acknowledges this by admitting that she has had to move away from some of her earlier, strong claims for educational technology because her follow-up studies found that the examples of technology that relied on a cognitive science framework, like intelligent tutoring systems, failed in practice (Laurillard, 2002, p. 143). The social world has turned out to be overwhelmingly more complex than Pask's experimental design suggests and consequently impossible to ignore. What Pask was able to demonstrate through his experiments was that students could be taught to interact with machines about academic topics using a control language. However, to do so he needed to consider students to be surface learners who could be instructed on how to act in the micro-world he created. By doing so he legitimises a form of educational

oppression to create an early but successful type of authoring language supported by the mechanical theories dominant in educational technology at the time. The subject matter expert is placed in a privileged situation, which, as noted in Chapter 5, is not conducive to students adopting a deep approach to learning.

Many of the principles set out by Pask remain alive in the experimental field of artificial intelligence. This is a field of research whose limits have been assessed by Hubert Dreyfus (1979; 1992). Dreyfus argues that there is no empirical evidence that the mind processes information by working through discrete steps and therefore it is the disembodiment of knowledge that sets the limits of artificial intelligence. Were intelligent behaviour as orderly as researchers like Pask supposed, then Dreyfus agrees it could be formalised as rules that are reproducible by machines. However, Dreyfus argues that the lack of progress in artificial intelligence is a testament to how hard it is to determine these rules. Dreyfus observes that humans must always fall back on everyday practices and appeal to their own concrete representations so that the use of computers simply augments rather than replaces human intelligence. Artificial intelligence has had to come to terms with the problems that come from an absence of the intersubjective and subjective domains of communicative interactions, or in Pask's terms, the relationship between the *M-individual* and the *P-individual*. As discussions on embodiment in learning demonstrate, it remains unclear to what extent one can exist without the other (McWilliam, 1996; O'Loughlin, 1998).

There are those in the artificial intelligence and cognitive science community who deny the centrality of embodiment to human identity, believing that symbolic interaction is sufficient for intelligence (cf., Newell & Simon, 1997). Criticism of Dreyfus' position largely stems from his lack of scientific expertise and the limited technical base on which he draws his conclusions (J. McCarthy, 1996). By focussing on one area of artificial intelligence, Dreyfus is said to provide an inadequate account of the accomplishments of the field (Koschmann, 1996). Further, it is argued that he concentrates on symbolic representation which is only one position among a range of approaches to artificial intelligence (see for example, Haugeland, 1997). While it is commonly agreed that artificial intelligence research has not lived up to its early promise (see for example, Gams, Paprzycki, & Wu, 1997), as Dreyfus has so little to

say about what has been achieved, his critics argue that he does not accurately represent the progressive nature of the research program (Strom & Darden, 1996).

However, Dreyfus' arguments against artificial intelligence are supported by the empirical explanation of the limited nature of the communication between humans and machines by Lucy Suchman (1987). Suchman undertook one of the first anthropological studies of human interaction with complex machines to examine the problem of shared understanding and interpreting the actions of others. The purpose of her investigation of a photocopier which was designed to provide a simple, feature-rich environment for casual photocopier operators, was to determine why its users found it to be complex and unfriendly to use. Suchman's study describes the operator's interactions with an expert help system on a video display unit built into a large and sophisticated photocopier as a solution to the machine's complexity (Suchman, 1987, p. 98). Suchman found that there is always a short-term loss of productivity with the introduction of any new machine, associated with the effort involved in making sense of a new technology. This is a result of the learning to communicate being delegated to the human operator while the machine performs the relatively straightforward action of following commands.

While conveying a less complex procedural domain than probability theory used by Pask in his experiments, the expert system implemented in the photocopier studied by Suchman used many of the same communicative structures as those described in Pask's conversation theory. Information was presented in a sequential order so that each instruction was activated by the successful completion of the previous step. To start the interaction the users responded to a series of questions about the state of the original documents and their desired copies. From the selection made on the display unit the purposes of the copying were identified and a plan, such as double-sided copying, was ascribed to the operator (Suchman, 1987, p. 100). These plans were then presented to the operator in a sequence of procedural instructions. Conforming to the instructions was expected to change the state of the machine in predictable ways with the completion of an action generating a move to the next display. Suchman argues that it is linking the presentation of certain instructions to different

machine states that provides the appearance of the machine responding to the operator's actions (Suchman, 1987, p. 122).

Suchman found that this strategy could lead to successful completion of the desired operations (Suchman, 1987, p. 125). However, confirming Vygotsky's findings on tool use, Suchman found that instructions relied on their ability to attach descriptions to concrete objects and actions. From that fixed point they contained both future and retrospective accounts of what occurred, describing both a course of action and a descriptive account of what actions had been completed (Suchman, 1987, p. 102). Instructions rest on the premise that if they are followed correctly, the procedure will produce a predictable result. Plans work because instructions are seen as authoritative, with any trouble with the instructions coming from failures in their execution. Suchman describes the complexity of situated action as lying in the users' expectations which, due to the fixed direction of communication, are unavailable to the machine. As the system cannot determine the meaning of the current situation, the assumptions behind the system were about proceeding with the current plan, not about building an understanding of when to abandon or repair that plan (Suchman, 1987, p. 133).

6.5 The Limits of Conversation Theory

In describing the resources drawn upon to make sense of situated actions with complex machines, Suchman documents the tremendous asymmetry between human and machine interaction. Whatever the outcome of the debate on artificial intelligence, Suchman shows that understanding depends on a common, shared background that cannot be fully determined prior to an interaction. As Popper demonstrated (see Section 2.3), understanding is not merely pattern recognition and reproduction but is only verified through the use of conceptual artefacts. For example, theory is only determined to be understood by the problems that it solves (Popper & Eccles, 1977, p. 461). Human communication draws on a rich set of resources to interpret the historical origins of qualities and to project imaginative possibilities. This highlights the difficulty of having a machine step in as a substitute for a human communicator. Conversation models, like those advocated by Pask and

Laurillard, represent a weak form of artificial intelligence whereby machines can be designed to appear to achieve the same effects as human cognition without the machine needing to develop any meaningful understanding. All that is required is a codification of the responses to the situation into simplified strategic actions. Choices are then restricted to a list of options which may or may not coincide with the operators' wishes. When actions progress as planned, this provides the surface appearance of intelligence. When communication with machines break down it reveals the limits of this approach and the richness of human interaction.

Suchman demonstrates that intelligence is contingent on a situated understanding that cannot be separated out into purely conceptual components where the body is purely a platform for the mind, as Pask suggested. Like Vygotsky, Suchman argues that a common focus on the task at hand is necessary for successful communication of instructions (Suchman, 1987, p. 105). The situation of action takes the full range of resources that the actor has available to convey the significance of his, her or its actions and to interpret the actions of others. Computers work with isolated facts and it is human interpretation that gives those facts significance. In contrast, Pask's conversation theory was an early version of an expert system whose expertise consisted of a body of propositions and the rules for their use. Its concept of learning involves a comparison of expert models, making it an attractive framework for Laurillard who wants a mechanism for developing a formal language that could be used to control students' learning of "second-order experiences" (Laurillard, 2002, p. 21). Once the conceptual map of the subject matter and a procedure for how it is learnt is available, Pask argued that it does not matter in which *medium* the *procedure* is implemented. The *conversation domain* can be used for curriculum design by altering the phasing of the programs to suit the different student learning styles.

In the process of developing the idealised language that represents the expert's knowledge, it was necessary for Pask to severely limit the area of analysis to the transaction between learner and machine. Pask readily admits that this is a decontextualised conversation that is removed from the social practice and its institutions, which Suchman has demonstrated is so influential in constructing a

meaningful understanding. Pask's theoretical language (italicised in the above description) is his way of reporting and explaining his experimental observations of students becoming skilled in the use of his computerised system. Pask describes the dependent variable in conversation theory as the *strict conversation* (Pask, 1976b, p. 4), or, in other words, the computer language used to complete a learning task. Pask was, in the first instance, involved in the task of constructing his computer system and operating language and set out to prove that students could adapt to his early teaching machines. What he demonstrated was that in creating pseudo-intelligence it is always much easier to have people to act like machines than machines to act like people.

Laurillard's great insight was that Pask's conversation theory might provide the underlying learning theory missing from phenomenographic research. However, by relying on Pask's theories, Laurillard retained a mechanistic conversation of transactions between student and machine rather than communication directed towards reaching an understanding. The number of italicised words in the above description can be used to highlight one of the primary difficulties in Pask's conversation theory, namely, the restricted vocabulary that students and lecturers need to adopt forms the basis for learning. Whereas normally the term conversation alludes to a relatively freewheeling and undirected interchange, from the discussion of Pask's conversation theory in Section 6.3 it can be seen that Laurillard made the error of locating academic teaching in the objective production of approved descriptions of the world rather than in the interactive processes of student learning.

From my earlier discussion of Habermas' levels of interaction (see Chapter 5.6) it can be seen that Pask methodologically constrained students and lecturers to the level of pre-conventional strategic action. Pask wanted his research subjects to accept his interpretation of the model of the content, and the constraints of his limited form of interaction were not able to provide the conditions to build an unforced understanding. This analytical proposition is linguistic in nature and unsurprisingly, given Pask was committed to empiricism and the mechanistic cybernetics of information-processing, firmly based in the ideological foundations of classical behavioural psychologists. While this may be suitable for the control of computer

systems, due to the severe restrictions they place on human choices, the limited conception of action in mechanistic theories have not, on the whole, been successful in accounting for human behaviour (Bernstein, 1971). Following the analysis of student learning in Chapter 5, it can be concluded that relying on Pask's conversation theory would resign students to adopting a surface approach to learning that is not suitable for deciding to learn with technology, however useful the theory may have been as a stepping stone in the evolution of models of artificial intelligence.

6.6 Communication as a Model of Teaching

Working within the phenomenographic tradition, Laurillard conceives of academic learning as being a particular way of looking at the world that needs to be distinguished from direct experience. Laurillard represents academic learning as an experience of our experience of the world. The purpose of an academic subject, from Laurillard's perspective, is for students to go beyond their primary experience, to reflect upon it, and change the way they describe their experiences of the world (Laurillard, 2002, p. 22). Academic knowledge is situated in a logically distinct context that Pask called the *p-individual,* or what Popper would call World 3. Laurillard conceives of direct experiential knowledge as the wrong kind of knowledge for academic learning. It only applies to specific contexts and cannot be transferred to other situations. Although Laurillard acknowledges that there are authoritarian tendencies in this position, by keeping theory distinctly separate from practice, her conversation framework does not have the theoretical resources to counter it.

Laurillard's surface approach to Vygotsky's theories allows Habermas' own characterisation of the relation between theory and practice to be more accurately illustrated. Habermas wants to avoid the separation of theory from practice because of the danger of conservatism. Habermas argues that total unity or total separation between theory and practice is unrealistic. Habermas would agree with Laurillard that the critical power lies in the universal, but would argue that the universal needs to be reinterpreted by the situated participants into the particular. For Habermas, there needs to be a conversation between theory and practice, not within theory

alone. Interpretations can only be determined through participation in which theory crosses the gap to situated, local concerns. Habermas' theory plainly has practical intentions, but it would be inappropriate for theory alone to direct, say, political actions as it does not have specific strategies or solutions to problems in their particularity (Habermas, 1973, p. 3-4). Further, Habermas argues that from a moral point of view theory can never tell participants what risks they should be willing to take in engaging in political action. This, for Habermas, defines the limits to all theory, not just in politics. Only the participants themselves can assess the consequences of decision, particularly the personal consequences, and decide what are appropriate goals (Habermas, 1973, p. 40).

While Habermas may agree with Laurillard that theory cannot be fully unified with practice, he would also argue that its intention is to transform consciousness which the actors themselves have to translate into change. Pedagogical practice is more than a restricted conversation about the various ways to describe the world. It involves overcoming systematically distorted communication through both its identification (using the tool of the ideal speech situation) and through active participation in discourse. In other words, morally justified actions require theoretical innovation and the adoption of actual courses of social actions and practices. Once lecturers are aware of how speech has been distorted systematically, they are able to defend the boundaries of the lifeworld from colonisation because they are able to encourage the students to adopt a personal relationship to the claims and positions inherent in the abstractions of theory. For instance, medical theory can tell a patient what alternative treatments are available for treating a tumour, but it cannot tell them which of the risks of the different treatments they should prefer. It is up to each individual patient to determine which of the side-effects of a treatment would be acceptable in their circumstances. So that, a musician may decide not to risk his or her hearing while a painter might favour his or her vision.

Laurillard's critique of situated learning turns Vygotsky on his head, arguing that it is lecturers, not artefacts who mediate. She places the lecturer in-between the student learning and the products of learning, what she calls "conceptions of the world". This has the effect of turning actors into objects in the hope of being able to control them

through strategic actions. Habermas shows that moral human interaction is concerned with coordination of actions, not strategic control. Following Habermas, it is not possible to entirely separate primary from secondary experience. Technology already has embedded in it the ideas and values of teaching and learning which in Chapter 3 was described as a combination of World 1 and World 3 objects that result in specific technical codes. While it is argued by radical constructivists that humans have never had unmediated experiences (Glasersfled, 1995), in modern western societies experiences mediated through World 3 objects are increasingly more familiar than primary ones. For example, a student both watches a computer screen and the images represented on that screen, or reads words in a text and looks at a piece of paper at the same time. In each of these examples the students are unlikely to be aware of how their experiences were originally constructed, and therefore treat reports of an event with the same significance as if they were part of their primary experience (which, as Laurillard points out, to some degree, they are).

That students' learning experiences are packaged for consumption in our information-rich society also makes them the basis from which students can interpret their subsequent experiences (see, for example, the discussion of mediated-quasi-interaction in Thompson, 1990; 1995). The goal of Habermas' procedural perspective is to assist in determining which of these practices creates the environment that in Chapter 5 it was argued is needed for students to adopt a deep approach to learning. In an academic world without the external authority of certain knowledge, where students need to learn to decide for themselves, the lecturer's role is to ensure that the interaction in the classroom assists in the development of a post-conventional identity through a discourse that aims at developing an understanding. To post-conventional students, opposing views cannot simply be asserted. As Barnett and Hallam (1999) show, teaching aimed purely at providing students with preconceived competencies would not be adequate in a world of radical uncertainty and changeability. Formal lectures, for example, which limit communication and exaggerate the distinction between the students and the lecturer, keep students at the level of an observer rather than a participant.

