THE AUTOMATIC STUDENT AND THE ROBOT PROFESSOR: ONLINE EDUCATION AND THE POLITICS OF UNIVERSITY REFORM

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ABSTRACT

Since the 1990s, “online education” has emerged at the centre of debates over the future of higher education. Symbolising for proponents a transformation of universities to align them with informational economies, for critics online education signifies the commodification of knowledge, commercialisation of learning, and the deskilling of instruction. Critics posit these tendencies as online education’s essence, and mount their critiques as a reaction against technology. This dissertation attempts to retain a critical position on educational reform while displacing critics’ essentialist claims. Commodification, commercialisation and deskilling are not inalienable technical properties but contingent social values informing how online education takes shape. This means that if online education supports commodification, commercialisation and deskilling, this is the result of its development within social contexts in which such values “win out” over competing educational values. It also means that these competing values could stand as a basis for alternative realisations of online education.

Drawing on constructivist technology studies, Foucauldian genealogy and Andrew Feenberg’s critical theory of technology, this dissertation develops a framework for understanding the history of technology as a process of struggle between competing values. It demonstrates the validity of this conceptual and methodological turn through the analysis of historical and contemporary cases in online education – the development of computer assisted instruction for distance education in the 1970s; experiments in educational computer conferencing in the 1980s; and the translation of a programme of institutional reform into a logic guiding the articulation of online education in the 1990s. Each case demonstrates that the forms of educational computing are relative to the values and interests that inform the strategic development of pedagogical practice and technological development in online education. Interventions into these value frameworks can result in an alternative form of online education. In the conclusion, I outline three areas that reflect such a transformation – blended learning, open source online education, and institutional policy developments around network technologies.

Keywords: Online education; critical theory of technology; genealogy; social construction of technology; computer assisted instruction; computer conferencing; higher education reform.

Subject Terms: Technology – Philosophy; Technology – Social aspects; Critical theory; Educational Technology – History; Educational Technology – Social Aspects; Education, Higher – Effect of technological innovations on; Internet in Education.

For Tammy and Silas

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It's not trial and error; it's designing the future
- Linda Harasim

It is not things, but what we think about things that troubles us.
- Epictetus

1.1 Introduction: Online Education as Saviour and Threat

Since the mid-1990s, online education – put simply the integration of networked information and communication technologies (ICTs) into the processes and structure of education – has emerged as an object of considerable contention in universities. In the context of shrinking budgets, rising costs, questions of relevance and accountability, burgeoning competition from "non-traditional" (i.e., private sector) providers, bloated classrooms, and calls for an expansion of access to support the emerging knowledge economy, online education appears as more than a new set of tools with potential to enhance educational practice. Indeed, it is being called upon to answer some of the deepest pedagogical, economic, and organisational challenges of higher education systems. In doing so, however, it is anticipated to transform higher education in ways that will leave no corner of the institution untouched, and that

[1] I will use "online education" throughout this dissertation in preference to other terms – "e-learning", "networked learning", etc. - because it embraces education as something that occurs *between* people in particular institutional, social, and historical contexts, as well as the wide variety of technologies involved in mediating this process. "Educational technologies" will be used to designate technical artefacts designed for or put to some educational purpose.

will require dramatic overhauls not only to the practice of teaching and learning, but to the organisation of academic labour, the place of the university in society, relations between the university, the State, industry and the market, and the goals of education as a social process. In this context, online education takes on a meaning and import greater than the functions or features of its underlying technologies, but which derives from the way in which its technical components are interpreted as part of a broader transformative movement in contemporary universities. As such "online education" comes to function metonymically in reference to a complex field of institutional transformations and to the role technology plays in giving shape and substance to them. Online education thus also stands at the centre of political controversy around the nature and meaning of these changes. By and large, this controversy has developed around opposing claims about the presumed benefits to be derived from and threats posed by the increasing use of ICTs in higher education.

Proponents of online education see new technologies as necessary instruments of reform in crisis-riddled education systems. Online education is depicted here as a beneficial solution to economic, organisational and pedagogical problems in the "traditional" (i.e., pre-technological) university. Thus, technologies are means of improving the quality and reducing the costs of higher education, resolving questions of the "relevance" of the university in the digital age, and integrating it more closely with the processes and structures of the information economy. The intractable schedules, parochial traditions and programmatic strictures of the university can be shaken off, in favour of a customised “anytime/anywhere” education organised around the interests, needs and “cognitive styles” of individual students (Kozma, 1987; Moore & Kearsley, 1996). Digital networks can serve as a distribution system for pre-packaged multi-media learning materials, designed by star faculty, mass produced at falling unit costs, and delivered by low-paid tutors, thus saving money on faculty salaries while addressing the need for more personalised, responsive forms of teaching (Margolis, 1998).[2] Economies of scale can be realised in the mass production and delivery of online instructional materials, providing campuses with new sources of revenue as access to hitherto untapped markets is extended (Taylor, 2002). Further, networked computers will ultimately serve as the primary educational interface, allowing much of the expense of maintaining campuses to be translated into equipment costs borne by students (Katz & Oblinger, 2000; Kibby, 2007). And since education will be delivered via the latest technologies, it will also embody the skills required for success on post-industrial labour markets, increasing its practical relevance and aligning it with the social and economic priorities of state and industry (Advisory Committee for Online Learning, 2001; Canada, 2002a & b; OECD, 2001).

Of course, proponents of technological reform in education do not see these perceived benefits of online education as being without their challenges. As societies develop an increasing technical interconnectivity, not only will educational institutions be able to gain distributed access to global learner

[2] Klass suggests, not without a dark irony, that tutors could perhaps be replaced by actors, it being understood that the expert development of content can be effectively separated from the “performance” contexts in which learning apparently occurs (Klass, 2000).

markets, but students will also be able to realise greater mobility between educational institutions, programmes, and courses. Universities will no longer be able to exercise *de facto* local or regional monopolies, but will have to remain competitive in virtualised global markets in education services (Galen, 2001; Katz & Associates, 1999). The quality of online course offerings – or at least their attractiveness as interactive media experiences – will have to remain high and production become more flexible as the mobility of students and competition for them increases (Wulf, 1998). And not only will universities be competing with one another, but the low costs of provision through ICTs will also encourage the entry of private providers into global education markets (Collis, 2002; Duderstadt, 1999; Lewis *et al.*, 2001). Such providers will be in a unique position to dominate the field, given that traditional universities are both unused to and unfit for operation in competitive environments (Auld, 1996).

Proponents also claim that changes in the university's operating conditions will, in turn, necessitate changes in its internal organisation and in pedagogical practice. The realisation of online education will mean the replacement of "physical processes with new process that can be accomplished over networks" (Katz & Oblinger, 2000: 2). The result will be a new kind of distributed institution, able to engage in the flexible work processes demanded by post-Fordist production (Harvey, 1989). Online education further heralds an "unbundling of higher education services," with "different providers carrying out different functions" (Wallhaus, 2000: 22). An intensified division of labour, along with a mass-customisation of learning, will encourage more "learner-centred" approaches, resulting in a redefinition of university instructors as “coaches” (Smith, 2002). Diversification in higher education will also necessitate the adoption of consumer models of the instructor-student relationship, where instruction becomes tailored to individual clients’ immediate needs and goals (Goodfellow, 2007). And meeting the growing demand for “lifelong learning” has suggested to some that online education will involve “the judicious use of automated [tutorial] systems” in order to align an expansion of access with the goals of cost-effectiveness and revenue generation (Taylor, 2001: 6).

As lofty and sweeping as many of these claims may appear, they have not been without a concrete foundation in technical and programmatic developments. The innovation of learning management systems (LMS)[3] and student information systems (SIS)[4] has demonstrated the technical possibility of fully virtualised higher education drawing on the vast information and communication resources of the Web, and indicated that many of the claims outlined above are not idle fancy on the part of dreamy-eyed technocrats. At the same time, the emergence of a number of fully online universities and programmes both in the public and private sector has made this more than a mere technical, but also an operational possibility.[5] For proponents of the technological transformation of the university,

[3] E.g. WebCT and Blackboard. LMS are virtual environments for hosting courses. They are amalgamations of individual tools and technologies which attempt to replicate the full palette of processes that make up education – provision of content, communication with instructors and other students, research, grading, assignment submission, quizzes & exams, etc.

[4] E.g. PeopleSoft and PowerSchool. SIS are systems that automate certain elements of students’ relations with the institution – course registration, account maintenance, application, etc.

[5] E.g. Jones International University, The University of Phoenix Online, the Western Governor’s University, the National Technological University and the California Virtual University. While these are but a handful of examples, their role as exemplars has lent force to a convergence of online education, privatisation and marketisation.

then, the inherent qualities and historical trajectories of online education point towards increasing marketisation (the opening of educational institutions to competition), commercialisation (the reconfiguration of education around virtualised educational products), privatisation (the adoption of corporate models of organisation and production and the entry of private providers into a traditionally protected sphere of social practice), and automation (the leveraging of technology to realise efficiencies in production and delivery along lines familiar from other industries). Because these qualities are largely seen to characterise and flow from the functional attributes of technologies themselves, they are also seen to supply an objective socio-technical environment to which universities have no choice but to adapt as online education develops. This situation has led many to predict that, insofar as online education represents a solution to the various problems besetting universities, it is one that will exact no less a price than the university itself – at least in its familiar form.

As is reflected in a raft of encomiums on the "death of the traditional university," proponents of online education as an agent of reform increasingly frame the relationship between technology and institutional change within what I call an "evangelical discourse": a figuration of online education which posits traditional forms of educational organisation and practice outside of – even negative to – a realisation of the potentials of new educational technologies, and which imagines the forms of change it details as the more or less inevitable by-products of such technologies. The evangelical discourse depicts the "virtual university" as an inexorable end-point on a logical historical *progressus*, makes its realisation seem contingent upon the implementation of just those features of the underlying technology that support the vision of automated, marketised, commercialised and deprofessionalised education outlined above, and relegates social groups in and around higher education to reactive positions *vis-à-vis* institutional restructuring. Under these terms, failure to adopt and adapt to online education means death for universities. Online education thus presents a devil's bargain – whether by self-conscious reform or the pressure of technological change, the university as it has existed for most of the twentieth century is apparently over. In a much-cited 1997 interview, management guru Peter Drucker crystallised this position:

> Thirty years from now the big universities will be relics […] It's as large a change as when we first got the printed book […] [It] took more than 200 years for the printed book to create the modern school. It won't take nearly that long for the big change. (Lenzner & Johnson, 1997: 7-8).

The nature of this "big change" is obvious: traditional practices, values, relationships, structures, etc. will vanish, no doubt in a puff of pipe smoke and a rustle of tweeds, to be replaced by the delivery of commodified information by deskilled instructors in digital networks. Salvation will come for the university, but it will come bearing a sword.

As the evangelical discourse rose in volume and frequency, and as the reformist movement underpinning it gained momentum, its terms came to be identified as intrinsic features of networked educational technologies themselves, and not only by proponents, but by those critical of the technocratic *putsch* that appeared to be sweeping over higher education. By the end of the 1990s, it had become clear to some that online education had less to do with education than with capitalising on technology to realise heightened institutional control (through division of labour, deskilling and automation), to integrate higher education more closely with the requirements of industry (leveraging technology for partnerships between universities and the private sector), and to tap into the huge higher education market (via commercial appropriation of system design and the production and sale of educational commodities). Wielded as a tool of reform by university administrators, state bureaucrats and corporate CEOs, online education was seen by many critics as inherently corrosive to the values of free and open inquiry, the academic profession as a semi-autonomous association dedicated to the pursuit of knowledge as a public good, and higher education as central to the project of democratic social and individual development.

This position was galvanised in a series of essays by David Noble, entitled "Digital Diploma Mills" (Noble, 1998a, b & c).[6] In the first of these, published in January of 1998 and subtitled "The automation of higher education," Noble focuses on the commercial take-over of universities, in which ICTs are seen to play an instrumental role. Noble's attack focuses on initiatives at York University and UCLA through which administrators tried to make the publication of online "courseware"[7] mandatory for all faculty. This was not, for Noble, merely the movement of physical resources into virtual space. Rather, both initiatives were undertaken in the context of deals with private corporations through which the

[6] All passages from the series are taken from the revised and expanded monograph version, published in 2002 under the title of the first in the original series.

[7] Anything from a course syllabus to a body of classroom resources and lecture notes.

newly digitised resources would be appropriated from faculty and used to generate revenues to be shared between the universities and the companies. Once alienated from the faculty who produced them, online courses could be delivered by low-cost tutors and education effectively rationalised along lines familiar from other industries organised around mass production. That the mass production technologies in question here would work on human beings was made more palatable by recourse to their “interactivity” and potential for customisation. Seemingly opposed principles (individualisation and mass production) thus find a kind of rhetorical harmony. Beneath the surface, however, is a form of rationalisation whereby education is re-imagined as an automated process of information delivery, in which learning is reified as a passive acquisition of commodified information, and in which knowledge is alienated from expert faculty and circulated through computer networks by a deskilled labour force. So tightly bound do the ideology of the market, the processes of labour rationalisation, managerial/corporate interests and the technologies of online education seem to be that, for Noble, there is little need to focus on the latter in their own right – the technologies themselves being merely a shorthand, screen, mask, and avatar for a familiar roster of interests who supply them with their dark animus:

> […] the universities were not simply undergoing a technological transformation. Beneath the change, and camouflaged by it, lies another: the commercialisation of higher education. For here as elsewhere technology is but a vehicle and a disarming disguise. (Noble, 2002: 26)

As critical voices multiplied, this appraisal came to be repeated, extended, and enhanced with respect to a variety of cases – with the result that critics of online education came to identify technologies with the very same trends in higher education reform as those to whom they were, in principle, opposed. Stanley Aronowitz, for example, associates educational computing with the rise of the “corporate campus”, the commodification of knowledge and the denigration of education as a critical process of individual and social development (Aronowitz, 1999). Marita Moll and Neil Tudiver connect the emergence of educational technologies with changes in public policy and institutional management that favour the commercialisation of the university to the detriment of its autonomy as a public institution (Moll, 1997, 2001; Tudiver, 1999). Les Levidow sees educational technologies as instrumental to efforts at increased managerial control for the purposes of economic gain against faculty autonomy and related notions of knowledge as a public good (Levidow, 2002). Heather-Jane Robertson analyses online education in terms of a “technopositivist” ideology which tends to align it in theory and practice with terms provided by its technocratic masters (Robertson, 2003). Robins and Webster identify educational applications of ICTs with an emergent “instrumental progressivism” – a sublimation of progressive trends in education to the requirements of production – in understandings of the social function and processes of education (Robins & Webster, 1999). And Dan Schiller provides a historical account of the appropriation of ICTs within the global restructuring of capitalism, depicting the university as a key site at which the neoliberal impulse in the global political-economy is given shape and legitimacy within the sphere of social reproduction (Schiller, 1999).

Overall, critics have tended to react to the portrayals of online education purveyed by proponents of evangelical reform in the university, presenting technology in terms of the extension of corporate and administrative power. Beginning from trends in the neoliberal restructuring of knowledge production in information economies (Delanty, 2003; Gibbons *et al.* 1994; Slaughter & Leslie, 1997), critics have tended to see online education as a mere reflection of these trends, a means by which higher education can be effectively subordinated to the requirements of capital, integrated into global markets for commodified knowledge and skills, and organised to ensure a maximum of managerial control. Online education is understood here as a lever for neoliberal restructuring – an extension to the university of capitalist power distilled in technology. Ironically, critics end by situating themselves alongside their opponents in accepting the latter's interpretation of online education as a historical phenomenon. The critique of online education has thus largely been articulated with respect not to actual technologies but to a *reformist discourse* of technological change. The result is that critics have tended to reproduce the same opposition of traditional values and technical forms and the intrinsic relation of technology to marketisation/deskilling that characterises the evangelical discourse.

The debate over online education and the transformation of the university is thus characterised on both sides by an immediate identification of technical functions and historical outcomes. Both sides claim to grasp the essence of online education and deduce its ultimate meaning and consequences from there. The symbiosis of proponents and critics generated out of the mutual adoption of essentialist conceptions of technology has led to a stale-mate in current debates over the meaning of online education, with the two sides disagreeing more on the way in which apparently objective and pre-determined tendencies and meanings are evaluated than on the substance of the tendencies themselves. This situation has coloured the way in which the political implications of new educational technologies have been assessed, in which critical judgements have been made, and in which the field of online education has developed and been delimited. What one side sees as greater accountability and efficiency, the other sees as a means of deprofessionalising faculty. What one group praises as greater flexibility for students, the other decries as an extension of managerial control over instructors. What proponents imagine as a way of adapting higher education to a changing society, critics condemn as the subordination of education to commercial interests. What one side sees as pedagogical advance, the other attacks as a mendacious attempt to garner profits by commodifying learning. Having grasped the “essence” of online education, and reduced it to a zero-sum game played across an unbridgeable chasm, there seems little to do past uncritically trumpeting its arrival or stubbornly building barricades against it.

This situation has proved most disadvantageous for critics, whose acceptance of the terms of the evangelical discourse has resulted in a more or less static opposition between online education and the critical humanistic values, practices, structures, and traditions they defend, in a tendency for the concerns they raise to be externalised from online education as a field of research and practice, and in a critique which largely takes the form of agonistic reaction. As a result, the majority of online education's critics are blind to another possibility – that their concerns could be aligned with the developmental trajectories of online education and rendered as positive components of its concrete realisation as a sociotechnical practice and field of knowledge. In order to highlight such a potential in online education, I would like to present another narrative of its historical development, one contrasting in many ways with that presented above, and which raises the central problems with the critical politics and history of online education that this dissertation addresses.

1.2 Reintroduction: Online Education as Problem and Potential

In January 1982 – two years before the personal computer was named "Man of the Year" by *Time* magazine, a decade before the invention of the World Wide Web, and sixteen years (almost to the day) before the first instalment of "Digital Diploma Mills" – a small, quiet experiment began at the Western Behavioural Sciences Institute (WBSI) in LaJolla, California.[8] The experiment – the School of Management and Strategic Studies (SMSS) – was an executive education programme whose aim was less to instruct students in a particular content than to gather a group of professionals together to engage in critical dialogue around key social, economic and political issues, drawing on the experience and expertise of both faculty and participants to promote shared

[8] A more detailed account of this experiment is presented in Chapter 5. In the treatment of the WBSI case, I rely on unpublished material held at the Applied Communication & Technology (ACT) Lab at Simon Fraser University, accessed by permission of Dr. Andrew Feenberg.

understanding through sustained small group interaction (WBSI, 1990). On the surface, there may have been little to distinguish the SMSS from other executive education programmes, but for one feature: it was to be hosted almost entirely via personal computers utilising a computer conferencing system,[9] making it in effect the first organised online education programme.

At a time when few people outside of large organisations had access to network computers, and when those to which they did have access were slow and cumbersome to use, such an experiment may have seemed ill-fated. The immanent possibility of disaster, underlined by a novice user population and a relatively high level of technical complexity, was exacerbated by the fact that neither staff nor faculty at WBSI had any idea, at the outset, of what online education was; neither were there any existing models to which they could turn to find out (Feenberg, 1999b). The desire to realise an engaged, interactive pedagogy rooted in critical analysis of social issues allowed WBSI to identify elements of what constituted success in this unfamiliar medium – namely, lively group participation in coherent, cumulative, and reflective dialogue (WBSI, 1986a, 1987). But in order to realise this goal, the developers of the SMSS had to invent models for online education practice as they went along, identifying, drawing on and negotiating what appeared, with respect to their basic pedagogical goals, as affordances or limitations in the underlying technical systems and tools. In this, they were on a similar footing as other experiments in

[9] Computer conferencing allows small groups to engage in a variety of communication and information sharing processes. It has been recognised as one of the first forms of "virtual community" (Rheingold, 1993), the descendents of which are contemporary Web forums and social networking systems.

educational computer conferencing which were concurrent with the SMSS,[10] and which together with it, generated the first models for the organisation and practice of online education.

This was not, of course, the first time computers had been used for educational purposes or tested for their educational value. One well-articulated model of computer-mediated education was Computer Assisted Instruction (CAI), first introduced in the 1960s and exemplified by systems such as PLATO (Rhamlow *et al.*, 1980). Drawing on the information storage and processing powers of computers, CAI delivers both instruction (sequentially arranged and modularised course content) and testing (pre-programmed drill-and-practice exercises). The system leads students through course material, evaluates their performance on standardised quizzes, and judges their readiness to move on to subsequent modules (Distefano *et al.*, 2004; Hiltz, 1994). In place of focussed dialogue stands automated delivery of commodified information; in place of social interaction stands interaction with pre-programmed content; and in place of the instructor stands the system itself. For faculty and staff at WBSI and elsewhere, CAI stood for exactly the kind of deskilled, commodified learning decried by later critics of online education – and they rejected it as a model for their own initiatives for similar reasons. These initiatives, insofar as they tried to foster interaction and dialogue, explicitly defined themselves *against* this model, seeing

[10] These included research experiments in educational computing at the New Jersey Institute of Technology, some adult education courses at the New York Institute of Technology, the Connected Education programme at New York's New School, some courses at the Ontario Institute for Studies in Education, and other scattered experiments at a variety of institutions in North America and Europe. For some analytic and descriptive accounts of these experiments, see Harasim (1993, 1990), Hiltz (1994), Kerr (1984), Kerr & Hiltz (1982) & Mason (1988).

conferencing systems as an opportunity to go beyond the limitations of CAI, and mitigate their unsavoury implications for academic labour. In the words of a WBSI staff member,

> […] technocrats […] think the technology is going to 'replace' teachers. This approach needlessly scares off the very people who need to involve themselves with the technology [i.e., faculty] […] [T]o think that a good teacher is someone who drills and repeats […] is to misunderstand the larger significance of the teacher's role. (Kerr, C303, cc41 [Icenogle] March 19, 1982).[11]

The CAI model was clearly not desirable to faculty and staff at WBSI, whose interests were shaped by their professional backgrounds and positions, and whose goals involved realising something *like* traditional seminar discussion rather than simply a more efficient way of representing content and transmitting information.

Computer conferencing may have been seen as presenting the possibility of a dialogic alternative to CAI, but it was initially unclear how to focus the communication potentials of conferencing systems into effective pedagogical practice in an organised educational programme (Feenberg, 1993). In the late 1970s, people beyond the computer science community were just beginning to grasp the potential of computer networks for communication and interaction (Abbate, 1999; Rowland, 2006). The popularity of online services like CompuServe, The Source, and Usenet had demonstrated that computer networks could be effective environments for building communities on an

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[11] This passage is from an unpublished transcript of a computer conference moderated by Elaine Kerr of NJIT between December, 1981 and July, 1984 on the Electronic Information Exchange System (EIES). All passages from such sources will be cited by conference moderator's name, conference number ("C"), comment number ("cc"), [author's name] and date.

informal basis, for generating engaged participation in dialogue around issues of general or special interest, and even allowing for unique forms of group identity (Hiltz & Turoff, 1978; Rheingold, 1993). But while these groups served as a valuable source of information on a range of subjects, they also tended to lack many of the structural and directional features that particularise *educational* communication (Hiltz, 1994). The presence of a few experimental courses on The Source had done little to concretise any specific value the technology may have held for education as a formally organised endeavour.