Teaching in the complex context of modern universities is a search for ways to frame the needs of everyone concerned in such a way that some generalisable interests can be found through which all voices are heard. Habermas calls this a reasoned consensus when it is reached under those ideal conditions, constrained by nothing external to the argument so that only recognising the better argument persuades participants (Habermas, 1984, p. 36). This "ideal speech situation" is also a powerful tool with which to understand the values inherent in a teacher's social practices so that they can respond to these critically (Young, 1990). The ideal that everyone has an equal chance to participate is anticipated in every act of argumentation. The resulting principle of universalization (U), that the consequences of a norm must be acceptable to everybody affected, is of course, counterfactual and while Habermas sees practices that anticipate reason at every level, all fall short of that ideal. What each situation does is attempt to get as close to the ideal as possible, given sufficient time and freedom from domination (Habermas, 1984, p. 42) or at least, find a justifiable reason for the asymmetry that exists.

Discourse ethics is an abstract way of strengthening the ground rules for interaction. In a normative framework participants, whose goal is to reach an understanding, are always free to move to the meta-ethical level where the framework itself is called into question. The ideal speech situation is the means by which the type and degree of asymmetry in which subjects set out to understand each other can be judged in a grounded way. Pask, for example, missed (and therefore Laurillard with him) the influence of the artificiality of the experimental conditions in which he expected his subjects to interact. Rather than a relatively freewheeling and undirected interchange of a conversation, Pask established a contractual agreement between the teacher and learner to abide by the restricted vocabulary and syntax of the command and question language with respect to the *conversational domain*. Pask failed to appreciate that he had already established the ethical and moral claims of communication about the use of his equipment, as Vygotsky would have suggested. That is, the computer mediated the interaction between him and his students as the appropriate setting for an educational experiment so that they were able to agree on the appropriate way to act when adopting his method of learning elementary probability theory.

Pask's conversation theory does not seriously confront the question of whether understanding was deduced from his elementary principles, just that it appeared logically right. As with the inauthentic communication of surface approaches to learning, the students were able to succeed academically by learning academic models of concepts. Pask's conversation domain fits Ramsden's (2003, p. 45) definition of an "imitation subject", in which students have been involved in a process that has enabled them to acquire factual knowledge that is only useful in a limited range of situations, such as passing university examinations. Ramsden's criticism of imitation subjects, which mirrors Habermas' concern about distorted communication, is that students give the impression of authentic learning and, as a result, mislead teachers into thinking their students have genuinely learnt. The result is imitation teaching, which is no more than deployment of rules of instruction that enable the lecturer's knowledge to be transferred to students (Ramsden, 2003, p. 228).

6.7 The Learning Environment Created by Interacting with Educational Technology

Habermas is not arguing that it is actually possible to design an ideal speech situation (Habermas, 1982, p. 235). Rather, the idealisation provides a counterfactual standpoint from which it is possible to determine a true consensus from a false one. The purpose of the universalization principle (U) is to encourage participants to engage in an exchange of roles in order to find a norm with which everyone can agree. It only tests proposed norms in light of the consequences which can be anticipated. Habermas clearly states that his principles rely on their content being brought in from outside (Habermas, 1990, p. 103). By this he means that it is up to the participants themselves to raise topics for discussion and it is their responsibility to convert the agreed-to norms into a concrete form. It is only after this course of action that discourse ethics can say whether the processes followed have met the procedural standards of fairness. In this regard, discourse ethics do not propose a utopian state that all classrooms must emulate. It is described as "ideal" by Habermas because to communicate we cannot help but to act as though the ideal speech situation were real.

There are many potential approaches to good teaching. All of the examples offered in this chapter, including Pask's restricted conversations, have the potential to be accepted as a legitimate approach by the students in a given pedagogical situation. The teacher's role is to determine which of these approaches is acceptable to those participating in the larger collective enterprise of learning. Lecturers are put in the position of showing to what degree the inequality in their classroom can be discursively justified. Young (2000) argues that the vast asymmetry in the classroom requires teachers to exercise their authority methodologically to constrain their use of power and create the environment of symmetrical relations of unforced reciprocal recognition required for students to adopt a deep approach to their learning.

The exercise of power in the management of the different elements of learner freedom, such as pace, method, content and assessment, are, in a formal education, largely controlled by the teacher who makes decisions on the learners' behalf (Heron, 1992). To be consistent with Habermas' discourse ethics, these teachers need to show that their teaching processes are arrived at through a process of reaching and defending a compromise, designed to encourage debate, in so far as students are required to consider whether the compromise actually compensates for the asymmetrical power structures. Educators may rarely discuss the values in educational technology but Feenberg demonstrates that their values are nevertheless delegated to their technology through its use where they steer their students' interactions. This chapter has argued that we can build a better understanding of the processes that steer interactions embedded in educational technology through an analysis of the communicative nature of teaching. Classrooms involve students and lecturers coming together for meaningful learning through which students clarify the questions of their identity as learners. As demonstrated in Section 5.5, this questioning of their identity is necessary for them to adopt a deep approach to learning. Teaching, students tell us, can also produce inappropriate approaches to learning, called a surface approach. One of the important roles of the classroom is to coordinate students' and lecturers' actions so that they can come to an understanding on the appropriate learning actions.

While Pask's conversation theory does not suffer from the same performative contradiction as phenomenography, it is similarly fixed on the monological dimension of communication as conveying the intentions of the speaker. In Pask's model of a dialogue about teaching and learning, it remains the student's role to discover the teacher's view of the appropriate method of learning their subject. The teacher determines whether the student is sufficiently close to their intended meaning to be considered to have learnt. This is a model of teaching that can substitute technology for the teacher but is unable to go beyond the products of teaching (the conceptions of the world) to identify environments that support the ethically more advanced discourse of a deep approach to learning

What ought to be done in our classrooms can be described through the use of Habermasian ideas. Habermas argues that communication is related to both meaning and learning, so that teaching is not only involved in meaning construction but also involves normative action. Participants in any interaction are continuously testing the legitimacy of institutions and the use of its authority from different perspectives with different social knowledge. How teachers ought to teach is determined by a democratic proceduralism. This proceduralism does not focus on what is to be done as much as how teachers might go about doing it. It is the conditions by which reasons will be accepted that ultimately supplies the legitimising force to decisions (Habermas, 1979, p. 184). Ethical interactions are captured through what Habermas calls his discourse principle (D), in which actions are valid because everybody affected could agree as participants in a discourse. There is also a need to agree to Habermas' universalization principle (U) which says all affected can accept the consequences of the decisions.

These propositions present the ideal procedures for fairness and provide the critical standard by which things can be compared. Suchman was able to show that when there is a marked asymmetry in these shared understandings, as is the case with even the most sophisticated machines, then there is a large scope for misunderstanding. The asymmetrical interaction with technology occurs without the means for rectifying problems in communication in order to come to an understanding. The implication for education technology is that the decision to use technology should be

an exercise of communicative rationality. This is something that Feenberg demonstrates can be achieved through user participation (Feenberg, 1995a, 1999b). This requires adopting the principles that everyone with competence to speak should be allowed to take part in discussions about their approach to learning and everyone is allowed to question any assertions, without anyone being prevented from exercising these rights. In this way any decisions made to use technology cannot be authoritarian and they will serve the student, not the technology.

CHAPTER 7

TECHNICIZATION OF HIGHER EDUCATION

One of the questions facing higher education researchers is how to contend with the expansion of higher education, an expansion which threatens to change the very nature of universities. The substantial changes in the tertiary education context over the past decade put at risk many of the conclusions of prior educational research. The majority of today's students would not have been born when the original student learning research was first studied by Marton and Säljö (1976). The elite university system experienced by Martin and Säljö's students has gradually been replaced by mass education characterised by "academic capitalism" (Slaughter & Leslie, 1997) with its increasing levels of student revenue and external scrutiny. As well as an entirely different generation of students, academics are working with a new generation of information technology that offers students fresh ways to interact with their lecturers. The personal computer may not have been widely available until several years after Martin and Säljö's students had graduated, yet contemporary lecturers continue to recognise the different approaches to learning they described in the habits of their own students.

For the purpose of testing the legitimacy of universities' use of technology for teaching and learning, I will turn again to the critical theory of Habermas who offers a tool by which it is possible to evaluate practice in order to understand the institutional constraints that prevent full student and academic participation. This chapter is a reconstruction of the concepts discussed in the previous three chapters into the particular instance that crosses the gap into situated, local concerns. Thus, critical theory is a theory with practical intent. It looks at normative theory for the assistance it can give the design and evaluation of democratic institutions. It does not apply normative theory in direct evaluation, but indirectly, as a tool to allow the existing situation to be better understood. Critical theory attempts to discover the gulf

between values expressed in this theory and empirical reality with the intention of providing theoretical assistance in practical decision-making. Understanding the constraints to one's actions can lead to emancipation, which is understood as liberation from externally imposed compulsion.

The three analytical critiques of higher education technology that form the basis of the three previous chapters have not directly addressed any particular implementation of educational technology. Instead, they reviewed different interpretations of classrooms to reveal the accumulated ideas of teaching and learning in educational technology. The ideal speech situation represents the standards of fairness by which all teaching, including teaching with technology, will be judged. However, it only establishes a starting point for reflection, a point from which it is possible to understand the obstacles to legitimisation. A moral approach to teaching challenges the asymmetries of power that result in biases in educational technology. The ideal speech situation excludes systemic distortion of communication and it is intended to guarantee that the participants do not accept a situation that they do not want. The closer these practices are to the ideal, the narrower the gap between reality of the situation and values of the community involved. This would suggest that in the ideal situation only technology that meets the valid norms of the community in which it is to be used would become concretised. In reality these conditions are never achieved. It is simply not possible to know all the consequences of our decisions in advance. There is, consequently, a continual tension between the real and the ideal that will never be in perfect alignment. Any consensus that is reached, even over the use of technology, is always provisional and incomplete, requiring continual re-establishment whenever validity disappears.

This chapter investigates how the technical codes of higher education, the norms of student learning and the process of teaching manifest themselves in the identity of a particular university through the technology it employs. My goal is to look at the systemic actions of introducing technology into this university to draw attention to normative content already implicit in the presumptions of that university's technological discourse so that the normative content in question may be made the subject of conscious educational attention. My intention is to restrict my inquiry to

one institution while acknowledging that other institutions would no doubt reveal different cultures and constraints.

The focus of this chapter is a technology university in Australia, to which I have given the pseudonym, the Australian University of Technology (ATU). The specific identity of the university is not important, as the following analysis of use of the Internet for learning at a university is not an investigation of the success or failure of a higher education institution. There is no suggestion that this university's response to the changing context of Australian higher education is what should or should not have been carried out. Nor is it a comprehensive case study that tries to give a complete picture of the institution, although it identifies conditions that could be extended to a more complete case study. It is an investigation of the self-understanding of the university assembled from the publicly accessible published accounts of the steps the university has undertaken to provide technology and flexibility to its students. The research questions addressed in this chapter concern the teaching and learning problems highlighted during evaluations of technology and the relationship between these types of problems and subsequent actions. The data consists of internal and external evaluations of the university's educational technology. The purpose of examining this material is to determine the deep structures of student learning that are revealed by the university's interpretation of flexible learning and the technologies that support it. As a partial analysis that is structural rather than evaluative, this analysis will draw educational rather than political conclusions from what the university did.

This analysis will assist in the recontextualisation of general analyses into local ethical dimensions. I will begin this investigation in Section 7.1 by reviewing the historical account of the university's decision to adopt information technology for teaching and learning. As a new university that identifies with technology, the ATU has been more self-reflective on its development of technology than other, longer-established universities. As a result, the university provides a well-documented account of its response to new technology in its publicly available annual reports, project reports and in the statistical information which it has provided to the Department of Education, Science and Training, the main administrative body for

universities in Australia. Section 7.2 is an analysis of this public discourse about education technology which indicates deeply held principles of how the problem of education can be tackled. Section 7.3 explores the implications of these values, before moving on to describe how they are manifest in the technology of the university. Building on the concepts introduced in the previous three chapters, the review of the ATU's implementation of online learning establishes whether the implementation of educational technology provides structures that allow students to explore their identity as learners in an open and uncoercive way that allows them to build the academic community they need in order to adopt a deeper approach of learning. In Section 7.4 I will use Habermas' theory to reconstruct this understanding of the structures of online learning to address questions of the design of educational technology. This section applies Habermas' macro-level analysis to the micro level of online learning by distinguishing course management systems as open to misuse and subversion for authoritarian purposes. Course management systems are integrated computer packages designed to assist academic staff in creating, managing, and updating their subject's web pages. The course management tools, such as those outlined in Section 4.3.1, are used to make specific resources available to students, usually for a limited period of time. Section 7.5 attempts to determine how we might counteract the inequalities of social and technical asymmetries of power to determine what an egalitarian alternative may look like. I will conclude this chapter with a description of the educational principles that can be taken from the online classroom and the effects it has on the post-metaphysical learner.

7. 1 The Australian Technology University

The Australian Technology University was established as a university in 1990 as one of Australia's thirty-eight publicly funded universities. It is the result of the combination of three institutions, one of which had just become a university in the year prior to the merger as recognition of its expanding research profile. The university's main features would be typical of other modern metropolitan universities. Although smaller than other Australian technology universities, a survey of comparable overseas universities revealed the ATU to be large by European standards but similar in size to its American counterparts. Typical of an urban-based,

Australian university, over a third of its thirty thousand students come from a non-English speaking background (39%), while its large proportion of part-time students has led to a lower than average representation of low socio-economic status, and rural and isolated students. Currently, the largest faculty in the university is the Faculty of Business which enrols almost a third of the total students (29%), more than double the number of students of the next largest faculty, Engineering (14%). This is a marked change from the original university structure, which had Science as the largest faculty.

This brief introductory description alludes to the two factors that are important in understanding the defining elements in the ATU identity. Like many Australian universities, the structure of the Australian Technology University is a legacy of the amalgamations encouraged by the changes to the Higher Education Funding Act (Dawkins, 1988). All three founding institutions were originally part of the College of Advanced Education (CAE) system created to confront the growth in demand for higher education in the 1970s, referred to in Chapter 5. Each institution, however, has a much longer history, in the case of teacher education reaching back to the 1940s. The new university, with its close link with research into science and technology, was a relatively young but in other respects dominant partner in the amalgamations with the other two, non-researching CAE institutions. Nonetheless, as with all genuine amalgamations, power was shared, and the choices since the establishment of the University have influenced the direction, organisation and culture of the merged institution. As the result of a lengthy process of self-assessment, the identities of each of the founding institutions fused sufficiently to enable the ATU to define its uniqueness in higher education through the provision of practice-based teaching, learning and research, something that was common to all three institutions.

The city location of the ATU is the other significant factor in the identity of the university. The ATU does not see its relative youth and lack of historic buildings as a disadvantage in competing against other universities in the region. As a young university, not bound to tradition, and positioned close to the business district the university argues it can be more flexible and responsive in times of change. The

University believes that being on the edge of the commercial sector of the city is how it will impact on national policy agendas and directions in professional practice. Its close ties to business and industry enable the university to distinguish itself from other universities in the area by placing a strong emphasis on workplace experience and incorporating the latest industry practice and professional standards into its curricula.