Some of those engaged in early experiments extrapolated the educational value of computer conferencing out of formal dimensions of the technology – its capacity for text-based, asynchronous, distributed communication – which appeared to be linked to or even to explain its success in other contexts. In the standard discourse of today, the value of such features is referred to in terms of flexible anytime/anywhere learning; egalitarian communication in the absence of identity and status markers; permanence of messages allowing for more reflexive assessment of knowledge building processes; the capacity for taking time to formulate considered responses, and so on.[12] In the offing, however, it rapidly became clear that the location of some formal *potential* in technical systems was a different thing from its *realisation* in actual learning situations. One early attempt in the SMSS to realise active, educational dialogue by trusting that the system itself would compel participation failed to produce much participation at

[12] Examples of this discourse are too plentiful to cite extensively here, but c.f., e.g., Bates (1995), Goodman (2002), Harasim *et al.* (1995), Laurillard (1993), Lockwood & Gooley (2001), McVay-Lynch (2002), Naidu (2003), Smith (2002), Steeples & Jones (2002), Stephenson (2001).

all. The empty, socially decontextualised space of the conferencing system failed to produce much activity, and it became clear that whatever value the technical features held would remain latent as long as there was no active effort on the part of an instructor to bound, contextualise and facilitate the process (Feenberg, 1989; Kerr, 1984). The initial failure of expectations for educational computer conferencing suggested to faculty and staff at WBSI – in a strategy that would be adopted in one form or another across the range of early experiments – that the realisation of the value of computer conferencing for an interactive, dialogic pedagogy begged for the presence of a professional instructor employing self-conscious teaching strategies familiar from traditional education. If online education were to work in the terms that WBSI and others had specified for it, there would need to be a designated teacher, whose role would be, as in traditional classrooms, to invite participation, achieve presence, maintain coherence and direction, and to contextualise, both formally and in terms of the substantive content of discussion, an ambiguous communications environment (Feenberg, 1993; Kerr, 1984; WBSI, 1987). And contrary to the common wisdom developed later, which posited classrooms without teachers, both the formal and substantive dimensions of this process needed to be performed by faculty who had both experience in the classroom and expertise in a field of academic study. Coherent, engaged, dialogic online education best occurred, it was discovered, not because of the technology itself, but because the instructor was able to evaluate and synthesise abstract concepts, link participant contributions to scholarly traditions, provide historical context and background, point towards useful resources, and survey arguments within a field.

In the course of their practical engagements in online education, faculty and staff at WBSI discovered that it was the mediation of technical affordances and limitations by pedagogical and professional principles rather than the introduction of new technical mediations into education that produced a viable model of online education. Over time, and as a product of its negotiation of these affordances and limitations, WBSI designed a coherent online pedagogy according to the goals set out for the SMSS, and which also resulted in the innovation of technical modifications to the conferencing system they used, and informed their own initiatives in the design of educational software (WBSI, 1987). The social practice of online education was thus articulated as a field within which could be specified a set of technical features that could support WBSI's pedagogical model. Rather than education adapting to technology, technology could be adapted to what had been articulated as sound pedagogical practice. The result was an iteration of online education – as a practice, a set of relationships, a technical infrastructure – that, while distinct from traditional education, nevertheless bore a strong family resemblance to it. WBSI thus successfully appropriated computer conferencing to establish "online education" in continuity rather than in opposition with traditional conceptions of the organisation and practice of higher education.

1.3 Problems of History and Theory: Scope of the Dissertation

The stories presented above offer very different accounts of online education. In one, online education is objectified in terms of certain essential qualities that are claimed to translate directly into prescriptions for institutional change; in the other, it appears as an ambiguous process, a nest of potentials which only gains a degree of stability through a dynamic process of negotiation between the values and goals of human actors and the affordances and limitations of technical systems. In the evangelical discourse, online education is associated with inherent trends towards commodification, deskilling, commercialisation, and automation; at WBSI, online education was realised as a critical, dialogic process grounded in familiar professional roles and relations. In the first story, proponents and critics stand in eternal opposition around the reified figure of technology; in the second, the proponents *are* critics, able to articulate critical academic values not as a means of fighting against technological rationalisation, but as a means of incorporating those values into rational, technical form.

The differences between the early experiments and the totalising discourse of educational restructuring raise some thorny questions for the kinds of critical appraisals of online education that have characterised the evangelical debate. As noted above, critics have tended to understand online education by replicating the essentialism of evangelical proponents. Critics are, of course, correct to contextualise online education with reference to wider political-economic trends, and to associate patterns of development in the field with the attempted capture of higher education by corporate, administrative, and technocratic state interests for purposes that are frequently more pecuniary than pedagogical. But identifying these historical forces – powerful as they are – with the essence of online education is to mistake a contingent historical outcome for an intrinsic quality. This results in an unfortunate propensity to generalise a (necessary and important) discussion of the politics of higher education in the information age across the entirety of online education as a complex field of social and technical practice. On the other hand, it has crystallised a reactionary orientation to technology, the assumption being that online education is a done deal before critics ever get to it. Critics thus elide a complex, heterogeneous content into a seemingly unitary, objective referent ("online education"), and establish themselves at such a distance from their object that to imagine the critical values and traditions they espouse as a potential undergirding for it appears out of the question.

But even in the brief form presented above, the WBSI case indicates that the characterisation offered by evangelical critics is not online education's *essence*, but the product of a history, and that critical values and traditions are not negative to online education, but can operate as a grounding for concrete realisations of it. While this one example in and of itself proves little, it is suggestive, at least, of two substantive questions that this dissertation will pursue. First, how did "online education" as an extension of familiar pedagogical practices and professional relations become "online education" as a nefarious gambit of profit-minded administrators and corporate managers? And second, if two alternate potentials for online education are identifiable – one with reference to the WBSI case, the other emergent out of the evangelical discourse – then can the distance between them be explained as a linear historical progression from disaggregated, faculty-driven experiments to “mature” online education systems? Or is there another possibility – that the historical development of online education can be understood as an ongoing struggle between these two inflections of its concrete realisation. This possibility gestures towards an alternative to the politics offered by the evangelical discourse, and underpins the history of online education that this dissertation pursues. The radical difference between the visions of online education presented in the evangelical discourse and the WBSI case suggests the possibility that online education is available for multiple historical determinations, and that the real story is not one of the natural evolution of a technical system towards some optimal state, but of its historical appropriation within frameworks that drive its realisation away from models such as WBSI’s and towards ones that foster the reform programme which evangelical critics have so vociferously opposed.

If this is the case, then critics, while accurate in their diagnosis of a politically charged reform programme, are nevertheless incorrect in their *prognosis* of online education as an inevitable expression of that programme. By bracketing the historical specificity of technical artefacts and practices, evangelical proponents collapse a set of economic goals and priorities into the inherent functionality of online education, equating it with a particular set of “necessities” for university reform. In response, critics interpret the desultory effects of a reform programme but fail to attend to the heterogeneous historical processes through which the latter comes to invest educational technologies or the theory and practice of online education, or to identify points at which fissures might yawn between the programme itself and its actualisation. The over-reliance of critics on the essentialist claims of proponents has mired them in a reactive position, obscuring the possibility that their critique could stand in a positive relation to online education as a basis for alternative realisations. The result is a highly polarised debate, circulating around a reified object and admitting of few, if any, convergences between the interests of critics and the development of online education. It is to addressing and offering a way out of this impasse, as well as to contributing to a pro-active critical discourse of online education – one directed at the positive articulation of alternatives rather than stubborn opposition to technology – that this dissertation seeks to make some small contribution. The critical approach to online education that I attempt to develop here first involves substituting the opposition underwriting the evangelical discourse – i.e., that between knee-jerk technoenthusiasm and curmudgeonly refusal of online education – with another: between two alternative realisations of online education symbolised on the one hand by the evangelical discourse and on the other by the model of online education developed at WBSI.

Developing an alternative critique of online education out of this latter opposition will involve reversing the historical polarities of the current critique – that is, suspending objective claims about the essence, status, meaning, or consequences of online education, and examining it as a historically emergent phenomenon whose essence, status, meaning, and consequences are precisely what is in question. Rather than replicating essentialist conceptions of online education, a renewed critical discourse must look to the *processes* through which its historical appropriation within the evangelical discourse has occurred, and identify the still-existent (if suppressed or marginalised) *potentials* it might have to support *alternative appropriations* consonant with critics' concerns. Chapters 2 and 3 explore the conceptual and methodological foundations of this reversal through an examination of analytic frameworks for a constitutive critical history of technology. The starting point for this exploration is constructivist sociology and history of technology – in particular the variants known as social construction of technology (SCOT) and actor-network theory (ANT) – which provide a cogent critique of the essentialist position on technology characteristic of the evangelical discourse, and which offer methodological grounds for an alternative approach. Rather than assuming the status of technology as an objective determinant of social order, constructivism argues for the study of what Latour calls "technology in the making" (Latour, 1987: 3), and demonstrates how technical artefacts and systems are constituted through the interventions of and interactions between social actors. After outlining the contributions and limitations of constructivism, chapter 2 turns to the classical foundations of critical constitutive history in the work of Karl Marx and Friedrich Nietzsche (Marx, 1973, 1967; Nietzsche, 1967), whose approaches are grounded in normative frameworks – largely missing from SCOT and ANT – for the evaluation of the processes and outcomes of the historical constitution of practices, concepts, and objects (Brey, 1997; Radder, 1992; Winner, 1991).

Apart from correcting the omissions in constructivist approaches, Nietzsche and Marx also contribute, respectively, a basis for the two critical approaches to the study of technology, power and historical change examined in chapter 3, and out of which I attempt to develop the analytical framework employed in this dissertation – Michel Foucault's genealogical analysis of power/knowledge, and Andrew Feenberg's critical theory of technology. Foucauldian genealogy and critical theory of technology not only share parallel concerns with the ways in which rational forms and systems (institutions, scientific knowledge, technologies) constitute forms of power in modern societies. They also root their critiques within formally resonant historiographical frameworks within which specific convergences of rationality and power are seen as emergent out of the appropriation of a diverse set of "microtechniques", drawn from diverse fields of practice, and open to contestation and transformation on the basis of active resistance to hegemonic logics which attempt to functionalise them. Both conceive power as a contingent product of a logic of association or configuration which binds local microtechniques to a hegemonic strategy, which is itself produced, extended, reproduced, contested, and transformed out of these same microtechniques. And both theorise resistance in terms of localised, tactical counter-appropriations of the mechanisms of strategic power. But while Feenberg develops critical theory with reference to the microtechnical foundations of modern systems of power, and while the constitutive historiography of technology that critical theory offers seems (at first blush) consonant with the principles guiding Foucauldian genealogy, no attempt has yet been made to explore the potential each has for enhancing the other with respect to the historical analysis of technology. Feenberg, in taking up some of Foucault's central themes, opens the question of whether or not the analytical framework he innovates may not be developed along the lines of Foucauldian genealogy. It is this latter possibility that chapter 3 explores, while the historical analysis of online education which comprises the remainder of the dissertation seeks to develop it empirically.

Chapters 4, 5 and 6 present case studies in the historical development of online education, each of which focuses on a particular period in its development as a sociotechnical practice – the development of CAI in the 1970s as a formal model for computer-mediated distance education (chapter 4), an extensive exploration of early experiments in computer conferencing during the 1980s, highlighting the WBSI case (chapter 5), and the emergence of the evangelical discourse in the 1990s as a dominant framework for articulating online education as a reform project for the university in the information age (chapter 6). The red thread throughout these case studies is the conflict between the two modes of online education outlined above, the processes through which they gain substance as frameworks for ordering the development and practice of online education, and the ongoing development of wider frameworks of values, assumptions, and goals that informs the constitution of online education as a concrete technical, pedagogical and organisational practice.

Chapter 4 begins the historical analysis of online education by tracing the pedagogical, institutional, and technical logics that lay behind the innovation and development of CAI as a paradigmatic form of computer-mediated education. Its focus is the field of distance education, which supplied a background of theoretical problems, conceptual frameworks, organisational concerns, and an existing technical heritage against which CAI emerged as both a logical and desirable form of educational computing. The outcome of this development process, I argue, was a definition of educational computing in many ways aligned with the later evangelical discourse. However, seeing this definition as contingent upon contextual factors involved in the development of CAI allows us both to identify how social and technical factors interact historically to produce systems which give shape to fields of sociotechnical practice, and also to set up CAI as a contingent model against which alternative expressions of computer-mediated education could be (and were) articulated.

Chapter 5 returns to the early period of innovation and experimentation in online education in the 1980s, revisiting experiments in educational computer conferencing, including a more detailed discussion of the WBSI case. If CAI emerged in the context of a concern for the potential educational value of the *computer*, the WBSI experiment and others contemporary with it took the *network* as their starting point and arrived at a much different conceptualisation of the educational potentials of new technologies and of online education as a sociotechnical practice. The analysis in this chapter focuses on two dimensions of the WBSI case that are central to the alternative critical politics this dissertation hopes to develop. First, it looks at how WBSI faculty and staff actively negotiated, with reference to a set of pedagogical goals and through the actual conduct of online education, the technical affordances and limitations of conferencing systems and networked computers, and at how, out of this negotiation, WBSI developed a unique pedagogical model for online education. Second, it examines how this pedagogical model allowed faculty and staff at WBSI to identify desirable features of online education systems and to engage in a process of technical development that would concretise their pedagogy in the technical infrastructures of online education. Ultimately, this chapter parallels chapter 4 in situating the concrete development of educational technologies and computer-mediated educational practice in the social contexts of their articulation, pointing out the social origins of technical features. But it also serves to introduce an alternative developmental basis for online education which can ground a politics of technology and educational reform which is directed at their sociotechnical foundations rather than at technology as such.

By the early 1990s, the model of conferencing developed at WBSI and elsewhere seemed set to become generalised to further technical developments in the field. But at the same time, the climate of higher education had shifted significantly, creating a great deal of pressure for change at all levels of its institutions. In this situation, technology came to appear as a tremendous solution for a great many of the universities problems, as I outlined above. Chapter 6 returns to the evangelical discourse as a programme of university reform, tracing not only what its claims were, nor only how the figure of technology came to appear within it, but how it came to be transmuted and installed in the organisational, pedagogical and technical foundations of online education. At the organisation level, I examine the ways in which faculty came to be displaced from the sphere of online education's innovation, how a systematisation of online education enabled a totalisation of the discourse of reform, and how a new set of values came to be installed at the basis of online education's development. At the pedagogical level, I sketch how elements of the theory and practice of teaching and learning drawn from cognitivist and constructivist pedagogies were appropriated and interpreted to support an evangelical reform programme. At the technological level, I examine the way in which a general programme for technology-based educational reform came to be reflected or installed in design features and specifications of a number of different learning technologies and systems, as well as promoted through the formation of particular kinds of development initiatives. While the aim of the analysis presented in this chapter is to describe the emergence of the evangelical discourse, it also emphasises the contingency of this discourse as a logic guiding online education's development.

The three case studies presented below attempt to trace, historically and socially, the emergence of the evangelical discourse as a programme for the realisation of online education. But they also attempt to illustrate that this is only one potential iteration of online education. This begs a discussion of recent developments that might suggest that alternatives such as that developed in early conferencing experiments might still ground concrete developments in the field. Since 2000, online education has tended to fragment from the kind of unity it attained in the evangelical discourse, opening it to developmental trajectories more consonant with critical concerns. Since the bursting of the dot-com bubble, much of the fervour – and a great deal of the funding – for online education as a reform vehicle has dematerialised, seeming to confirm Noble’s triumphant assertion that “the bloom is off the rose” (Noble, 2002). This period is a momentous one, insofar as the deterioration of the material and discursive foundations of the more extreme visions in the evangelical discourse has once again opened the field to a variety of developments suggestive of a recodification of online education. The collapse of the evangelical discourse – while not resulting in a complete displacement of the tendencies associated with it – has opened online education to question once again, destabilised its objectivity, and allowed for a potential pluralisation in terms of its realisation.

The conclusion will trace three lines along which this has occurred. First, the paradigm of the virtual university has largely been replaced by one of “hybrid” or “blended” learning. In this paradigm, many of the functions and meanings of technology ascribed to it in the evangelical discourse have been radically altered – and in ways that suggest a potential for integrating critical pedagogical and professional values back within online education as a field of sociotechnical development. Second, the recent development of open source initiatives in online education – most visibly Moodle and Sakai – suggests a viable alternative to the centralised, corporate, commercial provision of online education. The open source alternative gestures towards a different kind of relationship between the contexts of educational practice and those of technological development, one in which the values and interests of faculty can once again be placed at the heart of online education. Finally, the development of policy frameworks for the implementation of online education – both at the institutional level and at the level of professional associations – has altered the conditions in which online education comes to be integrated and operationalised in universities and university systems. Examining a selection of policies from universities and faculty associations, I will examine how faculty have been able to leverage their position as participants in institutional governance to shape the environments within which online education comes to be articulated.

In concluding the dissertation, I also reflect upon the implications of the history explored here for the critical analysis of technology-based reform initiatives in the university and outline three general directions for future research – the development and fuller articulation of the conceptual and methodological framework to contribute to the critical theory of technology; the extension to other fields of sociotechnical practice of the historiographical approach suggested by genealogy and critical theory of technology; and a closer examination of blended learning, open source and policy developments to deepen an understanding of how trends in these areas might act as supports for a critical iteration of online education. Ultimately, this dissertation seeks to build a bridge between legitimate critical concerns around university reform and the work undertaken by researchers, developers and practitioners in online education. Unless such a *rapprochement* is attempted, it appears more than likely that critics and proponents of online education will find themselves speaking (or shouting) across an ever-widening gulf, in terms that are increasingly unintelligible to one another, and with the result not only that the university and higher education may fall victim to the technocratic vision promulgated in the evangelical discourse, but also that online education will be impoverished through its detachment from critical values and the closing of alternative potentials opened to it under the horizon of those values.

CHAPTER 2: FROM CONSTRUCTIVISM TO NORMATIVE CRITIQUE: BACKGROUND FOR A CONSTITUTIVE HISTORY OF ONLINE EDUCATION

Hunger is hunger, but the hunger gratified by cooked meat eaten with a knife and fork is a different hunger from that which bolts down raw meat with the aid of hand, nail and tooth.

- Karl Marx

2.1 Introduction: A Constitutive Social History of Technology

In the previous chapter, I tried to illustrate that what is called “online education” in the evangelical discourse is capable of varying realisations lying both within and outside the terms of that discourse. A similar assortment of tools, arranged according to different goals, assumptions, priorities and values, and developed within an alternative context and orientation to technology can result in divergent sociotechnical configurations, each of which can legitimately be called “online education”, but which support highly varied outcomes in terms of educational organisation and practice. Failure to note this historical ambiguity has proved problematic for critics of online education. In collapsing a complex field of sociotechnical practice into a single reform agenda, critics tend to reproduce and validate the claims of proponents as to the *essence* of online education, projecting this essence across the entire history of the field as its inherent teleology. That the claims of proponents could stand in a historically contingent position with respect to online education’s realisation does not emerge as an option for many critics, nor does the notion that online education could potentially be articulated on a variety of development paths, some of which might lie outside the evangelical discourse or even disrupt it as a framework for university reform. Critics obscure the possibility that the essence of online education – the core values, tendencies and meanings informing and embodied in its concrete realisations – could be exactly what is up for grabs, and thus foreclose on a different kind of critical engagement: one which sees online education not as a monolithic instrument of control, but as a site of struggle over the future form of the university and over the values, relations, and practices of higher education.

A critical analysis of online education based on this proposition involves some basic conceptual and methodological shifts. First, to escape the impasses of the evangelical discourse while keeping it in view as a real possibility for university reform, it is necessary to suspend claims to the objectivity of online education and instead trace the *processes* of its historical constitution. Online education must be situated within a constitutive social history that brackets claims to its essence and that demonstrates both the contingent processes of its social shaping and the possibility of development paths that both conform to and fall outside the evangelical discourse. Related to this reorientation to history is the necessity to differentiate analytically between the various technical and social elements comprising online education and their concretisation in specific sociotechnical arrangements. The alignment of online education with the evangelical discourse must be treated as a contingent historical outcome in conflict with other potential outcomes. And attempts at the appropriation, functionalisation, and contestation of the various moments, elements, and practices of online education within this agenda must be seen as the primary points at which a critical politics takes shape. This politics involves a struggle not *against* online education, but rather *for* it – for the forms of its realisation insofar as these are capable of concretisation under the terms of very different programmes for the technological mediation of higher education.

The differentiation of technical forms and functions from their concrete iterations, and the critical orientation towards online education as a constitutive process beg the question of what mediates between such forms and functions and their investment in a particular reform agenda, and how forms of power operate through these mediations to align a diversity of technical objects and practices (but also people, institutions, and concepts) to the interests and goals of hegemonic groups, or, on the other hand, to open them to alternative appropriations. Where can we turn to ground a constitutive history of online education that can effectively address these questions? To begin answering this question, it is necessary to abandon the essentialist frameworks within which the evangelical discourse figures online education, determines its historical dynamics and evaluates its political implications, and turn to conceptions of the relationship between technology, power, and historical change developed in constructivist technology studies.

2.2 From Essentialism to Constructivism

The critique of essentialism in technology studies is well developed, and I will refrain from rehearsing it in detail here. In brief, constructivism argues against the notion that technology is somehow outside history and politics, reducible to pure, objectively rational functions whose linear, progressive development autonomously shapes human destiny. Instead, technology is seen as a *social process* whose outcomes – finished artefacts and systems – are emergent from the contexts within which they develop. The common sense division between the purely technical and the purely social collapses, and we see that, as Law writes, "[w]hat appears to be social is in part technical [and] [w]hat we usually call technical is partly social" (Law, 1991: 10). The primary object of analysis in constructivism is thus neither technology nor society, but "sociotechnical ensembles" (Bijker, 1993), the "seamless web" of technology and society (Hughes, 1986), or "heterogeneous networks" (Law, 1992, 1987).

That technology does not descend on society from above but emerges out of it from within introduces constructivism's basic methodological innovation – the tracing of the history of technology as a process of the ongoing imbrication of social and technical factors in finished designs. As emergent phenomena, artefacts cannot be the starting point of historical analysis but are exactly what need to be explained – why *this* artefact in *this* form? Instead of seeing technologies as pre-constituted bundles of functions, we should "open the black box" to analyse the dynamic processes of "technology in the making" (Latour, 1987: 3). Constructivism thus tries to get behind finished artefacts and to trace the vicissitudes of their emergence in the forms we take for granted in the present, to show that these taken-for-granted forms are contingent products of a history, and to demonstrate the influence of social factors in their historical determination. It is not that technology does not give shape or stability to society, but that whatever shaping or stabilising role technology plays is contingent on its passage through processes of social determination relative to which its concrete forms develop. This is the basic meaning of the sociotechnical – the concretion of social values and meanings in the form and function of technologies as structures for the ordering of the social world. In what follows, I will outline two distinct constructivist approaches – social construction of technology (SCOT) and actor-network theory (ANT) – highlighting their contributions to a critical history of online education and considering some of their limitations.

2.2.1 SCOT: Interpretative Flexibility, closure, and stabilisation

The basic underlying contribution of SCOT to history of technology is the insight that technologies do not develop along a linear path in which advances are measured by improvements in efficiency, "elegance" or other technical values. It is, rather, often the case that several configurations of artefacts are possible, each of which is technically feasible, but not all of which survive. At the origins of many artefacts, there is often a deal of uncertainty and controversy over what the thing could or should be in conditions where alternative designs are equally viable candidates for "success". SCOT analyses this dimension of technology according to a "principle of symmetry" (Bloor, 1976; Pinch & Bijker, 1984), which states that where an array of working designs are available, it is necessary to look beyond the technical sphere to explain the success of one over the others. The outcomes of the innovation process have less to do with whether one design works better from a technical perspective and more with the way that each design works with respect to the competing interpretations granted to them by social groups.