The emphasis on professional practice has led the ATU to blur the boundaries between study and work to the point where the Australian Technology University is the largest provider of part-time university education in Australia, with almost forty per cent of its students enrolled on a part-time basis (Department for Education Science and Training, 2003). The ATU is particularly proud of the employability this provides its graduates, which is well above national averages for all fields of study. The demand for ATU undergraduate places is very high, and growing at a time when other institutions report a decline in enrolments. In 2004, ATU Business, Design and Communication courses attracted the highest demand from school leavers across the State.

These strengths in business, design and communications help to make the city campus the natural focus of growth and change at the University. Initially planned as a single campus university, the opportunity to build a strong geographic identity was disrupted by the amalgamations which brought with them a number of non-city campuses. This created a university that was a confederation of buildings, each existing as separate entities, and as such providing its students with a much more fragmented university campus experience than in the traditional sense. Just as part-time ATU students blend in with the city workers from the nearby offices, the refurbishment of office buildings into teaching spaces ensured its buildings also blend with the buildings of the surrounding business district. In order to provide a defining location for student learning that would embody its identity as a business-like and flexible institution, the university has more recently undertaken to consolidate all faculties around a city-based education precinct.

7.1.1 Flexible Learning at the Australian Technology University

The response of the ATU to its city location which attracts a predominance of worker-students with a practice-based orientation to their studies has been to put less emphasis on the on-campus experience and provide flexible study options and ease of access to course materials from home and work. James, Baldwin and McInnis (1999) found this to be the stand-out characteristic of all technology universities in Australia. At the ATU, flexible learning was announced as a strategic initiative of the University in 1996 with the aim of providing teaching and administrative practices tailored to meet the needs of its diverse student population. The university's flexible learning policy included providing students with more open access to learning opportunities by increasing flexibility in the choice of subjects, in the student's degree, how the students study their subjects, and in what student support was provided by the University. Since the introduction of flexible learning, ATU students have come to learn through course designs which gave them opportunities to follow multiple pathways to achieve the same learning outcome. A mixture of learning methods such as intensive face-to-face workshops, independent study material, interactive web sites and phone access combined to provide students at the ATU with greater flexibility in the time, rate and location of study.

In adopting flexible learning as its educational framework, the university was making a considered decision to move its identity away from a university as a physical campus to a university as the provider of infrastructure for learning. To deal with student demand for the infrastructure of flexible learning within the budgetary constraints being faced in the higher education sector at the time, the ATU adopted what Barraket, Payne, Scott and Cameron (2000, p. 14) call a "resource management" approach to providing computer and information technology infrastructure. Resource management in this context involves maximising the accessibility of facilities and services to the widest possible range of students while meeting special needs on a case-by-case basis. The implementation of flexible learning across the university was the responsibility of a number of Flexible Learning Action Groups (Scott, 1996). These were teams of academics and non-

academic staff with a shared interest in flexible learning who proposed how the funds were to be spent in six targeted areas.

Flexible learning was never intended to associate computer infrastructure with teaching, yet the most successful Flexible Learning Action Group in terms of participation and longevity was related to the use of information technology to enhance learning. As student numbers continued to expand at the ATU there was an increasing demand for computer and information technology infrastructure for teaching and learning. Students who choose to attend the university wanted access to technology and those without Internet connections at home continually rated the level of computing support at the university as inadequate. Information technology infrastructure was clearly something students expected universities to provide, particularly at a university of technology, which they conceived of as developers and users of leading-edge technology (Barraket et al., 2000). The ATU acknowledged that it needed to continue to invest in information and other technologies to ensure that its image was matched by the reality of the students' experience. In response to the students' complaints the university has made a continued commitment to substantially invest in enhancing the learning and teaching environment for staff and students.

7.1.2 Online Learning

Flexible learning was adopted as a deliberate plan to underpin the university's facilitation of student learning by providing enhancements to the student administration system, the production of self-managed learning materials, quality assurance and policy alignment. Staff and students expected that a university with its identity so closely linked to technology and flexibility would also provide large amounts of technology for teaching and learning. Like other universities in Australia, the ATU was looking to computer and information technology to ease the pressure of increased competition and decreased funding. The aim was to increase the quality of the students' experience by bringing teaching levels into line with university norms and minimising the over-teaching that was a legacy of the CAE system. The

technology for supporting this shift to greater independence in student learning was to be online learning through the Internet.

The standardised provision of information technology for teaching and learning at the ATU is through a course management system called "Blackboard". This is a web-based learning tool that is used in approximately a third of ATU subjects to deliver online learning to students. By standardising its course management software, the ATU has been able to dramatically increase the number of subjects with an online component from the original two in 1997 to the current five hundred individual subjects. As a result of this rapid expansion, two-thirds of academic staff have two or less years' experience with online learning, with a third of the staff using Blackboard for less than a year.

The use of Blackboard in ATU subjects was rarely made compulsory for students. The system was more likely to be used for class announcements and for the distribution of course materials which would also be available through more traditional means. Over a third of academic staff who taught using Blackboard still had major concerns with some aspects of its functionality, particularly the performance of the online grade book. The variety of responses to the availability of the software at the university has resulted in three bands of usage of the system which relate to the size of the Faculty and the length of time each Faculty has been engaged with online learning. The two largest Faculties, Business and Engineering, average almost half of their subjects online. In the middle band, a group of faculties average a third of their subjects online and the final three faculties average half that number of subjects again. The academics in the two smallest faculties of the University have the least experience with the system, and correspondingly have the fewest subjects online.

As the largest and most rapidly expanding faculty of the University, the Faculty of Business had a history of experimenting with online learning for academics and senior students going back to its pre-university days. Freeman (1997) reports on the success of an early trial with online learning, in which students commented positively about the range of resources available to support their learning. The

students described the use of the online system as providing greater opportunity to access information and interact with the materials that helped them to accept greater responsibility for their learning. Even students with a relatively low level of experience with the Internet (Freeman found that in 1997 almost two thirds of students had little or no experience with email) expressed positive perceptions of using technology. Now, with almost ninety per cent of ATU students having access to the Internet at home, few users of Blackboard report major problems with access or the software's operation. Students regard the major benefits of using the system as the access it provides to course materials, announcements and the ability to check their grades at times that are convenient to them. While students agreed that Blackboard could make study more efficient by saving time, students saw its major disadvantages as the lack of immediate responsiveness, a lack of face-to-face contact with lecturers and other students, and a lack of institutional resources.

7.2 The Use of Educational Technology at the Australian Technology University

The decision to develop a more flexible and responsive learning environment across the Australian Technology University was intended to enhance the quality of student learning. It was expected that information technology would contribute to student learning experiences by providing access to online learning resources, academic staff and administrative services. This was seen as important, not only educationally, but to position the university favourably with both students and employers in the face of increasing competition from other universities and the impact of recent developments in information and communications technology. In response to the conception that it is the type of university that should have easy, ample access to technology, the ATU had made it a priority to expand information technology access in teaching spaces, stating that a "low tech" university environment would not match its aspirations for excellence in technological study and research. Likewise, students are enthusiastic about the use of technology in their studies with many of them choosing to study at a university of technology in the hope that they would be on the right side of the "digital divide" during the changes in new information and computer technologies, the growth in knowledge and the changing nature of work.

Through the adoption of Blackboard, information technology at the ATU, which is available to all staff and students, has come to demonstrate the characteristics of what Carr (2003) calls an "infrastructural technology" (p. 42). These are technologies that have become so widely adopted that organisations can no longer do without them even when they no longer provide obvious advantages to an organisation. Carr compares this to proprietary technology, like Blackboard, which can be owned by a single company that has exclusive rights for its use. For Carr, there is no clear business advantage in an infrastructural technology because it provides greater value when it is shared than when its use is restricted to a particular group of users. Once a proprietary technology has become so widely adopted that the organisation cannot do business without it, the organisation has little other choice than to manage the technology's cost or technical standards in order to minimise the disruption to its services should the technology fail.

An important concept in the analysis of technology outlined by Feenberg in Chapter 3, is the idea that new technology is underdetermined, meaning that there is a range of interpretations to do with its use. Like other infrastructural technologies, Blackboard provides a greater capacity for online learning than is required by the University and lecturers have embraced only some of the system's capabilities, such as the delivery of course materials, while remaining sceptical of the benefits of using other aspects of communication and information technology in their teaching. McInnis (2000, p. 28) found that this was fairly typical of Australian academics who rank computer skills highly as one of the generic attributes of university graduates, yet academic-computing officials constantly describe persuading academics to embrace technology in their own teaching as their most difficult task. Many of these academics reported to McInnis that they felt intimidated by having computers in their classrooms, especially when their students may have had more computer experience than they did, while others simply did not think computers add anything to the educational process.

The course management system was selected by the ATU as a means of expanding collaboration and increased reflection through its potential for communication between students, and between staff and students. It was not seen as a means for the

delivery of course materials which were considered more appropriate when paper-based (Flexible Learning Action Group, 2000). The perceived emphasis on the communicative capabilities of the software turned out not to be the case at the ATU, where the most common reason for using the course management system given by academics in a university-wide survey was to provide students with information. Students, likewise, rated access to course materials, announcements and checking grades to be the most useful features of the software. Essentially, as Feenberg would have predicted, academics at the ATU have determined for themselves through their use of course management software that they are comfortable with the role they have become used to playing as lecturers in face-to-face teaching. Consequently, the online software at the ATU is not used by lecturers to replace face-to-face classes. Instead it supplements regular teaching with announcements and the distribution of course material. Even after receiving instruction in the software's communication capacities and a growing prevalence of group activities in face-to-face teaching, an internal report into the use of the course management system at the ATU found that online discussion boards remain one of the least-used features of subjects registered on Blackboard (at less than one in three subjects) and three-quarters of the students only use the discussion board tool to participate in discussions that have an assessable component.

7.3 Course Management Software and Its Role in Flexible Learning

With this understanding of the intentions behind online learning at the ATU and the response of the lecturers and students to its implementation, it is now possible to examine more closely the kind of communicative interaction that takes place through the use of course management software such as Blackboard. As discussed in Chapter 4, an accumulation code in educational technology results in a problematic flood of information in the classroom, driven by coverage of content and an attempt to manage student learning through predictability. Digital technologies, such as the World-wide Web, have continued to lower the cost of distributing course materials, and correspondingly the students' access to information has become virtually limitless. On the other hand, the participation code also found in learning technologies starts from approximately the same point as the accumulation code,

namely that students are actively engaged in making meaning from information, but draw different implications from it. Rather than accumulating additional information, emphasis in the participation code is placed on students interacting with teachers and other students to be actively engaged in what they learn so that they can express their understanding. For the participation code it is the process of interpretation rather than the information that is seen as problematic.

In Chapter 5 it was argued that the two technical codes of higher education, accumulation and participation, correspond to different forms of identity formation in higher education classrooms in which students adopt one of two approaches to their learning. One is a surface approach in which the student's intention is to reproduce the teacher's understanding. The second is a deep approach in which the student searches for meaning. With the breakdown of authoritative knowledge in a post-metaphysical age discussed in Section 5.5, classrooms need to adapt to constructing independent, self-directed learner identities able to adopt a deep method to their learning approach. In an education focused on ethical development where students are expected to decide for themselves, a classroom environment cannot just assist students in discovering the facts but must also allow students to find out the rules of participation. As suggested in Chapter 6, learning with technology offers the conditions consistent with deep approaches to learning in certain circumstances, such as when all voices are heard, the best arguments from our current knowledge are put forward and the only force for agreement is the force of the better argument. As such, discourse ethics provide a powerful theoretical support for the conception of flexible learning and developing greater student independence.

Habermas' discourse ethics calls for open and equitable communication so that a morally consistent form of teaching would ensure that learning takes place under the ideal conditions of being free from coercion. In reality these conditions are never achieved. There are too many institutional constraints for there ever to be a totally open discourse. Even the shift to encouraging greater student autonomy can be seen as an exercise of power, as students are just as likely to resist the requirement to take greater responsibility for their own learning (Rowland, 2000, p. 68). Establishing whether the use of online learning at the ATU reflects the practices and intentions of

discourse ethics can assist in determining whether online learning achieves what Habermas described as communicative rationality and therefore qualifies as a legitimate technology for supporting a deep approach to learning. Or, at least, the application of the tool of communicative rationality to this technology will assist us in understanding the ways in which norms of a strategic rather than communicative kind have been incorporated in the technology, which then makes them available for discussion and change.

While there may be good access to the infrastructure of online learning, misgivings about the quality of interaction mean that online discussions are not necessarily providing the best possible arguments to all students. Most students at the ATU abstain from using the course management system for communication unless it is required for assessment. In this case, it is the assessment that sets the requirement to participate rather than any desire to put forward convincing argumentation. While there is some evidence that non-participants are more likely to participate in an online discussion that is part of online learning, in discussion groups in general many of the inequalities of face-to-face communication are simply transferred online (Herring, 1994). When not forced to participate through assessment requirements there are few voices in online discussion forums, with Cummings, Butler and Kraut (2002) finding that online listservs had relatively low levels of communication compared to face-to-face small groups. Discussion online is generally carried out by a small group of participants with fifty per cent of the listserv members not contributing any messages at all and only a third of messages receiving any reply. This led Cummings et. al. to conclude that while interaction can happen in these environments it is the exception rather than the norm (Cummings et al., 2002, p. 16)

It can be concluded that it is not argumentation determining the outcomes of online interaction, but the strategic actions of students seeking to expedite their learning. As students' use of the World-wide Web has increased, reports of plagiarised assignments have also grown. Academic dishonesty is lower where there is a perception that there is a high probability of being caught (McCabe, Trevino, & Butterfield, 2001). Yet, by providing access to vast amounts of information, the Internet creates the appearance that this is less likely to occur online than in the face-

to-face classroom. With such a large number of online resources it is relatively easy for students to find information that can be copied directly into assignments. Studies of student plagiarism have found clear differences between students' and teachers' views of cheating. Surveys in the United States show that almost half of the students come to university with the view that there is nothing wrong with copying and pasting from the Internet (McCabe, 2003).

Problematically, a general lack of trust of students by lecturers motivated by concerns of academic misconduct leads to a desire for greater control of the learning environment so they can monitor student progress. The ability to collect large amounts of statistical data on the students' interactions that course management systems provide, permits detailed surveillance of students' actions far beyond what is possible in the traditional classroom. Unlike in the classroom, the instructor and student do not encounter the course web site in the same way, with students largely unaware of the instructor's actions behind the scenes. Indeed, Rehberg et al. (2001, p. 105) suggest that instructors use this to good effect and masquerade as students to produce pseudo-participation. As Heidegger might caution (see Chapter 2), identifying and articulating specific behaviours of learning permits them to enter the public arena and becomes officially recognised. It is here that certain kinds of learning are categorised as legitimate and the means are created by which lecturers will attempt to have them controlled.