Artefacts evince “interpretative flexibility” insofar as they evoke, in their features, variable meanings for social groups, each of whom may bear specific interests with respect to which different designs appear desirable (Bijker, 1993; Pinch & Bijker, 1984). SCOT analysis thus first involves deconstructing artefacts by isolating the “relevant social groups” that bind their interests to different designs according to the meaning each ascribes to them in their practical engagements. The relevance of social groups is established where their interpretation of an artefact has an impact on its design. Where interpretations diverge, across either different designs or divergent orientations to the same design, the objective quality often granted to technology unravels, becoming visible as a product of historical interactions within and between such groups:

> Demonstrating the interpretative flexibility of an artifact amounts to showing that one seemingly unambiguous “thing” […] is better understood as several different artifacts. Each of the different artifacts hidden within that seemingly one “thing” can be traced by identifying the meanings attributed by the relevant social groups. (Bijker, 1993: 118)

The concept of interpretative flexibility exposes technology not only as an object to be interpreted, but as a key interpretative activity of modern societies. Such interpretations are not merely subjective, but describe a concrete relation between a given design and the social groups who incorporate it into their lives. Social interpretations and technical contents are dynamically intertwined in the development process. What constitutes a functional artefact is thus a product of interactions between social groups, each of whom attempts to realise a specific interest in the objective form of the artefact itself.

What this implies for history of technology is that the analytic focus should be on the production of and interactions between conflicting interpretations as these are realised in and attributed to specific artefacts and as they lend shape to further designs. In a classic study, Pinch & Bijker (1984) demonstrate how the standard design of the bicycle emerged out of interactions between a variety of social groups – racers, elderly people, women, manufacturers, anti-cyclists – around a number of different workable designs, from speedy but dangerous high-wheelers to safer, more balanced models. In this account, the high-wheeled Penny-farthing is not seen as a quirky design whose ridiculousness is obvious to posterity. Rather, it was a rational configuration reflecting the interests of a particular user-group (racers), who identified the bicycle as a “macho machine”, and for whom the design was optimal given the high speeds it could attain. Racers drew on this design in formulating their understanding of *the* bicycle, and pressed for designs with even more outrageously-sized front wheels. This realisation of the bicycle was contested by groups who interpreted the artefact as a means of public transportation, and who saw their interests reflected in designs corresponding more readily to the requirements of safety that were of principle concern to them. Each group saw different designs as both logical and desirable from within their interpretative frames, and each articulated such interpretations relative to what they saw as an exemplary design. A plurality of potential development paths thus emerged around the artefact. What it ultimately became depended on the formation of consensus on what it was (macho machine, mode of public transport), what practices it sustained (racing, basic mobility), and what values it supported (speed, safety).

Of course, artefacts are not forever open to interpretation, nor are interactions between social groups eternal contests of meaning. The outcome of such interactions is the wider generalisation of particular interpretations and the consequent standardisation of an associated technical form. Social groups deploy a variety of “closure” mechanisms through which the form and meaning of artefacts achieve “stabilisation” (Bijker, 1993; Misa, 1992; Pinch & Bijker, 1984). Pinch & Bijker identify two such mechanisms. “Rhetorical closure” involves the shaping of interpretative frameworks to the point where social groups “see [their problems with one configuration of the artefact] as being solved” (Pinch & Bijker, 1993: 427). “Closure by redefinition of the problem” occurs “when an artifact stabilised incompletely by one social group is stabilised more completely [by] a larger or more powerful social group” (Misa, 1992: 110). In each case, closure involves settling issues that impinge on the interpretation of artefacts and so impede their standardisation. Stabilisation involves *both* the shaping of the dominant meanings of artefacts (interventions in popular and official *discourses* of technology) *and* the incorporation of such meanings into actual designs (interventions in technical *forms* and *functions*). Through the successful deployment of closure mechanisms, artefacts become, by degrees, increasingly stable and objective, emerging as more or less consonant in form and meaning with the interpretation of one or more social group.[13]

Through closure, shared frameworks of meaning develop in tandem with stabilised technical forms, initiating what Hughes calls “technological momentum”: a build-up of inertia which drives future development on the basis of standardised designs (Hughes, 1987). These frameworks lend innovation the appearance of autonomy and linearity, and comprise a “new structural environment for further technical development” or, more briefly, a “technological frame” (Bijker, 1993: 123). Technological frames form out of interactions between groups, and consist of an accumulation of shared meanings for “exemplary” designs which then provide a background for further innovation. They are heterogeneous, combining concrete technical elements (standardised artefacts and functions) and social elements (cultural values, goals, implicit knowledge). They are subject to fluctuation and transformation as social groups take shape and deploy closure mechanisms. They are both constraining (narrowing interpretative flexibility by providing a horizon for development) and enabling (allowing social groups to “more clearly and readily” identify “remaining possibilities” for innovation [Bijker, 1993: 123]). In sum, they supply a horizon under which increasingly standard technical forms and meanings coalesce in stable artefacts. Such frames, like artefacts themselves, are emergent, subject to varied articulation, and act as a background against which the contingent outcomes of innovation come increasingly to be stabilised both symbolically and

[13] In the case of the bicycle, closure was eventually reached by the incorporation of concerns for both speed *and* safety in a single design (Pinch & Bijker, 1984: 427-8).

formally. We no longer question the form of mundane artefacts like the bicycle since they are embedded in technological frames which combine standard designs with a delimited sets of meanings.

SCOT makes several valuable contributions to history of technology – its empirically grounded analysis of technology as a social process, its centralisation of social and cultural interpretations as key elements in innovation, and its insistence on the contingency of objective technical forms. With reference to this study, SCOT widens the scope of critical analysis in its insistence that we approach online education as a historical process contingently fusing social interests and technical functions. Whatever objective content is named by the term “online education” must be traced through its configuration according to the meanings attributed to it by social groups. The concept of interpretative flexibility suggests that the models of online education outlined in chapter 1 can be understood not as historical phases but as divergent iterations corresponding to the different meanings, goals, and interests of identifiable groups. The focus of critique thus shifts from the “essence” of technology to struggles over meaning and form as negotiated by such groups through the deployment of closure mechanisms, and with reference to the divergent possibilities opened up by alternative designs. The challenge offered by SCOT is to identify the continued flexibility of online education and, for this purpose, to transform critique from a negative reaction into a foundation for technical reconfiguration on the basis of alternative values, meanings, and functions.

2.2.2 ANT: Generalised symmetry and the process of translation

Despite its insistence on the imbrication of the social and the technical, SCOT's analysis tends to reproduce a basic distinction between technology and society. Social actors form their interpretations and engage in strategies of closure with respect to artefacts which are independent of them. A more radical approach to technology in the making is offered by actor-network theory (ANT), whose focus is on systems combining human and technical elements, the formation of which involves the constitution of the social along with the technical. Innovation is understood as "heterogeneous engineering" – the production of durable associations between human and nonhuman elements in functional systems (Law, 1987). Humans are not granted special status as interpreters of the technical, since they themselves are subject to processes of "translation" by which they – along with artefacts, natural phenomena, organisations, etc. – are given shape and incorporated into sociotechnical systems as functional components. As Law writes:

> […] [S]ocial agents are never located in bodies […] alone […] [A]n actor is a patterned network of heterogeneous relations, or an effect produced by such a network […] [T]hinking, acting, writing, loving, earning – all the attributes that we normally ascribe to human beings are generated in networks that pass through and ramify both within and beyond the body. (Law, 1992: 383-4)

In ANT, SCOT's principle of symmetry becomes "generalised symmetry" (Callon, 1986; Law, 1992), according to which we cannot distinguish *a priori* between what will count as technical or social in the formation of sociotechnical systems. Such distinctions are emergent from a process of "translation", which involves defining and associating human and nonhuman elements ("simplifying" and "juxtaposing" them, and "enrolling" them into functional networks) and "delegating" functions to them according to an over-arching programme of action (Callon, 1986; Callon & Latour, 1981; Latour, 1986). A corollary to this is that we cannot, in principle, distinguish between the agency or being of humans and nonhumans since both play an integral role as actors in the operation, survival, and expansion of sociotechnical networks. As Latour says, "Boeing-747s do not fly, airlines fly" (Latour, 1994: 46), meaning that action is not uniquely human, but is rather a performance of networks of "actants", each of which must play their part (i.e., be successfully "translated") in order to produce and sustain complex actions such as flying.

Translation is effected through an initial "problematisation" of the relations, roles, and functions of the human and nonhuman elements of the networks that sustain and comprise relevant fields of sociotechnical action. Problematisation takes place with reference to programmes of action formulated by "network-builders" or what Callon calls "engineer sociologists" (Callon, 1987). The latter work to formulate and test hypotheses concerning the nature of the social world into which technologies are to be functionally integrated, designating and delegating functions to human and nonhuman agents in a specified sociotechnical network through which the programme of action is to be fulfilled. Callon (1986), for example, documents the enactment of a programme articulated by a group of French scientists to recover a depleted scallop population in Brieuc Bay. Carrying out this programme involved defining a set of problems relative to the various human and nonhuman actors involved –

overfishing on the part of local fishermen; unpredictable ocean currents that would sweep the scallop larvae away; the ravenous appetites of starfish and Parisian gourmands; lack of concern shown by the scientific community and the government – and deploying diverse strategies, or “interessement devices” (Callon, 1986) – lobbying to control the scallop fishery; introducing collectors to catch the scallop larvae and protect them from environmental threats; publishing research reports, and so on. Each of these strategies was initiated to hold elements of the network in place and thus realise the scientists’ larger programme of saving the scallop industry. Each actor has a part to play: scallop larvae must cling to the collectors; collectors must be effective in protecting the larvae from the dangers of the environment; fishermen must desist from fishing at certain times and places; the scientific community and the state must be convinced that the project is legitimate and worthy of continued support. Each of these entities had to be enrolled in a pattern of action and association dictated by the scientists, and translated according to functions defined in the scientists’ programme of action. And each was the object of their strategic interventions as network-builders.

Problematisation operates to build the terms – scientific, technical, social – of a “programme” under which human and nonhuman entities are functionally associated, and also to foster those associations (Callon, 1986). The programme acts as a framework for defining the roles and functions of each of the components in the network (“delegation”); it establishes the terms of interoperability and association through which the “being” and “function” of the various components emerge ("juxtaposition"); and it specifies and fixes on just those qualities of network components which are functional to it ("simplification") (Callon & Latour, 1981; Law, 1992). Network elements are successfully enrolled when they consistently and unquestioningly adhere to the functions and associations into which they are placed – when they are "translated" into a form consonant with the programme of the network-builders. The programme becomes an "obligatory passage point" between the entities comprising the network and the functioning of the network itself (Callon, 1986; Callon & Latour, 1981). To SCOT's insistence that technical objects are historically variable and contingent, ANT adds that they are also relative: what an entity, human or nonhuman, *is* emerges out of its functional relation to other entities in the networks through which programmes of action are achieved.