7.4 Legitimising Online Learning for Higher Education Teaching and Learning

What is striking about the implementation of online learning at the ATU is the inconsistency of that implementation with its stated view of the importance of flexibility and independence. This is a goal which would imply a move to open structures rather than a highly controlled one. That is, the technologic solution would replicate the technical codes of the tutorial room rather than the lecture theatre. The use of online learning, as revealed through the choice of course management software at the ATU, has many of the features of undemocratic procedures. What at first seems to empower students to control their own learning, on closer inspection, appears to actually have the contrary effect. Lecturers placing their course material

online in a proprietary system unintentionally mislead their students into believing they have a sense of ownership of the process without empowering them to make decisions on their own behalf. However, for teachers interested in the strategic potential of online learning, this is a positive aspect of technology for teaching, as it forces students to participate in order to succeed. The student's only choice is to adopt a strategic relationship to the teaching, which in Chapter 5 was characterised as a surface approach to learning.

What the use of online learning to provide flexibility has primarily delivered for students at the ATU is access to greater amounts of information rather than the means of developing a deeper understanding of the content. While there are isolated examples of immersive environments, such as debates and role plays intended for students to develop their own meanings about the topic, access to information remains the dominant use of online technologies for both academic staff and students. The analysis of course management software above demonstrates that the implementation of Blackboard at the ATU is a long way from the ideal of encouraging students to adopt a deep approach to their learning. This is not to say that individual students are not capable of using the system for that purpose. More accurately, the analysis leads to the view that the university is unable to claim legitimacy for the assertion that its online learning system was not intended simply as an efficient delivery system and that it will widen student experiences that will lead to high-quality learning outcomes. These types of system differentiations are pathological, according to Habermas, because they are originally justified on the basis of making things more efficient. When these institutional arrangements create controversy, they increase the level of argumentation among participants who expend effort in debating the decision-making process which would have been saved had those processes not been taken out of the domain of communicative action.

Real ownership is achieved when participants are involved in devising the rules by which they will operate. Habermas argues that these democratic principles are already partially realised in everyday speech. Within the speaking situation there is the assumption that everyone with competence to speak and act is allowed to take part in discourse. Additionally, everyone taking part in the discourse is allowed to

question any assertion and there is no internal or external coercion to prevent speakers from exercising these rights. Habermas sees any consensus reached under these conditions as attaining the special status of a rational consensus. In particular, he argues that a speech situation can be called ideal if communication is not impeded by external contingent forces or by constraints arising from the structure of communication itself. Habermas acknowledges that we can never know all the consequences of our decisions to ever actually construct these ideal conditions. Therefore, there remains a tension between what was intended and what actually is the case, so that the facts and norms are never a perfect alignment but are always imperfect and incomplete.

From this perspective, the normative decision of what ought to be done in the case of students learning with technology can only be decided in the public deliberations in which students have a role as active participants. This is a procedural basis for decision-making in which technical innovations are brought under the control of social rather than technical interactions. A consensus is only possible if the relations between people are symmetrical; something which Suchman (1987) has demonstrated is rarely the case with technology. To compensate for the absence of legitimacy in educational technology would require an agreement from the students that learning online represents their preferred approach to learn once they have undertaken a genuine discussion on the gains in efficiency that they are willing to accept. The choices must be reflected upon and discussed in a way that overcomes rigid ideologies hidden behind the pretence of value neutrality found in proprietary software systems. Any decision that was reached could only be considered to be provisional and would need to be revisited regularly to oppose bureaucratic institutionalisation and colonising tendencies.

The ethical dimensions of learning are captured in technical actions which are valid because all affected could agree as participants in a discourse. Including students in the decision-making is easily dismissed as utopian even though examples already exist in university teaching (see for example, Bruffee, 1993). In the case of technology, there is unease with the impracticality of non-experts being involved in technical decisions that may be discouraging lecturers from including students in

participating in its design. Examples of student participation in educational design are rare, although some examples in school education do exist (see for example, Burke & Grosvenor, 2003; Groundwater-Smith & Mockler, 2003; Sanoff, 1994). In higher education, participatory methods in assessment, such as learning contracts (G. Anderson, Boud, & Sampson, 1996), negotiate the use of a variety of technologies to assist students meet their objectives, including electronic student portfolios for reporting evidence of successful learning (see for example, Cambridge, Kahn, Tompkins, & Yancey, 2001). Similarly, inquiry-based methods, like problem-based learning, are increasingly using technology to ensure that undergraduate students are involved in collaborative learning, For example Savin-Baden (2003, pp. 97-98) describes the use of online conferencing tools so that groups of eight students can engage in a scenario over a three week period. The first week is directed at students defining their learning needs with the help of a tutor and ensuring tasks are shared fairly among the group. Students then work in asynchronous forums to debate and question each other about the material they have collected. The final online session involves reflecting on the process and what has been learnt.

Habermas argues that the strategic action, which is appropriate for controlling technology, would be the wrong kind of coordinating activity to determine decisions in the social realm. Technology relates to organisation of means and is not involved in the choice of ends, which in Chapter 3 was shown to be delegated to technology through a number of hermeneutic processes. Technical systems are needed in order to control actions that permit an expansion of the ability to influence actions within the physical world. Tying the legitimacy of educational technology to the efficiency of the delivery of teaching and learning is adopting a means-ends rationalisation that assumes “good” principles have an orientation to explicit rules and laws. In a formal rationality people and objects become part of the mechanical process in which each is assigned a functional position or role. Actions are only rationalised in hindsight once it is apparent that the ends have been achieved with individual purposes, wishes or values irrelevant to the technical decision-making process. Habermas, on the other hand, would argue that organising actions in such a way as to lead to external pre-determined goals with maximum efficiency would be appropriate once the goals have been set.

In the modern world, where there is a vast plurality of worldviews, it is no longer appropriate for success to be expressed only in terms of a simple set of foreseeable consequences while there is silence on the ends being pursued. The goal for teachers should be to find practices that promote free and open discussions through which students can act discursively, such as the examples of learning contracts and portfolios described above. Feenberg (1995a; 1999b) outlines a number of models of public involvement in technological design, which I will only describe briefly here. One of the more direct forms of collaboration in technical design comes from a Scandinavian approach called "participatory design" (Sanoff, 1990; Schuler & Namioka, 1993). It involves the interested community members and designers coming together in a series of creative workshops to collaborate in teams to design technologies for their own specific settings. In this approach the final users of the technology pursue objectives that they define for themselves during the design stage when major decisions can be made and changed. Participatory design revolves around a series of activities designed to build an understanding of the problems and issues surrounding the project. The goal is to experiment with possible alternative solutions through design games, mock-ups and rapidly developed prototypes (Sanoff, 1990).

Participatory design has largely been used by architects and planners for constructing a physical space in order to engender good design with the values of the people who will use it. There is a growing use of these techniques to engender student involvement in school design (for an overview of the research in this area see, Fletcher, 2004). Sanoff (2000:105), for example, describes the use of participatory design to tackle the problems with school buildings. He argues that the educational buildings should be an expression of the fact that exploration and discovery are important components for learning that are reflected in modern teaching methods, like group work (Sanoff, 2000, p. 106). In Chapter 4 it was argued that the physical environment has a powerful influence on teaching and learning by making some actions possible while constraining others. Moreover, participatory design is increasingly emerging as a process for software development under the broader banner of user-centred design (Hallewell Haslwanter, 1995). Its goal is to empower users of the computer software by increasing their involvement and their control of

the software design process (for examples, see Kyng & Mathiassen, 1999). One example of this approach is "open source software" which has developed as an alternative to commercial software. Software is considered to be open source if its users can modify and distribute software without restriction. The Massachusetts Institute of Technology (MIT) has adopted the same approach for its open source model of course materials, which are openly accessible on its web site. The academic staff recognised that the online component of their courses is only a small part of the university experience and agreed that providing access to the materials would improve the quality of teaching and learning by making course material open to public scrutiny (Johnstone & Poulin, 2002). The open source philosophy is a process that the university also extends to many of its systems, including its home page, which is designed by the MIT community, and the public at large (Lisanti & the MIT home page team, 2003).

Participatory design is associated with strong democratic claims that derive their appeal from western democratic institutions that use Habermasian discourse ethics as a justification for participation (Spaul, 1995). Examples of its application in schools and universities for building, software and courseware design demonstrate that alternatives to the accumulation code that match educational values of universities do in fact exist. However, participation only makes sense if things can be changed, and software, like Blackboard which only permits minimal customisation, generally does not encourage the critical analysis required for educationally valid design solutions.

Academics already possess many of the facilitation and inquiry skills needed for generating participation which can readily be turned towards student learning with technology. It is embedded in the practices of universities where research and scholarship are already based on collaboration and communication (McWilliam, Green, Hunt, Bridgstock, & Young, 2000). The strength of scholarship as a basis for educational technology design is the re-integration of the values of higher education towards university teaching. Whatever procedures lecturers and students choose to facilitate their working together, they need to ensure that they are as fair as possible for the given circumstances. Institutionalising some of these judgements in technology is a way of maintaining effectiveness without the need for constant

deliberation. Guaranteeing an open dialogue between student, teacher and learning materials becomes the mediating factor in establishing high-quality learning experiences for students, and therefore the site of communicative action in higher education.

7.5 Lessons from the Online Classroom

If we examine the claim to greater student independence associated with online learning a number of deficits emerge. Those making the technical decisions on the students' behalf appear to have little consideration of what it means to be an independent learner other than that an individual has the right to choose the time he or she prefers to study. Moreover, it is an illusion that learning on the Internet requires special software. This is a decision made by educational administrators to improve the administration of teaching and learning. Course management systems are a centralised response to learning on the Internet that assist in administration at the expense of the students' approach to learning. The information provided in proprietary software, such as Blackboard and WebCT, is unconnected from what already exists everywhere on the Internet to narrow and limit its use to a particular university course. As a result, the experience of an online course for the student becomes limited to a series of choices among pre-determined course materials.

This is the inverse to Internet use in the general community. Instead of near-universal access with widely different patterns of use around the university, Katz (2002) found that in society there is some difference in levels of Internet access but little difference in individual Internet use. Email is by far the most common activity on the Internet, followed by the finding and collection of information (Nie & Erbring, 2000). Further, entertainment is the fastest growing service on the Internet. Chat rooms, "wikis" and "blogs" are all examples of the increasing numbers of people now involved in putting their own content onto the Internet. Consequentially, students who now commence their studies at the ATU come with far more experience with learning online than their lecturers. By interacting with information technology in intuitive ways students have already developed many of the specialised strategies for learning with computers (Gee, 2003, p. 39).

I have used the changes to educational technology at the Australian Technology University to illustrate what the implementation of online learning tells us about universities and their beliefs about student learning. Computers have changed university teaching by entrenched practices that appear to go against the normative values of higher education outlined in Chapter 5. Course management software is the university's response to the unmanageable levels of information that are now available through the Internet. Its purpose is to standardise the management of information for online learning. Learning has always required a free exchange of information and this can indeed be facilitated through information technology. What the current implementation of online learning demonstrates is that as long as educators remain in control of the technology design, they will remain committed to the one-way acquisition view of learning that is behind many common classroom practices.

To consider the use of online learning in Habermasian terms requires consideration of the social context of its use. Critical theory is concerned with how authoritarian tendencies, even unintended ones such as those in course management software outlined above, can emerge from seemingly democratic situations like the Internet. Blackboard could be shown to support student autonomy only insofar as the technology facilitates unconstrained discourse that leads to a consensus over important educational norms. Any consensus that is achieved can only ever be considered provisional and at some stage the trade-offs are no longer democratic because the participants themselves no longer make them.

The ATU's emphasis on professional practice positions the workplace as the ideal location for learning. Its educational model focuses on developing autonomous learners who are reflective and creative practitioners who blur the boundaries between universities and workplaces. In the process, the ATU is replacing the identity of the student with a hybrid identity of the worker-student. Students, it is argued at the ATU, should be in control of what is learned, how it is learned and how it is assessed. Teaching is required to embody greater flexibility through breaking down the requirements to attend classes at the institution's convenience and providing it instead at the workplace's convenience. The evidence from the collision

between work and learning shows there is less time available to both students and lecturers to care for the quality of interactions. The result of greater freedom and flexibility is a breakdown of attachment to the university. Students already make extensive use of the Internet for informal learning. They create their own study groups and pool their own study resources, which is an important step in taking responsibility for their learning. It is this kind of interaction that the technocratic thinking of proprietary software hinders. The professionalisation of learning contains the ideal of the student being available through twenty-four-hour uninterrupted access to the university. Yet academic staff are finding themselves increasingly remote from their students.

The ATU's encouragement for students to take more responsibility for their own learning would make it wrong to not encourage students to make full use of online learning technologies like Blackboard, as they favour independent, self-motivated learners. When students express their independence and use information technology software, they find that although email and electronic communication are intended to save time and ease communication, they can become a burden for academic staff as they raise student expectations of receiving quick and detailed individualised comments. Further, for the sake of efficiency, academic debate is squeezed into formalised structures like Blackboard, making the participation that does occur in online discussions often superficial in nature.

It is for this reason that the worker-student is not abandoning traditional classroom settings for the Internet. Online technologies do not replace teachers in the classroom but supplement traditional teaching and learning approaches. Lecturers who are designing the academic workplace for their students are adopting the technical codes of supervision and productivity of many workplaces by which the use of the computer can be an oppressive experience rather than a liberating one. Poor design, measured against the norms of the classroom, is that which gives worker-students little control over the computer systems they will use, reducing effectiveness, satisfaction and learner autonomy. Students who adopt a deep approach to learning should, on the contrary, be demonstrating an increase in student satisfaction, better-quality outcomes and better grades (Ramsden, 2003, p. 56-59). Just what staff and

students participating in an open discourse about the character and use of technology would look like, is the theme of the next chapter.