At stake in the process of translation is, ultimately, the relative power (or "size") of actors, specifically those whose efforts at enrolment result in the durable associations which give lasting order to relations, practices, and entities (Callon & Latour, 1981; Latour, 1991). While translation is analysed in the context of generalised symmetry, its results are the durable *asymmetries* constitutive of social order and embodied in patterned, functional associations between humans and nonhumans (Law, 1992). Callon & Latour (1981) illustrate this in their discussion of how Electricity of France (EDF) tried to enrol a range of "actants" (fuel cells, catalysts, town councils, social movements, the Renault company) in the development of an electric car. Though the innovation ultimately failed, EDF demonstrated all the qualities of an "actor" or "network-builder":

> What is an actor? Any element which bends space about itself, makes other elements dependent upon itself and translates their will into a language of its own. An actor makes changes in the set of elements and concepts habitually used to describe the social and the natural worlds. By stating what belongs to the past, and of what the future consists […] by building up balance sheets, by drawing up chronologies, it imposes its own space and time. It defines […] values and standards, the stakes and rules of the game – the very existence of the game itself. Or else it allows another, more powerful than itself, to lay them down. (Callon & Latour, 1981: 286)

On the basis of a particular programme, an actor attempts to bring a variety of elements into functional alignment for the realisation of an order of things. In doing so, that actor increases in size and power by channelling the agency of other entities into the fulfilment of its programme. The elements of actor-networks are entities whose being and agency are a function of their roles and relations within a network designed to fulfil a strategic programme, and which are the objects of strategies initiated to realise and maintain this programme.

But, as Callon & Latour indicate, the being and agency of entities are not confined to their definition and mobilisation within a programme of action. The entities are capable of acting outside its terms, and so of destabilising and transforming the actor-networks into which they are enrolled. Scallop larvae fail to cling to collectors; EDF's engineers are contradicted by Renault's; social movements lose steam; catalysts turn poisonous. At each stage, the potential for resistance on the part of the entities that network-builders attempt to enrol is such that the network itself is constantly threatened with collapse – and also constantly in flux as new strategies of enrolment are developed to respond to such resistances, hold the network elements in place, and reproduce the programme of the network-builders. Resistances can be quashed or circumvented by the replacement of “weaker” network associations with “stronger” ones – a process which often involves the enrolment of durable materials – the embodiment, that is, in concrete devices or systems, of prescriptions that stabilise the actions of and associations between network elements. Latour illustrates this in his discussion of the replacement of an “irresponsible” human porter by an automatic “door-closer”, through which the inconsistent moral agency and performance of a human is replaced by the more predictable kind housed in an automoton (Latour, 1992; 1995). Here, a programme of action – “close the door” – is delegated from a human to a machine, with ramifications affecting the entire network of relations that sustain this programme.

Like SCOT, ANT contributes much to a constitutive history of online education. Its focus on contingent programmes of action develops the notion of interpretative flexibility by demonstrating how interpretations are realised not only with respect to artefacts, but through the enrolment of an array of elements constituting a sociotechnical network. The evangelical discourse is just such a programme, supplying terms through which the various elements comprising online education (technical apparatuses and human agents alike) are simplified and juxtaposed – enrolled as functional components in a wider sociotechnical system. These elements may afford qualities which permit their greater or lesser simplification according to the evangelical programme. But the latter’s realisation will depend on the successful deployment of strategies by which network-builders attempt to hold each of the elements in place. This draws our attention not only to the political qualities of technology, but to the whole system of micro-level delegations, associations and simplifications through which both human and nonhuman elements are rendered functional under the programme's terms. ANT also alludes to the capacity borne by each element for resistance to the programmes under which they are enrolled, suggesting that the critique of online education must be approached not at the level of evangelical claims, but at those diverse points at which attempts are made to enrol actants that themselves contain potential for resistance to such enrolment. It is on the basis of this potential that a critical politics of online education might be built.

2.2.3 Limitations of SCOT and ANT for Constitutive History of Technology

In spite of SCOT and ANT's contributions, both have come under fire from those who argue that their approaches to technology in the making obscure as much as they reveal. Central to such critiques are charges that the principles of symmetry they employ disregard the *asymmetries* within which innovation takes place; that they gloss over some of the problems raised by their formulation of agency; that the focus on “relevant social groups” and “network-builders” erases from view the perspectives of those who are (consciously or otherwise) excluded from the development process; and that the empirical studies they offer resign themselves to *documenting* the innovation process without either evaluating the *consequences* of stabilisation against the background of normative values, tracing the results of stabilisation for groups affected by technical change but not immediately capable of realising their interests in technical forms, or fully theorising the potential for transformative agency opened by their analyses.[14]

The principles of symmetry deployed by SCOT and ANT, while useful for revealing the contingency of technological development, obscure the fact that the latter is embedded in the deep *asymmetries* of modern societies. Not all interpretations are equal where some groups draw authority and influence for their interpretations (i.e., their status as *relevant* social groups) from existing social hierarchies and established power and privilege, and where the outcomes of stabilisation can also work to reproduce or extend relations of domination through closure around designs that support some interests over others (c.f. Winner, 1986). This obscures the concerns of those whose interpretations are either excluded or actively legislated against. However, the very fact of the exclusion of what Winner calls “irrelevant social groups” (Winner, 1991: 369) is critical for understanding the politics of technology. A political theory of society which could inform constructivist analysis is a serious lacuna in SCOT.

ANT’s generalised symmetry is perhaps even more problematic. While ANT recognises that “the nabobs of this world are powerful”, it defuses this claim by insisting that “they are no different in kind sociologically than the wretched of the earth” (Law, 1992: 380). On this account, there is no particular reason to think that dominant and subordinate groups are any different apart from *being* dominant or subordinate. But, outside of actor-network theory, such divisions make all the difference, and simply claiming that a group which is dominant when

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[14] C.f. Brey (1997), Feenberg (2002, 1999a), Radder (1992), Winner (1991).

it goes to bed can never be sure if it will be dominant in the morning explains little about the structures through which such dominance is produced, nor the influence this dominance plays in creating conditions which ensure that the night will pass without event. ANT thus flattens the hierarchies of the social world, obscuring questions of power which are not themselves produced in the formation of networks, but which operate as conditioning factors in their formation.

On another level, ANT only recognises the co-constitution of the social and the technical by granting equal agency to humans and nonhumans, reducing human agency to instrumental responses while elevating that of nonhumans to a level bordering on anthropomorphism. But it can be argued that humans and nonhumans possess fundamentally different orders of agency. Nonhumans possess affordances that may open them to functionalisation, but their capacity to “resist” is merely passive, granted only by the degree to which their affordances fail to correspond in practice to the terms of their translation. By contrast, human agency includes reflexive decision-making and strategic action. Scallop larvae failing to cling to collectors may be “resisting” a network programme, but it would be difficult to say that they are building a “counter-programme” in the same way that Renault did in its interested and strategic actions against EDF’s engineers. An extension of this problem is the delimitation of ANT’s analysis solely to the programmes of network-builders, with the result that any action that falls outside such programmes – whether passive or reflexive – is seen as a force for the *deterioration* of the networks. Relegated to this secondary role, entities in the actor network are bereft of a capacity to articulate a successful programme of their own, but can only conduct tactical actions relative to the dominant programme of the network-builders. And so a whole range of network dynamics between social forces competing in specific conditions for the realisation of the social world is obscured.

A consequence of these problems of SCOT and ANT is their failure to supply a normative foundation for the critique of technology. In both, the possibility of historical alternatives is raised without consideration of what is lost through the stabilisation process, or of the problems raised for some by this process. The failure of the electric car, for example, bears normative implications for society and the environment insofar as it resulted in a reinstitution of path-dependency on fossil fuels and on the continuation of destructive patterns of consumption. But such consequences do not appear to matter, since what is important is the empirical verifiability of Renault's ability to define society and nature into the future, proving that they are powerful but not whether the programmes, goals, and values they represent are worthwhile or harmful. Likewise, for SCOT it suffices merely to note historically existent alternatives without re-opening the black box to pursue their implications as potential foundations for alternative technologies.[15] But closure is not a neutral process – it has political significance given the deep divisions that structure relations between social groups, as Misa suggests:

[15] Kline & Pinch (1996), e.g., *note* the importance of gender in the social construction of the automobile by rural users. But they fail to follow through with an assessment of the closure of this device around standard gender roles, or an evaluation of what was lost to women in its stabilisation in terms favourable to men.

> […] [C]losure may […] involve the creating or restructuring of power relationships […] [I]t may obscure alternatives, and hence appear to render the particular artifact, system, or network as necessary or logical. It is precisely because closure can impart direction and momentum that actors battle energetically to achieve closure on terms favourable to themselves. (Misa, 1992: 111)

Constructivism is grounded in the claim that technical things have a social history. SCOT and ANT provide useful terms for exploring this history, and reveal a dynamic relationship between technology, society and meaning. But they raise key political questions while failing to follow through with a normatively grounded critique of technology or a coherent theorisation of transformative agency in the technical sphere. To recover a normative critique on a constructivist basis requires turning to other sources – ones foundational for, but obscured by the analyses SCOT and ANT offer.

2.3 Rebuilding Normative History of Technology

Constructivism's distinction between technical objects and their potentials for varied realisation was first articulated – independently, within different philosophical projects and to different ends – by Karl Marx and Friedrich Nietzsche (Marx, 1973, 1967; Nietzsche, 1967).[16] Despite their differences,[17] Marx and Nietzsche share similar orientations to history as a process of the articulation and expansion of distinct modes of power which work to both

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[16] Marx and Nietzsche have contributed more to social theory than I am able to discuss here. I turn to them mainly to highlight a resonance between their work and constructivist analyses of technology, and to introduce some themes in Foucault and Feenberg's work pursued below.

[17] In many ways, Marx and Nietzsche represent diametrical positions in critical social theory. Nietzsche's opposition to socialism, his rejection of class interest as a foundation for historical analysis, and his insistence on perspectivism in contrast to the teleological thrust of the dialectic make Marx an uncomfortable bedfellow (c.f., Miller, 1977). I displace these distinctions here not to resolve them, but to draw attention to formal similarities relevant to the discussion in chapter 3.

particularise the "content" of objects, practices, and social relations over time, and functionalise the latter within a hegemonic order. This process is seen, as in SCOT and ANT, to skirt the divide between the material world and the subjective meaning held for that world by social actors. Of particular import here are the notions that the past is radically *different* from the present; that both the material organisation of society and the discursive organisation of knowledge are linked through social groups' *interpretations* and *appropriations*; and that the present is a *contingent* outcome of such interpretations and appropriations. We can recognise here the buried foundations of interpretative flexibility, relevant social groups, stabilisation, translation, and enrolment. But Marx and Nietzsche add to this a conception of past and present as fields of immanent *potentiality* in which forces struggle for power in conditions of asymmetry, the outcomes of which are open to evaluation on normative grounds, and within which it is possible to locate the seeds of alternative social forms and meanings.

2.3.1 Orientations: Commonalities in the Work of Marx and Nietzsche

Marx's historical materialism and Nietzschean genealogy depart from a common attack on the kind of history in which a social order in the present (the capitalist mode of production, a system of "priestly" values) is projected back to the origins of production and morality as such, and in which the present is depicted as the apotheosis of progressive historical development along a single trajectory. In this kind of Whig history, general categories and practices like labour or punishment are interpreted in their essence through the distorting filters of their particular iterations in a present hegemonic system – *wage* labour in the context of capital and *just* punishment[18] in the context of "slave" morality (Marx, 1973; Nietzsche, 1967). This obscures the dynamics within which such categories form and change over time, and conditions an acceptance of *what is* as *all that is*.[19] The historical systems in which wage labour and just punishment operate thus appear to be present from the beginning, expressions of laws derived from nature which liberal political-economy and moral psychology purport merely to unveil.

For Marx and Nietzsche, this style of history is not neutral, but erases the basic *difference* of the past as well as the conflicts between social groups that drive historical transformations, resulting in a misattribution of unity to concepts, practices, and relations across historical periods. Such a history hides the concrete foundations of social systems in modes of domination, eliding in a set of idealisations the real conflicts and displacements on which such systems rest, and obscuring the possibility of change, difference and otherness. In projecting wage labour, private property and capital across history as the foundations of production in general, liberal political-economists simultaneously naturalise and neutralise them as *historical* forms, presenting production "as encased in eternal natural laws independent of history, at which opportunity *bourgeois* relations are then quietly smuggled in as the inviolable laws on which society in the abstract is founded" (Marx, 1973: 87. Italics in original). This obscures the concrete machinations through which capitalism overturns feudal relations of production,

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[18] Nietzsche does not use this term, but it captures what he seems to mean by the "rancorous" nature of the priestly class and the absolute values of good and evil. C.f., Nietzche (1967a: 36-9).

[19] A conditioning which Marx & Engels note in their famous dictum about the ideas of the ruling class (Marx & Engels, 1947).

masks the specific transformations capital effects to secure its hegemony, and excludes the perspectives of the dominated which, through their basic opposition to capital, could serve as a ground for an alternative mode of production. The “English psychologists” Nietzsche attacks in the *Genealogy of morals* are guilty of a similar obfuscation when, in writing of “instincts of pity, self-abnegation, self-sacrifice,” they “projected them into a beyond,” and so rendered them as absolutes (Nietzsche, 1967: 19). The opposite instincts – those of a joyous and life-affirming self-assertion – are then cast as *evil* rather than as a foundation for an alternative moral system. A single, universal morality parses the world into good and evil elements, and the latter act as both identity markers and bases for normative notions of justice, punitive practice and questions of conscience.

In place of such a history, Marx and Nietzsche call for one that recognises the essential *otherness* of historical objects and practices in past social formations, and follows them through the processes of their constitution within historically differentiated social systems. For both, this involves the analysis of history not from the standpoint of general and universal concepts and categories, but of these latter from the standpoint of the material conditions of their emergence in particular forms we mistakenly see as general and universal. This kind of analysis necessitates, as a starting point, isolating what is *general* in categories, practices, relations, and concepts, and distinguishing this from their *particular* iterations in different hegemonic systems. And so Marx cautions:

> Some determinations belong to all epochs, others to only a few […] just those things which determine their development, i.e., the elements which are not general […] must be separated out […] so that in their unity […] their essential difference is not forgotten. For

> example, no production without an instrument of production […] Capital is, among other things, also an instrument of production […] Therefore capital is a general, eternal relation of nature; that is, if I leave out the specific quality which alone makes 'instrument of production' […] into capital. (Marx, 1973: 85-6)

Nietzsche calls for a similar reorientation in the basic principles of historical knowledge:

> [T]he cause of the origin of a thing and […] its actual employment and place in a system of purposes, lie worlds apart; whatever exists […] is again and again reinterpreted to new ends, taken over, transformed, and redirected by some power superior to it; all events in the organic world are a subduing, a *becoming master*, and all subduing and becoming master involves a fresh interpretation, an adaptation through which any previous "meaning" or "purpose" are necessarily obscured or even obliterated. (Nietzsche, 1967: 77. Italics in original)

Historical analysis should not interpret the past in terms of the present, but demonstrate how the present emerged as distinct from the past through the interventions of power – the hegemonic systems of capital and slave morality. The inevitability of a progressive history is replaced with an eye to the play of power in the historical constitution of both the objects of knowledge and the formal processes out of which knowledge is gained. The present is seen in radical *discontinuity* with the past, and the things of history are seen as elements whose meaning and nature depend upon historical determinations that specify them according to systems of hegemonic relations. It is towards providing a political theory of such historical ruptures, explaining the processes of interpretation/appropriation lying at the heart of social hegemony, and figuring the analysis of discontinuity as a basis for social transformation, that Marx and Nietzsche move.

2.3.2 Marx, Materialism, and Constitutive History

Marx demonstrates this kind of analysis in the introduction to the *Grundrisse*, in which he attacks the notion of the "Natural Individual" concocted by the "Robinsonades" of liberal political-economy (Marx, 1973: 83-4). Marx rejects the idea that individuality in the abstract is understandable with reference to the kind of individual emergent out of the specific conditions of liberal civil society in the eighteenth and nineteenth centuries. Rather, individuality in pre-capitalist societies is fundamentally different from its capitalist form – embedded in social dependencies that under capitalism appear as constraints on nominally free beings. In preparing the soil on which the liberal individual can grow, capitalism – through actions like the re-organisation of property, the development of the wage system, and the detail division of labour – is invested, first and foremost, in dissolving the various communal associations within which the individual previously gained substance as a historical subject. This is not the liberation of the individual, but the constitution, through specific acts grounded in class domination, of conditions in which an individual consonant with the requirements of capital can take shape. The individual is simply not the same in feudal and capitalist societies because the conditions in which individuality operates have changed.[20]

[20] Interestingly, Nietzsche also targets the liberal individual. Where modernity is typified by the dissolution of externally derived values (throwing individuals, albeit problematically, onto their own internal resources), previously, it was precisely these frameworks which sustained individual action and self-knowledge. In such a historical moment, "[…] to be an individual – that was not a pleasure but a punishment; one was sentenced to 'individuality'." (Nietzsche, 1974: 175).

In an example of constructivism *avant la lettre*, Marx applied this kind of analysis to technology in his discussion of industrial machinery in *Capital* (Marx, 1967: 368-556). According to Marx, the prior existence of a detail division of labour in manufactures was a condition for the specific forms that mechanical production and industrial machines took in the later development of the capitalist factory system. The organisation of manual labour in the earlier stage involved breaking down the production process according to its constituent operations, the assignment of workmen to the performance of such operations, and their serial organisation so that what was previously a skilled process undertaken by a single handicraftsman could be transformed into a collective process capable of technical manipulation in order to achieve greater productivity, intensity, efficiency, and lending itself to greater hierarchical control. This division of labour transforms the character of the labour process and consequently shapes both the nature of the labouring subjects and the implements of labour in such a way as to supply historical pre-conditions for the capitalist development of machinery.

At the level of the labour process, detail division of labour works to "[decompose] […] a handicraft into its successive manual operations" (Marx, 1967: 371), transforming skilled handicraft labour into a new form of collective labour – a "productive mechanism whose parts are human beings" (Marx, 1967: 371). At the level of the labouring subjects, "each workman becomes exclusively assigned to a partial function, and […] for the rest of his life, his labour-power is turned into the organ of this function" (Marx, 1967: 372). Detail division of labour thus "produces the skill of the detail labourer" (Marx, 1967: 372), but, in a sense, also his being: “[…] [D]oing only one thing converts him into a never failing instrument, while his connexion with the whole mechanism compels him to work with the regularity of the parts of a machine” (Marx, 1967: 383-4). The reduction of the labour process to a series of detail functions opens it to analysis and manipulation, and produces a mechanical co-operation and repetition in the labourers, dissociating labour from the full range of skills necessary for producing a good, and introducing the deskilled labourer as a historical subject. Detail division of labour also correlates to specific transformations in the implements of labour. Tools that used to serve many purposes are honed to perform single functions: “The manufacturing period simplifies, improves, and multiplies the implements of labour, by adapting them to the exclusively special functions of each detail labourer. It thus creates at the same time one of the material conditions for the existence of machinery, which consists of a combination of simple instruments” (Marx, 1967: 375). All of these *material* transformations supply a set of historical pre-conditions – a “technological frame” in SCOT’s language – on the basis of which machines come to be designed to conform to an existing patterning of social activity which is itself a product of a particular power relationship, the maintenance and extension of which is one of the key superlative functions of capitalist machinery.

These conditions, then, are not neutral, but bear implications for the distribution of power in both production and society. Detail division of labour, both in itself and as a basis for the design of machinery, is also a “form of the existence of capital” (Marx, 1967: 395). It is not only a technical intervention into the labour process, but a material investment of this process with a form adequate to the hegemony of capital. Division of labour plays a dual function here – deskilling labour by simplifying the range of necessary abilities, and creating a position “above” labour from which it can be managed, co-ordinated, and controlled: “The division of labour in the workshop implies concentration of the means of production in the hands of one capitalist […] [It] implies the undisputed power of the capitalist over men, that are but parts of a mechanism that belongs to him” (Marx, 1967: 390-91). The labourer is reduced to being a mere “appendage of the capitalist workshop” (Marx, 1967: 396). It is this same social logic that comes ultimately to supply a rationality – in the sense of a set of conditions which make certain kinds of action *appear* rational – for the design of industrial machines. The latter are designed to fit into, operate within, refine, reproduce and intensify this organisation of labour and the social hegemony it plays a part in creating. A set of historically specific interests thus work to particularise general categories, relations, and practices – labour, production, skill, tools – and to install these particularities at the heart of subsequent material innovations.

2.3.3 Nietzsche, Genealogy and Constitutive History

In the second essay of the *Genealogy of morals*, Nietzsche performs a similar operation on the practices and concept of punishment (Nietzsche, 1967: 79-81). Nietzsche argues, like Marx, for a distinction between general categories and particular determinations of them – between, in this case, punitive *procedures* (torture, imprisonment), which show consistency over time *as* procedures, and their *purposes* and *meanings* within historical dispensations, which vary widely. He presents a list of the latter which, far from clarifying the essential "utility" of punishment,[21] demonstrates that this utility is itself quite ambiguous – punishment as rendering harmless, as paying of damages, as a triumph over enemies, as containment of disruption, as an inspiration of fear, as a cancellation of the advantages of crime, as a source of memory, as payment of a fee, as a compromise between groups, as a declaration of war (Nietzsche, 1967: 80-1). Punishment is *overdetermined* by the variety of meanings and purposes condensed in this seemingly simple term – a feature which opens its procedures to great flexibility and enables them to be ordered to a variety of ends. The procedures – the very concept – of punishment thus possesses a kind of "interpretative flexibility" through the diverse meanings and purposes attributed to them, a feature of all complex concepts and practices, as Nietzsche indicates elsewhere:

> The word "revenge" is said so quickly, it almost seems as if it could not contain more than one root concept and feeling. And so people are still trying to find this root […] As if all words were not pockets into which now this and now that has been put, and now many things at once! (Nietzsche, 1967: 179-80)

The fact that there is no easily apprehended meaning or purpose to punitive practices raises a problem: how do they come to have *any* stable meaning or purpose? This is not a question of function only, but also of truth – the ambiguity of punitive practices reveals the "truth" of punishment (the reason

[21] Nietzsche argues that the idea that punitive measures were invented because they were useful is as ridiculous as the notion that hands were "invented for the purpose of grasping" (Nietzsche, 1967: 79).

behind the implementation of punitive procedures) to be multiple, inconsistent. We have already seen that it is, for Nietzsche, processes of “reinterpretation” and incorporation into “systems of purpose” that resolve, though never finally, ambiguities in historically consistent procedures, and transform them into historically delimited (rather than absolute) “truths”. For Nietzsche, all truth is interpretation: “[…] man’s sinfulness is not a fact, but merely the interpretation of a fact” (Nietzsche, 1967: 129). The point is not that there are no facts – no reality to which knowledge refers – but that the facts are mute in the absence of a perspective out of which they could gain form and significance within a historical dispensation. Seeing is always “seeing *something*”; thus, “there is *only* a perspective seeing, *only* a perspective knowing” (Nietzsche, 1967: 119. Italics in original). Facts are inherently perspectival, but just so are all perspectives peculiar to identifiable interests who struggle to establish their particular perspectives as unambiguous truth: [T]hey say ‘this *is* this and this,’ they seal off everything with a sound and […] take possession of it” (Nietzsche, 1967: 26. Italics in original). What is accepted as truth is the product of a hegemonic perspective which, through constant action in and on the world, is able to concretise and reproduce this hegemony through the imposition of a particular interpretative filter: the system of purposes which binds procedures, concepts and practices to a socially situated perspective (White, 1990). The will to power is thus also a will to truth (Foucault, 1977a; Widder, 2000). It is by stabilising and generalising the perspective of a dominant group that their dominance is, in part, secured and sustained.