CHAPTER 8

ONLINE TEACHING AND LEARNING IN THE UNIVERSITY

Notwithstanding being classed as a communications technology, the use of the Internet in higher education restricts the level of communication that takes place between lecturers and students. Even with ready access to course management software, students are finding that once they are online their lecturers are not using the system to generate online discussion. For their part, academic staff complain about getting too many postings to administer, wasting time reading through postings that are not on topic or students failing to participate thoughtfully, all of which can be seen as limiting the amount of communication that takes place in the online environment. The Australian Technology University described in the previous chapter is an example of how information and communications technology is used to encourage flexibility and experimentation in student identity. The review of the implementation of online learning at the ATU revealed that the price for the motivational influence of new technology is a limit in the opportunities to discuss academic teaching and learning. Students are restricted to fewer choices by the "deworlding" nature of technology outlined in Chapter 3. Yet, since World War 2 there has been a shift to educational technology to deal with the massification of education. Students continue to see spatial proximity as a major factor in information transfer, and while online technology may provide closer contact between the teacher and student with more opportunities to exchange information, there are fewer opportunities in that exchange to negotiate between the teacher and student in order to come to an understanding. Technology allows more students to be taught more efficiently but without close attention lecturers lose the ability to discuss with students the goals of what they are trying to achieve educationally. Instead these goals are assembled into the educational technology with the result that introducing online technology into higher education makes it more difficult for students to influence the lecturers' educational goals

The role that technology plays in changing or reinforcing the values of education raises important ethical questions about the use of technology. The concern for both lecturers and students is that online discussions will displace high quality face-to-face relationships. This is not a misplaced fear, as a number of authors, like Turkle (1995), have demonstrated that the Internet is a zone of identity experimentation that allows people to move beyond the fact of their physical embodiment. As a result online relationships have been shown to involve lower interdependence, commitment and permanence (Parks & Roberts, 1998). In testing the effects of having less time for interacting with family and friends as a result of being online, Kraut et al. (2002) found that the initial negative results of loneliness and depression do dissipate over time, although stress levels continue to increase with the level of Internet use. They concluded that it was not the technology that was causing isolation, but people who spend large amounts of time online feel more stressed because they have less time to complete off-line tasks. In the case of higher education, MacGregor (2002) confirmed that online students experience the same effects, with those who successfully completed their subjects tending to be more apprehensive, less lively, less socially bold and less open to change than students in face-to-face classrooms.

With the increased availability of course management systems it is now rare for university courses to not be at least supplemented with online technology. McInnis, James and Hartley (2000. p. 30) found that the use of web-based resources and multimedia software is relatively widespread in Australian universities, with only twenty-five per cent of first year students at Australian universities saying they have not used learning tools such as Blackboard or WebCT. There still remains some diversity in the level of adoption within specific universities in Australia which report having between nine to one hundred per cent of their course subjects online (Department for Education Science and Training, 2002). The majority of the online subjects, like at the Australian Technology University, used communications and information technology to provide content as a supplement to the face-to-face component of the subjects. Online discussion groups and virtual tutoring are much less developed and only used by a small minority of students.

Universities have reached a decisive point in their decision to adopt online technology. They have determined that it is necessary to teach with the Internet if they want their students to handle the flood of information in an efficient manner. Information technology is now part of the educational infrastructure made available to all students in all courses and universities. Students continue to expect to access information technology in many of their higher education courses (McCann, Christmass, Nicholson, & Stuparich, 1998). Further, in the information age processing information is an important skill. That is, not only knowing how to make sense of information but also in learning how to interact with meta-cognitive machines that expand our understanding of the world. But, communication with machines is one-sided, with the human operator doing all the interpretation. The more machines feign intelligence the more likely they are to restrict users to shallow, routine responses.

The review of an implementation of online learning to construct a technical system to handle large amounts of information in the Australia higher education sector revealed that it had not resulted in removing teachers from teaching. Indeed, this was confirmed in a survey of Australian academic staff in which it was reported that two-thirds of respondents were developing course materials for new technologies to the extent that it had a major impact on increasing their work hours (McInnis, 2000, p. 28). Lecturers reported that they must increasingly struggle to keep up with a large number of students, many of whom expected online technology to provide round-the-clock assistance. These lecturers work harder when using technology because the demands of the machine organises them to be more actively involved in teaching. That is, the simple action of delivering messages is undertaken by the non-human objects while the more difficult task of creating the conditions of learning is delegated back to the lecturers (see Section 3.2.1.1). Feenberg's fear that administrators would be able to use computers to automate education has not yet been realised. As the example of the Australian Technology University demonstrated, the traditional interactions between students and lecturers still exist, even though they may have evolved in response to the inclusion of an online environment. It continues to be difficult to find examples of cases of higher education where teachers have not played a prominent (if one-sided) role in student

learning. In fact, as Laurillard admits (see Section 6.4), projects that have tried to remove teachers from the classroom have all failed. Technology and teachers are both ubiquitous in higher education and they are both needed for students to lead productive academic lives.

The purpose of this chapter is to draw together the four critiques discussed in this thesis to demonstrate the conditions needed for an open discourse about the character and use of online teaching and learning. This final synthesis outlines the basic features of the argument suggested by Feenberg that the alternative to colonisation is through an appropriate rationalisation for higher education technology. In Section 8.1 I will argue that teaching with technology that does not demonstrate the same commitment to self-reflection as face-to-face interaction is not going to be consistent with the values of higher education. It would be wrong to view this as simply another argument for student-centred learning. Instead, it is an attempt to bridge the normative and empirical approaches of educational research and account for the social context required for student participation. In Section 8.1.1 I will describe how this would be manifest in the characteristics of a successful online learner. A deep approach to learning reflects the commonly agreed-upon values for a higher education and self-reflection into ones own life history serves as a guide for emancipated behaviour and action, online as well as when students are physically present. In Section 8.2 I will describe appropriate rationalisation in educational technology from the academics' point of view. To achieve this, I will follow Habermas' proposal that the alternative to colonisation would be an appropriate rationalisation involving an expansion of discourse in areas in which action is coordinated through communicatively achieved agreement. By this I want to recover the democratic elements of scholarship as a model for university teaching practice that is consistent with the values of higher education. In Section 8.2.1 this will be termed a "scholarly approach" to education technology. To achieve this discourse on education technology, this thesis has advocated lecturers adopt a deep approach to teaching that replicates a scholarship model of building an understanding. This scholarly approach involves a reconstruction of the values of higher education into its educational technology. Section 8.3 describes the kind of deep structures of educational technology necessary to be determined as an educational form of

technology. It concludes that for educational technology to be considered a valid approach to teaching and learning requires it to demonstrate the same commitment to open discourse as a deep approach to learning.

8.1 Beyond the Colonisation Thesis

Social functions may have originally been fulfilled by ritual practices, but in a modern society the authority of tradition is increasingly opened to question. Habermas argues that a modern society demonstrates a high degree of structural differentiation in order to accommodate greater complexity and the increasingly marginalised lifeworld only survives if it transforms itself into a media-supported subsystem reminiscent of Parson's (1971) steering media. To summarise Habermas' position already outlined in greater detail in Section 3.3.2, objectification of unconstrained discourse occurs when interactions are no longer coordinated through openly discussed norms and values, but are transferred to a medium of exchange value so that negotiation is coordinated through media and, in the process, technicises the lifeworld. Habermas believes that the main problem in an advanced capitalist society is the distortion of democratic modernity (Habermas, 1987c, p. 288). His guiding idea is that the lifeworld is the domain of communicative action that provides the context-forming horizon of social action (Habermas, 1987c, p. 135). Habermas argues that we need to encourage appropriate rationalisation so as to counter the effects of colonisation. Colonisation occurs when values are determined through a mechanism that is separate from general discussion and debate. Habermas' thesis is that technicization of the lifeworld turns into colonisation of the lifeworld only when the ability to argue what ought to be the case is lost. His discourse ethics is a theory by which we can identify these distortions. Habermas calls for resistance to inappropriate rationalisation by using a reconstruction of theory to overcome unanticipated consequences to actions. Theory shows how the experience of discontent is related to certain inherent structural contradictions in society. Reflection on these contradictions leads to consistent actions so that, once inconsistencies have been identified, participants in a society can then form their own social theory to guide their actions.

Habermas' theory of communicative action can be characterised as a pedagogy for social learning based on the symbolic interactions of individuals. He presents a pragmatic approach to the analysis of decision-making that considers outcomes arrived at by force to never be legitimate. Legitimisation of technology does not belong to the realm of technical rationality but to the communicative dimensions of technology and that belief opens it to a critical-pragmatic analysis focused on the conditions of a technology's validity. Subordinating procedures to technology oversimplifies the basis for their legitimacy. That is, reasons for decisions become accepted without negotiation, justified by their strategic value and leaving behind the critical communicative practice of everyday life. To be legitimate there needs to be a balance between the technical and structural constraints required to succeed in an endeavour, and the critical reflection that determine whether those actions are likely to achieve what it is hoped will be achieved. Too much constraint makes the decision-making process inflexible and unable to adapt to alternative circumstances, while too much reflection deprives us of the resolve to undertake decisive actions by spending excessive amounts of time comparing alternatives.

The dominance of technocratic thinking has to be closely managed if we are to achieve Habermas' goal of closing the gap between values and what matters in practice. This becomes somewhat more complicated when that dominance is as subtle as the built-in restrictions of technology. As we saw in Chapter 2, technology undergoes two stages of rationalisation. The experiential view of technology formed in that chapter argued that technology starts from experiences in which problematic situations initiate a learning process that transforms the problematic into a settled, determined situation. The tools used in this process will only be appropriate when they are designed specifically for that purpose. This creates a storehouse of conceptual artefacts that can be drawn upon to solve future problems. Successful solutions that suit the situation are continually reproduced and gradually become incorporated into physical objects through a process of delegation. This makes technology a combination of human ideas with physical objects. Some technologies are specifically directed towards cognition and, in an information-saturated world, we have become increasingly dependent upon them.

In the first stage of instrumentalization, as portrayed by Feenberg it in Chapter 3, values are delegated to technology so that it can, in the second stage, take on the role of steering media once it has been relieved of the problem of justification. In the example of online learning presented in the previous chapter, communication technology develops fields of experimentation and creativity in which the project of the student's identity as a learner is co-formed along with their understanding of the subject matter. The concept of co-formation questions the idea that there is a linear development of technology and it sees design as a social process in which all possible actors take part. This contradicts many of the design schemes followed by educational technologists who only consider the second stage of instrumentalization which is the operationalising pre-determined plans. From this perspective, technology development is seen to be a systematic process beginning with analysing the needs of the target audience (see for example Dick & Carey, 1985). However, an extensive survey of educational projects by Lowther and Sullivan (1994) found that a focus on the first stage of instrumentalization, in the form of team-building, to be a more effective approach to educational design in the long run. This is due to different practices and beliefs having the potential to lead to significant disagreement between teachers and educational technologists and thereby delaying projects. Similarly, Toohey (1999) describes course design in higher education as involving a two-stage process, the first involving the course design team building a shared understanding of the beliefs, values and ideologies that inform the course design. Toohey admits that this is often overlooked because it requires highly developed facilitation skills but, once completed, the second stage of developing the materials is relatively straightforward by comparison.

Habermas agrees that there are two spheres of social integration in human actions and argues that they need to be kept separate. Long periods of time spent in disagreement over the direction and approach of an educational project is clearly inefficient in project management terms, but equally, it would be just as inappropriate to judge a system established for the effective running of the project based on social values. For example, when learning to use the World-wide Web, students do not want to debate the merits of computer technology. Their focus is on making the system work as effectively as possible rather than how the system

maintains the inequalities in society, privatises human interaction or reduces the chances that people will meet in public places. While the use of the Internet in higher education may in fact result in a loss of appropriate workloads or a decline in the quality of intellectual conversations and academic integrity, an endless discussion in this context about how higher education had become a little less personal would simple result in greater inefficiencies, when the intention of introducing the technology was to reduce such problems.

The example of the Australian Technology University, described in the previous chapter, is illustrative of how neglecting the value formation stage of an educational technology can produce unintended outcomes. In higher education a tension exists between the needs of learners as an autonomous adults and the administrative needs of the institution. With technology taking such an important role in higher education teaching and learning, educators need to have a say in the values embedded in educational technology. By relying on externally produced proprietary software its educators have lost the opportunity to establish an educational technology embedded in the culture, social norms and beliefs of higher education. Universities will only survive as long as they maintain a strong connection with the values of its academic community, which also underpin all its activities including its technology. Users of the Internet are plainly communicatively competent in that they can perform complex acts that coordinate their interactions with others without necessarily knowing the underlying rules the system uses to function. Following Habermas, how we communicate with others is based upon an implicit understanding of communication and our perception of others involved. In order to be brought into a speech community requires giving up the authoritative position of an observer. One has to accept that everyone involved in communication has the same status as the others and is therefore open to critique. The Internet can support these kinds of interactions and therefore can be a successful environment for authentic learning, as is demonstrated by its users learning to use email, computer conferencing and web browsing every day without formal instruction. Like money and power, technology contains built in values that are easily perceived by its user, and therefore does not require additional negotiation to be utilised. This may be fully appropriate in situations where negotiations of norms are a waste of time or resources, but it may

lead to ethical failures when education is intended to socialise students into professional praxis.

8.1.1 Characteristics of a Successful Online Learner

Universities are only at the threshold of exploring the social potential for these technologies. To understand modern technology within the framework provided by Habermas' theory, it is necessary to recognise that societies are pluralistic, in which the numerous perspectives of its sub-groups causes a fragmentation of worldviews. Any decision needs to take into account this diffusion of views which destabilises the shared backgrounds and traditional authority in a society. With more perspectives to draw upon there will be more aspects of any decision that need to be discussed in order to reach an explicit agreement. It is up to universities to create the technology for academic learning and the participants will evaluate for themselves whether it is appropriate to their values in teaching and learning. In the shift from physical to digital, the representation of conceptual artefacts has the potential to add additional capabilities to students in handling knowledge, and therefore increased intelligence. It is through its combination with the conceptual artefacts that Popper called World 3, that technology is able to augment the experience of the physical world. This is the opposite to the artificial world conceived of by "virtual reality" which hoped to replicate and replace a naturalistic, physical environment with the help of a computer (for examples see Sherman & Craig, 2003). Instead, it is a view closer to current versions of ubiquitous computing that augments reality to support "ambient intelligence" (Aarts, Harwig, & Schuurmans, 2002). That is, it adds information to the physical world to create a form of artificial intelligence which extend our understanding of the world, as suggested by Levinson's (1988) concept of "meta-cognitive tools" (see Section 2.3.1.1), rather than replacing human intelligence. In other words, in an age dominated by information, computer technology continues the evolution of providing the tools humans use to think with (Rheingold, 2000).

In Chapter 5 it was argued that taking an argumentative position to learning develops an authentic understanding. This moves teaching well beyond simple transmission models of communication that view learning as a process of correspondence between

teacher and student conceptions. In Chapter 6 a discussion of Vygotsky's theories showed how, by standing between the student and the lecturer, these tools for thought enhance learning from experience (Section 6.1.1). This is where social life and communication interact to take the collective behaviour out of the heads of individuals and into the dynamics of the situation. In Vygotsky's view, by drawing on the collective understanding of a number of people it is possible to come to know more than what any individual knows about the same activities had they completed them solely by themselves. The task of technology for learning in higher education is to reconstruct the problem situation so that the students experience it in such a way that their actions can be authentic to that situation. In Chapter 6 it was argued that teaching in higher education creates an artificial environment for learning in which the students' learning identity is formed. The task of setting up a classroom environment is to ensure that students can learn and in this thesis it has been argued that studies of authentic learning demonstrate that students learn best in social situations.

Understanding is always about something in the world and Habermas argues that we negotiate three worlds at once—the physical, social and subjective worlds. The material world is influenced by the ideas we have about the physical environment. As well as the objective world, Habermas points out that it is necessary to make a reference to something in the social and subjective world in an effort to reach an understanding. Experiences result from interacting with other people and we learn from those experiences. It is the members of our social group that encourage us to think in a certain way. Technology may mediate this interaction but, as Suchman (1987) demonstrated, it is impossible to interact with technology in a way that the technology develops an understanding. Communicative reason bases its criteria in the argumentative procedure of redeeming claims to propositional truth, normative rightness and subjective truthfulness. When any explanation is unclear we demand alternative forms of justification grounded in four validity claims—comprehensibility, truth, truthfulness and rightness (Habermas, 1990, p. 58). The universal conditions of understanding are reconstructed in these four validity claims which operate under the assumption that speakers are always accountable for what they say (Habermas, 1987c, p. 100).

It is widely agreed that to be a good student in the university is to possess more than just knowledge. A good student approaches learning with the right frame of mind, with what has been called a deep approach to learning. Following Habermas I have argued in this thesis that this is a communicative rather than strategic frame of mind. As Habermas' theory of communicative action demonstrates, organising knowledge to meet another's ends is not serving the student's learning. Learning is as much an attitude to education as a mastery of content. It is an attitude of thoughtful interaction in which students become informed of better arguments. The major skills needed by online students are also communicative rather than technical. The worker-students of the ATU, for example, do not need instruction on what to decide, rather they need procedural guidance for ways of managing academic interactions that exemplify the ideal of communicative fairness. Communication is far more than a transfer of signals from a sender to a receiver. It involves people, institutions and culture. Naturally, online learners still need to be comfortable with the use of technology preferably with a high-speed, reliable access to the Internet (Palloff & Pratt, 2003). Ideally, an online learner would have access to their own technology, can develop their own computer skills, such as basic typing ability, and cope with large amounts of information through well developed abilities in research, reading and writing. However, we saw in Section 4.3.2 that success in online learning depends as much on how much power the students have to say "no" to the other priorities in their life as any specific technical abilities. Greater computer processing power will not make students better learners. As Feenberg (2002) argues, the majority of online learning involves low-bandwidth text and packet switching technology makes the transmission of text very efficient. Text can be exchanged on machines with the lowest levels of processing power, even pagers and mobile phones.

The key to being a successful online learner is to have the ability to manage time and possess a commitment to learning made necessary by the lack of incentives and greater flexibility of the online learning environment. Self-control in our relations with the world and with others has the highest standing in our society. The most important institution for fostering this self-control is education. Higher education tries to get the balance between external control and encouraging self-control that develops the self-directed, autonomous student. In this way universities socialise

people into being autonomous students. This gives teaching and learning in higher education both a moral and ethical dimension. The self-realisation of working something out for him or herself entails the development of students into an ethical agent. Their ethical self develops its identity in the concrete context of interaction which determines the meaning of a good learning context in which students are in control of their own learning.

If lecturers want students to adopt a deep approach to learning then their students have to be involved in shaping the learning context. While no formal learning context can be an equal sharing of power between learners and teachers, the example of the course management software programs such as WebCT and Blackboard, which provide tools for monitoring student participation, highlights the skewing effect that can be built into technology. But, students should never be conceived of as powerless when faced with a new technology. Even in the most teacher-centred course students make decisions through their attention to what is necessary for their own learning. However, to offer a true choice students need to be competent at online communication by which they are able to participate and coordinate their actions with others. In universities these would be the practices that are consistent with the generally agreed norms of higher education. That is, successful online learning is consistent with the goals of a deep approach to learning. A deep approach to learning entails a level of interaction that includes argumentation involving the imaginary projection of oneself into the position of others with the intention to test their claims in a non-coercive, democratic environment.

8.2 Appropriate Rationalisation in Educational Technology

In the ideal situation all students would simply adopt a deep approach to their learning. Instead, many concentrate on the information-processing components of knowledge. When external factors such as these dominate, student actions are taken to be less authentic. In Chapter 5 this was called a surface approach to learning. The model applied to examine educational decision-making in this thesis is discourse ethics. Discourse ethics provides the means of testing the legitimacy of the procedural nature of interactions. To be considered a fair and democratic system, all

sections of society, including higher education, need to demonstrate the same commitment to procedural openness, so that individuals can make their own decisions about the kind of life they would like to lead. In education, it is only this kind of system that will support an authentically deep approach to learning.

Chapter 7 outlined a proceduralist approach in which the legitimate regulation of such issues in online technology requires that students themselves take part in pubic discussions that determine which differences are relevant to discussions of equality. To be legitimate, technology-using students would need to come together to explicitly discuss the use of learning objects and agree to the appropriate use of the university system. McConnell (2000) provides an example of what this may look like in practice. He describes how communication technology can support open, negotiated learning in a post-graduate course in management learning taken by part-time students. The course blends computer conferencing with email and face-to-face workshops which provide students with two complementary learning environments. Only the workshop components are designed in any detail (McConnell, 2000, p. 144). The face-to-face experience is used to form small tutorial groups of three to five participants working with a tutor who all subsequently continue their learning online (McConnell, 2000, p. 145). Staff and students spend considerable time in the workshops discussing their interests in working with each other, which McConnell argues is the most complex and time consuming aspect of the program. The students decide who to work with online and how they intend to work together.

The computer environment is added to the face-to-face encounters to allow the discussions from the workshop to continue in different locations. The primary learning experience of the subject is a collaborative assessment task (for more detail see, McConnell, 2002). Each group operates their own online conference to provide feedback to others on their assignments based on criteria that they have negotiated in the workshop and the agreements on how they will give feedback. The focus of the online discussion is the collaborative writing that involves a process of assessing other group members' work and providing suggestions for how they can be improved. On analysing the transcripts of his student's interaction in the conferences, McConnell argues that this process led to self-managed cooperative learning where

the students took control of the learning process and made decisions on how to proceed with the assessment (McConnell, 2000, p. 155). Students describe becoming emotionally involved in the process of commenting on other students' work developed a feeling of intimacy with their fellow students (McConnell, 2000, p. 180). For example, they described becoming annoyed, frustrated and stimulated by the interactions online. Students described the process as pleasurable but some felt that at times there was a lack of honest criticism (McConnell, 2002. p. 82).

McConnell is mindful of the contradiction in the tutor-participant role that develops due to the power relationship between tutors and students (McConnell, 2000, p. 175). McConnell argues that tutors need to moderate their interventions through self-critical awareness and dialogue with participants. In online interactions it is more difficult to be aware of the impact of interventions than in face-to-face situations. For example, the lack of non-verbal cues can lead to unanticipated effects, like the desire to remove online silence because it makes it challenging to gauge the effectiveness of interventions (McConnell, 2000, p. 176). In this example the tutor held back from initiating the process and waited for participants to address issues. He did not lead discussion or initiate assessment. Students, on the other hand, saw an advantage in the need to clearly express all interventions. As they were largely unsure of the level of work required in their assignments, they effectively learnt from other student's experiences by having access to other students work which in turn helped them to gauge the quality of their own work (McConnell, 2002, p. 185).

McConnell's course would come close to approximating the Habermasian ideal of all involved deciding for themselves. He demonstrates how collective ownership of a conference can be achieved democratically by making the design of the program open to discussion. McConnell argues that it is the collaborative environment making decisions about online learning that allowed the peer and self assessment to take place (McConnell, 2002, p. 76). From the Habermasian perspective, the closer the model they experience in the classroom is with the agreed-upon values of higher education (namely a deep approach to learning), the more legitimate the situation. For students to accept technology as legitimate, decisions in its development and use should have a rational basis. Legitimacy is important because, in a post-metaphysical

age described in Section 5.5, the norms must be enacted without an appeal to an outside authority, which, in higher education, would just lead students towards a surface approach to learning. With the breakdown of authoritative knowledge, classrooms need to also adapt to constructing independent, self-directed learners.

Habermas (1987c, p. 366) argues that many legitimisations are first seen as freedom-guaranteeing, particularly freedom from pre-modern relations of power and dependence. This expands into more areas as they became steered by administrative imperatives. An example of the desire for self-determination becoming increasingly bureaucratised is seen in the shift from teacher-centred to student-centred learning. After initially being presented as a case for greater student autonomy (see for example Rogers, 1969), the argument for student-centred learning is increasingly moving to one of student consumer rights. As students are now more willing to take legal action against their institution over poor-quality teaching, the question of student learning is subjected to external judicial review and in the process establishes legal precedents. These precedents are then carried forward by government administration in an effort to avoid further legal action. Universities have, in the process, lost the ability to argue for particular student experiences based on what has traditionally been considered a good education.

The proceduralist paradigm that is the foundation of Habermas' work shows how the institution can meet the demands of increased complexity without becoming increasingly bureaucratic and undermining the democratic principles of education. It provides a new way of thinking about a more participatory form of classroom management. The appropriate rationalisation of educational technology incorporates the educational values of universities into the artefacts of teaching and learning. Not all universities display the same commitment to traditional academic values. For example, the Australian Technology University described in Chapter 7 emphasised a strong practice orientation embodied within its identification with technology. The students recognised that the ATU is not a traditional university with the same orientation to research and scholarship, but one that creates the environment for the development of their identities as worker-students. The flexibility of less traditions-focused and spatially dispersed students creates the demand for a means to

coordinate student and lecturer interaction through a communications technology, like the Internet. The flexibility of online learning assists with students continuing to study while still participating in the other activities important in their life, such as work and family obligations.

However, students do not accept that work and private ownership of teaching and learning infrastructure is the ideal form of higher education. Students have come to expect computers to be a large part of their learning. Surveys of the use of Internet access among Australian tertiary students show that nine out of ten students make regular use of information and communications technology, with sixty-five per cent of them having Internet access at home (Oliver & Towers, 2002). When students at the ATU rated their preferred ways to use computers, most favoured accessing them at home or at work. Students consistently rate the current levels of computer availability at the University as less than adequate. Yet, they do not necessarily want to use on-campus computers, as the ATU facilities were perceived as being overcrowded, unreliable and out-dated. The University's response to the student criticism has been to establish minimum requirements for campus-based student computing facilities and implement strategies that will increase student computer ownership. With already the vast majority of students owning their own computer, including an Internet connection at home, their dissatisfaction largely relates to the performance of the support services, which they criticise for being indifferent towards teaching them how to use the system more effectively.

A more intractable issue is that academics are not fully convinced that the online environment can provide the social network necessary to encourage the participation required for students to adopt a deep approach to learning. Meeting online is a shared conceptual space, more comparable to Popper's World 3, than Habermas' social space. Students are still physical beings and as such primarily reside in physical institutions where they are subject to the rules of social interaction. It may be possible to evade those rules for a while by being online, but it is still not possible to withdraw from humanity completely. As Habermas indicated, historical and social beings find themselves in an already linguistically structured lifeworld. These are the forms of communication through which we read an understanding with one another

about the world or about ourselves. Feenberg has been able to incorporate the concept of design critique within Habermas' theory of communicative action to argue that there are multiple possible rationalisations for society. Feenberg saw that communications technology acts as another medium for coordinating human interaction as another type of steering media. Feenberg's great insight is that technologies, like the Internet, host transactions that no-one fully understands or controls. There is never a single voice in a technology, which can be seen to act like a marketplace for human ideas. As with economic markets, technology is geared towards experimentation. Many of these experiments are likely to fail. It is this process of underdetermination that maintains the momentum for technological development which is a necessary condition for social participation in technical design.

8.2.1 A Scholarly Approach to Educational Technology

It has been argued in this thesis that academics rarely reflect on the values that technology introduces into their teaching. The reconstructive analysis used in this thesis implies that ideas are socially constructed and they therefore can be reconstructed and changed by making other choices. It suggests that educators have implicit understandings of education which inform their practices. These theories are ideal types that are modified in their implementation in specific contexts. Except teachers are rarely critical about their own pedagogical beliefs and they have very little to say about the values taught with computers (Bowers, 1988; Pacey, 1983; G. Russell, 1994). Even educational technologists, who are at the forefront of encouraging the use of technology, have not seen the need to deliberate on the impact of technology on teaching and learning and there is comparatively little evidence in literature of discussions of the values imbedded in what they do or how these values shape interactions in the classroom. As Feenberg argued (outlined in Section 3.4), experts' interests lie in serving the needs of technology and the advice from those who work with educational technology focuses primarily on the practicalities of hardware and software to ensure that the technology educators use is reliable, efficient and the latest available (for two recent examples of this extensive literature, see Jolliffe, 2001; or Roblyer, 2003).

It is the self-interested perspective of experts that has led to the crisis in confidence in the use of technology in higher education. Computer experts seem to consider academics not to have the appropriate skills required to decide how to teach their students. This defines the appropriateness of skills on technical rather than academic criteria. If universities accept this indifference to the lack of results from research into the influence of educational technology on student learning they would be engaging in a performative contradiction against the self-determining values of higher education. Most authors agree that the special character of higher education is through its close relationship with inquiry (see for example Barnett, 1997; Marginson & Considine, 2000; Parsons & Platt, 1973; Readings, 1996). In Australia the characteristics of universities are tightly regulated when compared to the United States and institutions must meet clear criteria for the definition of a university. National protocols by the Ministerial Council on Education Employment Training and Youth Affairs (2000) restrict the label "university" to institutions that award higher education qualifications across a range of fields at levels which are equivalent to comparable international standards. The institution must demonstrate a culture of sustained scholarship extending to the creation of new knowledge through research and original creative endeavour. Teaching and learning at a university must be consistent with these values and engage with advanced knowledge building and inquiry.

The scholarly approach to teaching that this definition suggests is a concept that is central to a study of academic work conducted by Boyer (1990). Scholarship is conceived of as turning the research skills of university teachers towards ensuring high-quality student learning. Ramsden (2003) describes the scholarship of teaching as making teaching into a process of discovery, so that lecturers enquire into how they can enhance the quality of student learning. The strength of this approach is the association with the values of research which already have widespread institutional support. Scholarship involves creating the visible artefacts of knowledge, which, following the analysis in Chapter 2, I have been calling technology. In higher education this includes textbooks, journal articles, conference papers and other teaching materials. Braxton and Del Favero (2002) indicate that papers,

presentations, reports, videos, computer software and web sites are all publicly observable but unpublished forms of scholarship.

It is this process of making the private teaching decisions public that represents the intersection of theory and practice between technology and scholarship. Shulman (1998) defines scholarship as the practical aspect of research, which involves creating the visible artefacts of knowledge that are not only made public, but are open to critical appraisal and are in a form that permits exchange with others in the scholarly community. If educational technology is a way of constructing the classroom environment which is to result in high-quality student learning, then scholarship of educational technology is the use of this technology to ensure that learning has occurred. If universities accept forms of teaching with technology that are not inquiry-based, they will undermine their own case for determining the appropriate approach to learning by showing they hold values contrary to the academic ethic. Similarly, a scholarly approach to online learning would use concepts, such as participation and collaboration, to include students in an exploratory environment that is open to further interpretation by the learner. Universities, as inquiry-based institutions, place evaluation and critical appraisal at the heart of all academic work. It is part of every academic activity, whether the students are evaluating their own work, their lecturer's teaching or the lecturer assesses the students, evaluates their colleagues' research or their own teaching with technology.

8.3 Understanding Higher Education Technology

In this thesis it has been argued that the key to a scholarly approach to educational technology is to include the students in the decisions about their learning environment while they still have a chance to influence the design process. However, the legitimacy of education technology is seen by many to be in the efficiency it provides in the economical delivery of teaching and learning. Universities are expecting the Internet to grant efficient access to a great variety of information to ever increasing numbers of students, while also containing the costs of education. Computers, however, have turned out not to be the tools of efficiency that they were

claimed to be. As discussed in Chapter 5, the automation of information retrieval does not encourage deep approaches to learning. Those staff who use online discussions find that it does reduce the burden of administrative queries but the system also places greater pressure on responding to student's enquiries. While it has been noticed that students seem to put more thought into written rather than oral discussions, the workload for students and lecturers increases, making teaching more time-consuming than teaching in a traditional class.

Time pressure has been a recurring theme in the adoption of new technology (see, for example, Cuban, 2001) and universities are coming to recognise that online learning is not a mechanism for saving money. There are substantial costs in maintaining modern technology, learning to use new software and developing a technological environment that comes close to replicating the face-to-face learning experience for students. Technology has a profound effect on teaching and learning if for no other reason than it forces lecturers and students to learn how to use the system. The time to learn the new conventions of online learning must also be considered along with the time for academics to develop resources. However, online learning has become an infrastructure technology without which students cannot learn at university, particularly time-poor worker-students. To determine whether technology provides students with more power and control over their learning, or it reinforces lecturers' power and control over students, this thesis explored the deep structures of technology and education to understand what is being affirmed and why. From the four critiques of the norms of higher education and the values in technology it concludes that there has not been a close alignment between the two. As we saw in Chapter 7, the technologies to support participation online already exist, however, universities on the whole have elected to adopt standardising systems. The university's response to uncertainty, diversity and what Barnett (2000) calls "super-complexity" in which the enterprise itself is being questioned, is the technological response of attempting to provide greater control and predictability. The ATU, for one, has opted not to consider the Internet as an infrastructure technology open to all but to limit and reconstruct the Internet as a "virtual classroom" by adopting proprietary software systems that separate learning experiences from the "real world" of the web-surfing, email and chat.

In the case of educational technology the only way to judge its value to higher education is against the values of scholarship. Performatively consistent teaching would add a self-reflective dimension to the use of technology in which academics become scholars of teaching (Boyer, 1990, p. 23), systematically reviewing how and what their students learn and including students in this process. In this thesis I have looked at the "deworlding" influences of educational technology by using Feenberg's societal view of the coordinating power of technology to analyse the classroom level at which educational technology coordinates students' actions. Following Feenberg's interpretative method of understanding the underlying meaning of technical objects, the first step in critiquing educational technology was to understand the possible meaning students attribute to their experience of learning in higher education. Feenberg describes technology as consisting of both social and non-social components that respond to two forms of rationality, one that he calls primary, the other secondary. The difficulty in analysing and critiquing the codes of technology is that once they are successful they disappear from the user's centre of attention. To bring these hidden understandings back into view this thesis has followed the methodological arguments put forward by Feenberg (1991; 1995a; 1999b). This was outlined in Chapter 3 as a critique of instrumentalization which draws on social constructivist research to demonstrate that technology has an interpretative flexibility that allows it to be viewed as symbolic expression.

In this thesis it has been argued that the medium for interaction in university teaching and learning is a combination of norms, situated actions and technical devices that combine to form a classroom. Classrooms formalise learning in a modern education by ordering students' experiences in the manner suggested by Heidegger (outlined in Chapter 2) as characteristic of all machines. When applied to an educational context, human ordering of student experiences inserts our ideas of teaching and learning into the physical space of a classroom. That is, they separate students from the outside, natural world by putting physical constraints on how they can or cannot act. Classrooms "deworld" everyday sensations from the experiences that are useful for purposeful formal learning. This thesis reconstructs the structural rules classrooms provide for learning from four corresponding dimensions of educational technology, the technical object, norms of student learning, teaching processes and technical

design. The conclusion that can be drawn from the discussion in this thesis is that a limited conception of technology is an obstacle to identifying what is educational about technology. This has been the key theme of this research, namely that a narrow view of educational technology is a failure to recognise the contested nature of technology as a concept. Simple examples of technology use maintain a separation of subject and object that excludes potentially constructive frameworks for the analysis of the influence of technology. This results in the influence of the technical aspects of educational use of technology being overlooked because of the widespread view that technology does not directly impact on academic performance, as there is no qualitative, observable influence by the delivery method (as argued by Clark, 1994).

The narrow view of technology as not influencing student learning has led to a tendency to ignore complex examples of educational technology like classrooms. It is a view that fails to notice that a standardised approach to teaching cannot serve every student and is therefore not appropriate for the kind of learning students require to participate in complex modern society. Agency is about relationships and it is for that reason that it is necessary to look at how it is possible to make technology work for student learning. By accepting that technology is a contested arena with political consequences, critical theory continues to provide the best framework for introducing the social character of technology within the dominant instrumental position. One of the outcomes of reconstructive analysis is to problematise taken-for-granted components of official accounts of how norms came to exist in a modern society. Similarly, many aspects of technological actions in higher education are no longer questioned, and it requires a critical reconstruction to investigate their normative dimensions with the aim of understanding what is trying to be achieved through the technologies concerned. Only then is it possible to suggest alternatives to achieving these or alternative aims.

Uncertainty about the impact of technology on education comes about because it is simply not possible to distinguish exactly where the technology of higher education begins and natural learning ends. Higher education is a co-construction of teaching and learning with its technical elements and its boundaries are not defined through association with any particular objects. Rather, higher education is a complex

amalgamation of elements that combine to form a space for education through their use. A successful educational technology is one that provides the ability for students to develop their identities as learners. To build an understanding of the problematic of educational technology and analyse the underlying structure of the elements that influence its activities, it is necessary to consider the most enduring technologies in higher education. In this thesis this has been through a reconstruction of the principles of technology that develops instruments of inquiry (Dewey, 1948) into the values that are steering universities' decisions. What this study adds to our understanding of educational technology is that the classroom continues to represent the standard by which a learning environment is judged in universities. Students still go to classrooms to learn and, as a consequence, find in university classrooms the learning resources they need to achieve the appropriate approach to learning. They are, however, responding to the environment that they find themselves in, in two distinct ways. Students respond either deeply and intrinsically or shallowly and extrinsically to the constraints of their environment.

Once it has been determined what a technology means for academics and students the interplay of social and technical elements will govern the future direction of educational technology designs. Feenberg asks whether the future direction for online learning will be to become more like the factory or the city (Feenberg, 2002, p. 114). That is, does knowledge creation in the digital world solve problems of sophisticated interaction that favours a cosmopolitan arrangement or does it solve problems of simplification and standardisation which Feenberg (2001) was concerned would lead to a removal of teachers from teaching in an effort to lower the costs of education? As could be plainly seen in the analysis in Chapter 7, the response of the ATU to increase competition and uncertainty was to draw on the rhetoric of the "university in the city". Its identity was not to be allied to the solidity suggested by the materials of its construction, as is the case with the traditional Australian university, but is aligned to the technical sophistication required by residing on the edge of the city. As a result the university becomes more fluid and open-ended in the same way that cities are loose networks with blurred organisational boundaries coordinated massive information flows, networks and information exchanges (Castells, 2000).

However, cities also consist of industrial areas where physical location is used to create the favourable conditions for production. For example, in the contemporary city there are factories of information processing, such as office blocks and telephone "call centres", as well as factories of manufacturing. Similarly, at the ATU only a third of computers are offered in common computing facilities open to all ATU students. The University's primary computer facilities are located within laboratories that provide specialised software to students enrolled in the respective faculty's courses. This creates major problems for the significant population of part-time students who cannot get after-hours access to computer laboratories, and for technical support at times when part-time students are using the facilities or need to spent long periods of time waiting to access these limited computer facilities. From the city-university perspective, however, it is providing the fundamental support and resources needed for studying and enabling an academic culture, which includes the requirement to access its factory-like, computer laboratories.

The city-university metaphor suggests that issues of technology's influence on teaching and learning need to be approached through student participation and technologically-informed citizenship (L. Winner, 1995). Students cannot be considered to be workers in a knowledge factory but are key stakeholders in the city-university who are active contributors to its development, collaborating and responding to constantly changing conditions (Frost & Chopp, 2004). The automation of teaching may at first appear to administrators to reduce the substantial fixed labour costs of teaching but, as Latour demonstrated, there is reciprocity in all technical interactions which cannot be ignored. It has been argued in this thesis that any automation in online learning is through the production and management of academic texts. With so much material being delivered through lectures, the role of audio-visual equipment has been to extend lecturing time by continuing to provide access to information even after the human lecturer has stopped talking. In the face-to-face classroom increased computerisation of audio-visual material has had the effect of increasing the abstraction of educational texts to the point where it effectively removes the production limits to incorporating ever-greater levels of information into presentations. Indeed, online technology has the prospect of appropriate rationalisation in which it may be used to enhance access to information

to such an extent that lectures lose their simple information delivery role. This has the positive effect of revitalising participation in learning by permitting lecturers to maximise the social interaction in the face-to-face classroom following students individually working with learning materials and thereby improved opportunities to interact with people supporting their learning.

For this ideal to become a reality will take patience on behalf of online teachers, who will need to recognise that the deliberative capacities of students are something that need to be learnt, practised and extended. Even when it comes to operating in a technological environment, groups will need to learn to manage their own procedures with fairness and effectiveness, as well as networking with others and maintaining their participatory core. It was suggested in Chapter 5 that students come to university to learn to control their own learning and they learn to do this through taking risks through argumentation that helps to form their identities as learners. An example of how this may occur in an online environment is demonstrated by the Middle East role-play simulation (Maher, 1999). In this web-based role play students learn the possibilities and limitations of political power in response to a hypothetical scenario set in the Middle East. Small groups research an assigned role with the help of role profiles and material they developed through their lectures and tutorials. They use email and chat rooms to simulate international diplomatic negotiations with overseas universities. At the end of the simulation all students participate in a teleconference to discuss the issues that developed through their negotiations. As a result of this collaborative inquiry in which the assumptions behind each of the characters are confronted with well-reasoned arguments, the students develop a more specific understanding of the political situation in the Middle East and its impact on international relations (IDP Education Australia, 1995).

Universities prepare students for highly complex situations where surface approaches to learning would not be appropriate. Rowland (2000) argues that how people work together is a form of social inquiry which is more about bringing personal insights into the relationships than working towards pre-determined outcomes. Larger groups find this process more difficult and therefore group interactions become less efficient. It is the realities of complexity that has driven the larger faculties of the

ATU to adopt technology as a means to maintain communication between students and their lecturers. There will always be some level of one-sidedness in formal education and it is the teacher's role to attempt to maintain the deliberative capacities of the group by maintaining procedures that are open to discussion and provide practice in the process of deliberation.

8.4 What Is Educational about Technology in Higher Education?

In exploring the question of what is educational about technology this thesis considers whether or not technology supports an increase in student autonomy and independence that requires new norms to regulate student actions or whether the use of educational technology simply comes down to individual preferences and therefore does not require any form of shaping or guidance. The reciprocity of the human-technology relations outlined in this thesis reveals the impossibility of ever relieving humans of an active role in teaching or learning. As long as academics alone control the educational decision-making, the delivery and management of information is most likely to be the most common use of online technology. Technology could play a key role in focussing the process of developing the students' opinion of their approach to learning and codifying the results in a binding form. As Latour argued (see Chapter 3), delegation means machines undertake simple actions while complex actions are left to people. By delegating actions to technological objects the more complex actions of ensuring a rational consensus are delegated back to the lecturers. If this is applied to reflecting on the lecturer's values so that they are able to act more educationally with their students (as suggested by Rowland, 2000, p.108), the technological experience could be considered an appropriate rationalisation of higher education.

As a communication medium the Internet has a dual definition. It both transmits information and projects a social meaning that coordinates cooperation between individuals that permits greater participation. As Feenberg would suggest, lecturers seek to resolve normative disputes through technical delegations that effectively reinforce their power and legitimacy. Academics and students are restricted in their actions by technology but also participate in the development of the technology's

meaning. This raises important ethical questions for all educators. The shift to redefine the question of technology in education as one of ethics provides a framework for introducing the more socially specific characteristics of technology. A technology that is socially constructed is open to multiple interpretations, implying that technological decisions are more like ethical decisions than technical ones. Once a consensus has been reached on the values and goals of higher education, the technical decisions on how technology can achieve these goals can be left to experts in different technical areas. Communication becomes the standard against which decisions are judged, so that technical design decisions can be measured against the conditions of communicative socialisation. Social decisions require widespread participation in discussion about the issues and cannot be left to any single interest group. The social nature of technology and the possibility for user intervention demonstrates that technology's development is always open to democratic participation. It is always open to people questioning the values of using a particular technology.

The technology critiques of this thesis show that it may simply not be appropriate to encourage any degree of standardisation in higher education teaching given the dynamic nature of student learning. The very nature of education provides unique problems of context which influence the ways things need to be approached. The loss of meaning in higher education is the result of the suggestion that human contact is not central to the educational process. In the proprietary online classroom students respond more to the educational structures delegated to the technology and less to the persuasion of their teacher's arguments. The teacher is shifted from the centre of the pedagogical relationship by their decision to use technology that is limited to crafting the environment. In proprietary software systems the values of higher education are too far from the facts of the students' experience of educational technology. To be consistent with the values of higher education, a learning technology would provide something more than just a one-way flow of information. The participation code in higher education expects students to gain greater control of their own learning so that they can make valid decisions in a super-complex, indeterminate, post-conventional world. As such, the use of proprietary software for online learning remains some

distance away from the ideal of students being socialised into educational self-determination.

CHAPTER 9

CONCLUDING REMARKS

Universities could go much further to incorporate the values of higher education into educational technology. The decision to use technology is as much a question of values as it is of technical considerations. Consequently, how students and lecturers should interact on the Internet is a normative question rather than simply one determined by technical constraints. Technology is constantly over-running the limits of its own legitimacy and is the wrong place to determine the values to be incorporated into higher education. Technology innovation is not a linear process but a complex web of interaction. By reconstructing the decisions in a technology's development it is possible to see the values that are incorporated into later versions of technical objects. In this thesis it has been argued that there are systematic aspects of student learning that can be distinguished from students' and lecturers' interactions in the classroom. Classrooms represent the archetypical educational technology in higher education and this analysis involves bringing its technological nature to the foreground. It also has to be acknowledged that this form of analysis is backward-looking to identify past patterns of behaviour and therefore does not predict future uses of technology in higher education. However, by conducting a situational analysis on the accumulated ideas of student learning manifest in educational technology, academics should be able to determine for themselves whether these match the values of higher education. It is then that theory and practice are most closely aligned.

Technology can only recover its legitimacy in higher education by providing the scholarly space for student learning. This is not created solely by teachers or by students but is a combination of the whole university experience, including that of having scholarly values incorporated in a flexible curriculum, the use of sustainable assessment, the development of open technology and in self-directed, autonomous

students. The online version of this academic world is constructed through conventions rather than physical affordances and these conventions need to be learnt by lecturers and students, rather than perceived directly from the environment. By concentrating on the deep structures of communication, Habermas' theory of communicative action offers a different approach to interpreting educational technology to Gibson's theory of affordances. Habermas suggests that the lifeworld is an environment of customary ways to structure activities that coordinate human interaction, which in higher education would be built into the representations of online learning. The everyday interactions of students continually reinforce their views and conceptions rather than challenge them, making it difficult for students to determine exactly which aspects of the representational classroom environment they should be turning their attention towards. By looking at the deep structures in educational technology and reconstructing them, it was possible to reveal their underlying, and taken for granted, assumptions and thereby open them to alternative explanation.

Universities have only just begun to tap the potential for online technologies to increase participation and identity experimentation. The students attracted to non-traditional modes of teaching will bring with them new values that will change how they relate to the university, to each other and to notions of education. This has become necessary because of the changing higher education context, which necessitates a reform of teaching and learning so that it can be faster moving, more effective and responsive. The past ten years have seen dramatic changes in technology that have included increased mediatization of student learning brought about by the invention and rapid expansion of the World-wide Web. The current development of online courses with course management software is an automation of computer programming by which lecturers construct educational web sites from a set of choices where the only influence they have on student learning is through the organisation and arrangement of textual information. However, the narrow view of technology that this is based on, overlooks the dual nature of information and communications technology described in this thesis. Experimentation with the conventions of communication renders some things in online classrooms much harder to achieve than in the physical classroom. For example, having the class break

up into small groups and discuss can be very difficult in an online class but is almost taken-for-granted in tutorials (Jaques, 2000). The same difficulties may exist in a face-to-face classroom as they do in the online environment but because of the familiarity with the conventions of communication, students handle it quickly in the more conventional setting, often without requiring additional instructor assistance.

9.1 Academics as Worker-Learners

How this study differs from other, more descriptive, studies of technology is in the investigation of the deep structures of student learning that influence the advice to academic staff that comes from reflecting on educational technology. Comparing advice given to university teachers about arranging aspects of physical classrooms to the advice for its online equivalent demonstrates the differences that are brought about by taking students out of the classroom. The reconstructive critiques of this thesis uncovered the logic of lecturer and student decisions to teach and learn with technology. In universities the interaction with conceptual artefacts is made possible by the fusion of multiple technologies in classrooms. These classrooms take many forms and three general types that have evolved as meta-cognitive technology discussed in this thesis are the lecture, tutorial and online. An investigation of the online environment created through proprietary computer software concluded that in order to make the Internet conducive to learning, the software emulates a classroom that combines the technical codes of lectures and tutorials. In doing so, online learning is able to build on the collective agreement about the norms of student learning drawn from the students' expectations of learning in the classroom. This recognises that the fusion of human and technical resulting from an interaction with educational technology is based on beliefs of the social group embodying the selective choices of technical objects. It is a simplification of the real world interaction that is accepted as meeting a socially recognised demand and from that point the technical codes on which it is based become largely taken for granted. The lifeworld then absorbs the necessary attitude and skills to operate the technology as if it were a given fact of nature rather than a constructed thing.

The response to advice on online technology raises particular challenges for academic development. The concept of developing academic staff seems obvious, yet is strangely elusive. The knowledge developed by academic developers always needs to be applied by someone else. Ideals like academic freedom, collegiality and institutional autonomy do not sit easily with the concept of human resources management. Given the widely discussed changes in society, knowledge, standards of accountability and technology, there is increasing pressure on school teachers to go beyond their pre-service teacher education and to be involved in career-long education and training. Academics, however, do not consider themselves to be teaching professionals. The Ph.D. is still thought of as the appropriate training for an academic career without concern for the teaching responsibilities expected of all academics. Lecturers see themselves as subject matter experts, rather than pedagogy experts creating a tension between pedagogy and subject matter (Isaacs & Parker, 1997). Hence, professional development generally refers to the research interests of the academic's original profession, which is usually not teaching unless they are members of a Faculty of Education.

The university teachers' emphasis on subject-matter often means questions of pedagogy are not taken seriously. McKeachie (1997) found that pre-service training before commencing teaching is a rarity in universities. University teachers, in contrast to school education, have always learnt to teach through a process of career-long education and training. In many cases this has not involved formal processes of academic staff development. Academics are themselves, ultimately, worker-learners. In Chapter 4 academic development was described as having a unique self-reflective relationship to university teaching in which theory and practice are closely aligned. For university teachers who go to the classroom to work, theory and practice are diametrically opposed. In the previous chapter it was argued that for students the university classroom represents neither the world of work nor the academic world as it solves problems from neither of these domains. Instead, it is a transitional location of reconstructive tension where problem situations are artificially constructed to prepare students for their role in society. The university can only ever be the authentic situation for academic learning. It is the workplace for academics in which they learn to teach better through reflecting on the influence of their practice, which

involves bringing the implicit assumptions behind their teaching to the surface so they can be examined and critiqued (Zuber-Skerritt, 1992). This thesis presents an invitation for them to do just that, as well as providing an analysis which shows the necessity of doing so.

Academic development is therefore tied up with identity, namely, what it is to be an academic. The changing goals of higher education are impacting on these perceptions where it is now more broadly recognised that academic staff need to develop a range of competencies including teaching, research, management, entrepreneurship and interpersonal skills. For academic developers the development of teaching is the defining element in academic activities. Research by Prosser and Trigwell (Prosser & Trigwell, 1997, p. 44; 1999) supports the belief that academics hold qualitatively different conceptions of teaching. They were able to discriminate five approaches to teaching, arguing that the principles of teacher's conceptions of teaching provide clear guidance for academic development (Prosser & Trigwell, 1997, p. 44). Prosser and Trigwill argue that the role of academic development is to work with staff to expand their awareness of teaching and learning situations which they suggest could involve exploring how their past experiences and their present learning and teaching contexts relate to the way they currently teach (Prosser & Trigwell, 1997, p.52).

The advice that academic developers have provided to academics about educational technology in the past has not always been honest. Research into technology that they rely upon to justify the use of educational technology cannot possibly prove that technical objects improve learning. To want it to do so places decision-making in the wrong location. Yet, quite unselfconsciously, the same people who encourage academics to use technology will turn around and fashion a career out of evaluating technology's failings rather than attempting to improve the technology that we have. Educational technology needs to be kept between academics and academic developers as a focus for reconstructive discussions about teaching and learning. Clearly academic development needs to be cautious about its use of technical expertise as a justification for teaching and learning as a focus on technology can result in less social interaction that has the greatest chance of changing academic

practice. As argued elsewhere in this thesis, it is technical experts who have a vested interest in promoting technology rather than student learning (see Section 3.4). In contrast, McKeachie (1997, p. 70) sees two goals for academic developers. The first is to provide training that results in greater skill through which academics can acquire greater confidence about their teaching ability. The second goal should be to provide academics with emotional support. Webb (1996) agrees that staff developers work with people, and while academic staff development may be about changing the knowledge, skills and attitudes of university teachers, Webb found it is easier for academic developers to be seen as catering for the technical skills and associated knowledge without altering, in any profound sense, the substance of the person (Webb, 1996, p. 35). In keeping with a reconstructive approach Webb calls for a greater emphasis on humanity to be brought back into the process of academic development rather than fostering claims to be neutral and professional with a specific technical focus and ignoring the uniqueness of the people involved.

9.2 Reconstructing Educational Technology

Universities are now faced with preparing students and academics to cope in a world of super-complexity, pluralism and work-place values which are putting academic values under stress (Barnett, 2003). There is no guarantee that the use of communications technology will improve the students' experience. We need to understand the kinds of shifts enabled by information and communication technology and balance the technical and social issues that result. The expansion of information technology into higher education, seemingly to increase interaction between the institution and students, has been a widespread response to the difficulty in managing communication in expanding institutions. Student choice has become a primary force in higher education. The possibility of choice is always a desirable principle because it is a measure of autonomy and freedom. Whatever technology is selected, it needs to permit students to make up their own minds about the best way to learn, in an unforced, undistorted way. Students are becoming active participants in their learning, wanting to have more control over their own lives, and are less likely to accept the views of authority. This represents a new teaching and learning contract in which the university is an enabling technology rather than a direct provider of

services. The university provides students with the resources to make their own lives, and in return they have to recognise their obligations to learn in a deep and meaningful way.

One criticism sometimes levelled at critical theory is that it is only concerned with meta-theoretical issues but has little to do with real problems of society (for a discussion of these issues related to education see the debate between Gallagher, 1996; and Young, 1996a; 1996b). Critical theory may not have direct practical consequences but it provides analytical tools with direct practical implications. Its practical relevance appears when it illuminates structural contradictions that individuals can then act upon. Habermas, in particular, maintains the value of abstract theory but rejects imposing theory on those who participate in practice. Instead, for Habermas, critical theory should have a practical intent in that it should assist participants to overcome oppression and domination. Theory, according to Habermas, must show social actors how their experience of discontent is related to certain contradictions in the social order and how these contradictions can be removed by indicating an appropriate course of action, similar to the way activity theory analyses human-object activity systems (see, for example, Engeström, 1999).

The goal of a critical reconstruction of educational technology is to provide guidance on how the deep structures in student learning can be uncovered. The important questions are not about biological characteristics of students or the media characteristics of technology, but what social and cultural changes will occur when a new way of thinking is introduced into universities. Reconstruction aims to counteract the failure to recognise the persistence of an existing system to reform itself. Simply pointing out distortions in a system is to engage in an evolutionary process that strengthens the status quo. It protects dominant interests from controversy by providing an opportunity for these interests to counter objections to its power. Reconstruction attempts to counteract this tendency by providing an alternative reality in the form of new goals and standards to work towards. The alternative reality for educational technology described in this thesis is one in which the goal is attainment of a “higher” education through increased student participation

in a deep approach to learning. Reconstructive investigations will not replace earlier systems but they hope to turn them towards more just outcomes.

A critical analysis of online learning is useful in this regard. It presents an alternative means of judging whether a higher education environment will enable students to not only learn the descriptions of the world devised by others, but also to develop their own understanding of the social world through argumentation. For Habermas the critical question in the technicization of the lifeworld is whether it is the pull of communication that shapes norms or the push of organisational performance that is motivating decision-making. According to Habermas, modernisation leads to a shrinking of the political for an increase in the administrative. From the analysis of online learning in this thesis it can be concluded that a variation of this one-sided reification of everyday communicative practice is occurring through the shift of pedagogical decisions to communication and information technology. The inappropriate use of online technologies to limit student options reduces the opportunities for situated participation that have the greatest likelihood of initiating change in student learning. As a result, classrooms are losing their specialised role in cultural transmission, a role that Habermas argues is dependent on mutual understanding as a mechanism for coordinating action (Habermas, 1987c, p. 330). Instead of false consciousness, the end result is a fragmented consciousness in which greater autonomy is provided for sectors dealt with by specialisation. In the case of higher education, administrative systems develop as university systems become more complex, separating the goals of teaching and research from administration. As a result, the academic lifeworld is fragmented into institutions increasingly controlled by power, money and technology, and universities are governed by senior executives who have become uncertain of what a higher education should represent (Marginson & Considine, 2000).

Habermas' principle that legitimacy requires agreement which is never coercive raises important questions about learning with technology. Online learning requires a new vision of social participation based on an acceptance of uncertainty, public involvement in decision-making and setting decisions in a wider value context. Discourse ethics is not a way to develop these norms but a means of judging which

of them are legitimate. By focussing on the social choices behind the technical it is possible to apply social critical theory to the use of educational technology. Critical theory provides a powerful combination of social analysis with interpretative processes to foster emancipatory interests. In higher education the Internet is one of the areas of social struggle. It raises questions of whether any institution established to serve a different epoch can still be relevant in the twenty-first century. Students are spending more of their time on the Internet and the quality of those experiences may not always be positive (The Learning Alliance for Higher Education, 2004). Commonly students describe the benefits of online learning as receiving prompt replies to emailed questions and the feeling of being able to form one-on-one relationships with academics online rather than in class. Its shortcomings come from the boredom of the solitary nature of online learning and the frustration of the self-discipline needed to keep up with assignments.

As a site of social struggle, the use of the Internet for teaching and learning reveals the technical codes we have come to rely on to incorporate educational values into technological decisions. From a research standpoint no conclusion is ever final and the question of what is educational about technology is in a perpetual process of being constructed and reconstructed. The development of technology and human practice does not stand still and may only be glimpsed from multiple perspectives. In any case definitive answers in education are not common and perfect answers on learning with technology are even more difficult. Instead, it is up to universities themselves to determine whether technology-mediated interactions provide the meaningful learning environments required in higher education.

The greatest concerns over the use of online learning emerge because the reasons for adopting new technologies are rarely educational. Some see technology as a solution to teaching problems. Others see it as replacing teachers with machines. Some commentators go so far as to predict the end of campus-based education as higher education loses its value to more widely available, cheaper forms of teaching. The understanding of educational technology developed in this thesis indicates that none of these scenarios are very likely. The Internet has not replaced the classroom but

over time it may very well give the classroom a new role for group interactions, culture-building and performance evaluation.

If academics, students and technology are to work together they must all learn to cooperate with one another. Habermas' communicative framework can demonstrate how the coordination of this cooperation ought to proceed for teaching methods to be legitimately adapted to the new environment. Academics and students have to make educational decisions for themselves, and to be aware of the influence that the values embodied in technology has on those decisions. To do otherwise would be to operate under a performative contradiction to the values of higher education. It is only through a reconstruction of educational technology with the values of higher education that university teachers are able to reinterpret the advice of academic developers in a way that furthers these relationships to make technology work for student learning.

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