Social hegemony is not, of course, only a matter of interpretation – there is also political violence. But Nietzsche's point is that there is no formal distinction between the conflict of forces on a field of battle and the operations of the will directed at establishing the meaning, form, and purpose of practices and concepts, which bears a violence of its own. The material and social worlds and a knowledge corresponding to them are crafted out of constant and shifting "force relations" whose product is an asymmetrical social structure *and* the meanings, forms, and purposes of the things of the world:

> The evolution of a thing […] is thus by no means its *progressus* towards a goal […] but a succession of more or less profound, more or less […] independent processes of subduing, plus the resistances they encounter, the attempts at transformation for the purpose of defense and reaction, and the results of successful counteractions. (Nietzsche, 1967: 77-8)

Here, the two basic ontological principles of genealogy are made evident: first, that the things of history only gain significance, on one hand, with respect to a perspective that interprets them according to its interests and, on the other, with respect to the various other elements interpreted from this perspective and articulated into a wider "system"; second, that such interpretations and appropriations are crafted out of relations of force between competing interpretative systems (Widder, 2000) – the two great moral systems Nietzsche identifies with nobles and slaves, and which he understands not in diachronic succession but in perpetual synchronic conflict. It is not only the groups themselves which generate the contingent meanings and purposes of things, but their specific struggles with opposing groups. The fabric of the social world thus consists in struggles through which social groups work to appropriate essenceless procedures, concepts, and forms within a system and so establish that system and its meanings in dominance.

In the *Genealogy*, Nietzsche targets the hegemonic system of what he calls the “priestly class”. It is implicit in his analysis that priestly notions of justice and morality – and the system of purposes out of which these are defined – differ fundamentally from those which may have obtained under a “noble” punitive system. What this suggests is that what one moral system brands as “evil” is more accurately to be understood as an *alternative morality*, the basis for a different moral order. The discontinuity between these two systems suggests both that values are relative and also that the realisation of an alternative value system based on an affirmation of life and self-actualisation is a real historical possibility, which it is genealogy’s task to expose and encourage:

> Even within a culture governed by a morality of good and evil, there remains the trace of another […] But this excess only comes into view through a genealogical endeavour that refuses to give primacy to identity, to exhaust events in their chronological sequence, and to ignore the dimensions of power and [relation] that exceed representation. (Widder, 2000: 325)

The discovery of this “excess” relativises absolute values, revealing that the material and conceptual frameworks which give historical body to those values do not exhaust them of their meaning or being. But it also allows for the “revaluation” of these values from an alternative perspective. Genealogy’s aim is not only to document the emergence of a value system, but also to evaluate this system along the measure of its benefit and worth (or the threat it poses) to “life”. A constitutive history of values is thus tied, on one hand, to a project of the normative assessment of the values themselves, and on the other to the realisation of a life-affirming alternative to a hegemonic moral system.[22]

2.4 Marx, Nietzsche, and Constructivism: Critical Histories of Technology

The constructivist approach to technology owes a largely unacknowledged debt to Marx and Nietzsche. In both historical materialism and genealogy, historical objects are treated as polysemous, evincing something like "interpretative flexibility", and subject to processes similar to "translation". Such flexibility derives not from the inherent properties of things, but from the possibility of a variety of subjective orientations to them based on the fundamental ambiguity of their contents. Particular iterations of categories, practices, and objects are the result of their appropriation by social groups in conflict with others in attempts to stabilise and concretise a hegemonic system. What can be seen as "closure mechanisms" are deployed to "translate" categories and practices such as individuality and punishment into the terms of a "technological frame" or "programme of action" associated with a dominant group, rendering the categories and practices functional to the hegemony of that group. The historical particularisation of categories, practices, and objects moves between subjective interpretations and the structures of the material world, and involves the appropriation and re-articulation of an array of heterogeneous elements (punitive practices, judicial process, technical objects, human beings, concepts, legal writ) into a functional system or "network".

[22] We need not, fortunately, agree with Nietzsche's substantive claims regarding "life-affirming" values to see the fruitfulness of his approach to history as a critique of the present.

For Marx, general categories like individuality, land, labour, money, machinery, etc. are open to multiple determinations linked to both the historical conditions in which and the social interests to which they are rendered operational. This is analogous to SCOT's conception of artefacts as open to varied interpretations grounded in the social and cultural frameworks of particular groups. A historically located but generalisable group (capital) establishes its interests with respect to particular iterations of general categories (*private* property, *wage* labour) and in opposition to others (*common* property, *craft* labour). Capital's realisation of its interests requires the extension and generalisation of these particulars in a variety of material forms (laws, enclosures, machines). For this purpose, it deploys diverse strategies (police repression, legislation, economic theory, technological development), which can be seen as closure mechanisms – stabilising, in terms favourable to capital, the categories parallel to the concrete reality to which they refer, thus ensuring their hegemony at the levels of both materiality and signification. The origins of abstract concepts are thus situated in the interpretations of a social group which are also material *appropriations* effected in an effort to gain power and advantage. The hegemony of capital ensures that historical peculiars like wage labour and private property can be generalised to a wider spectrum of social relations, this generalisation being precisely that on which the hegemony of capital depends. Likewise, Nietzsche's perspectivist approach to history bears strong resonances with constructivism. Nietzsche insists that the attainment, on the part of concepts, objects, or practices, of any stable meaning or form is the product of the ascendance of one interpretation over others. This interpretation is never directed only at a single element of the social world, but comprises a “system” (network?) into which a variety of elements are actively appropriated and so functionalised to the “purposes” (programmes of action?) of a hegemonic group. In this, Nietzsche comes close to articulating the actor-network principle as a basis for a general social philosophy.

But for Marx and Nietzsche, unlike for SCOT and ANT, the ambiguity of objects, the processes of stabilisation, the identification of the interpretative frameworks or strategic programmes of social groups, and so on are not merely interesting phenomena to be revealed by empirical analysis. Rather, they are embedded in political struggles whose stakes are the structures of domination and subordination in which social order consists. These struggles overrun the traditional division between knowledge and the material world, and refer to the contingent processes whereby material *and* discursive aspects of reality take shape together. In revealing the “interpretative flexibility” of categories, practices, and relations, Marx exposes their seemingly natural, eternal foundations as the products of historically located processes of class domination and of the political violence involved in their appropriation into a hegemonic system. At the same time, he reveals that residuum which is excised under the narrow horizon of capital: namely, the perspective of the dominated which could, if only it could rise to consciousness, initiate an alternative cycle of interpretation and appropriation (Poster, 1980). For Nietzsche, too, stabilisation must be understood as a coming into dominance of a particular group and its particular “system of purposes,” through which it actively grasps the ambiguities in both material and discursive reality and turns its elements to forms which subtly embody its will to power, its will to truth. The other subjective wills which are rendered subordinate in this process do not, however, passively concede to this system, but comprise active, constitutive moments in the system's articulation and development. The increasing consensus imagined as attendant on the development of technological frames gives way to ongoing struggles between dominant and subordinate wills in the shaping of an essentially contested reality.

Alternative interpretations are, then, not just fractures in historical development, but supply a basis for and emerge out of concrete struggles over the order of things. The processes of stabilisation – whereby social order comes into being through the appropriation of heterogeneous objects, practices, and forms of knowledge – is composed of concrete actions, initiatives, and strategic endeavours which in each instance evoke oppositions and resistances. These latter give shape to the concrete forms of domination and subordination, co-define the broader systems through which power is structured, and ground the formation of real historical alternatives. The task of historical materialism and genealogy alike is thus to identify and analyse the conditions through which general categories, practices and objects take shape historically, to integrate this analysis into a critique of hegemonic social systems, and to locate within this history the seeds of future alternatives. The rediscovery of these normative foundations of constitutive history exposes certain weaknesses in constructivism – weaknesses which do not aim at the core of that approach, but which render it inadequate, in and of itself, to a *critical* history of online education. But it remains relatively unclear how a turn back to the normative foundations of constitutive history in Nietzsche and Marx can contribute to the historical analysis of technology in general and of online education in particular. In order to clarify this, I turn in the next chapter to two more contemporary iterations of constitutive history which build on the legacies of both Nietzsche and Marx and which speak more directly to questions of technology – that is, Michel Foucault's reformulation of Nietzschean genealogy and Andrew Feenberg's critical theory of technology.

CHAPTER 3: A METHODOLOGY FOR CONSTITUTIVE HISTORY: GENEALOGY AND CRITICAL THEORY OF TECHNOLOGY

Not only was it difficult for [Funes] to comprehend that the generic symbol dog *embraces so many unlike individuals of diverse size and form; it bothered him that the dog at three fourteen (seen from the side) should have the same name as the dog at three fifteen (seen from the front).*

- Jorge Luis Borges

3.1 Introduction: History of Technology and the Politics of Rationality

SCOT and ANT both supply important foundations for a critical history of online education. SCOT reveals technologies as the products of competing social interests, opening the possibility of realisations of online education outside the agenda identified by critics as the defining force in the field. ANT exposes the evangelical discourse as a contingent programme that, on the one hand, works to enrol heterogeneous elements through equally heterogeneous means into functional networks, and that, on the other, encounters “anti-programmes” that work to modify the terms of enrolment and that could potentially lead to the derailing of the programme itself. These perspectives move us a great distance from the essentialism the evangelical discourse. But the lack of a normative grounding renders them inadequate in and of themselves to a *critical* history and politics of online education. Returning to the foundations of constitutive history in the work of Marx and Nietzsche allows for the identification of critical frameworks formally similar to SCOT and ANT but which add to the latter the normative aspect that is missing from them. Marx deploys something like interpretative flexibility, but qualities his analysis of stabilisation by situating it within the context of class struggle (Marx, 1973, 1967). And while Nietzsche does not address technology overtly, genealogy suggests constructivist approaches both in blurring the boundaries between the material and discursive aspects of reality, as well as in its emphasis on the “being” of objects, concepts and practices as a product of their appropriation into systems of purposes (Nietzsche, 1967).

The next stage in the construction of a framework for the critical analysis of online education is to bring the insights provided by Marx and Nietzsche into clearer focus with respect to technological design and development. This chapter addresses this by turning to two branches of constitutive historical analysis pertaining specifically to technology – Michel Foucault’s adaptation of genealogy, and Andrew Feenberg’s critical theory of technology. While Foucault fashions his work as a resuscitation of Nietzschean genealogy (Foucault, 1994), Feenberg develops elements of SCOT and ANT into an approach to technology with a basis in the Frankfurt School’s critique of “technological rationality”, itself derived from Marx’s critique of capitalism (Feenberg, 2002). Feenberg also builds upon Foucault’s insights into the “microtechnical” foundations of power in modern societies and extends them into a theory of the democratic transformation of technology. In what follows, I review elements of Foucault’s and Feenberg’s work relevant to the history of technology, and conclude by suggesting how genealogy and critical theory might be drawn upon in the critical analysis of online education.

3.2 Foucauldian Genealogy: Rationality, Power, and History

Foucault develops Nietzschean genealogy into a rigorous approach oriented to a history of the “objectification” of hegemonic interpretations of concepts, objects, subjects and practices in rational procedures and systems, and to the recovery, out of this history, of “subjugated knowledges” which can be activated in political struggles in diverse fields of knowledge and practice (Foucault, 1994, 1991, 1980). Both of these aspects of Foucauldian genealogy aim at a “history of the present” (Foucault, 1977b; Baert, 1998) – an account of the constitution of social order through precise, curiously impersonal “mechanisms of power” articulated at the level of heterogeneous, micro-social practices, relationships, subjectivities, and techniques. These mechanisms are not operative with respect to interested subjects, who might wield them for the instrumental purpose of furthering some conscious interest. Rather, they are to be analysed in terms of the formation, operation and transformation of “discourses” (Foucault, 1991, 1980, 1972) – “strategic ensembles of practices” (Khan, 2004) that serve as the basis of more or less general, more or less integrated logics that bind varied forms of knowledge, techniques, concepts, objects, subjects, etc. through diverse means into an overall strategy of domination (Foucault, 1980). Such strategies are not explicit plans, but products of the cumulative “effects” of discourses, which link heterogeneous elements constituting fields of knowledge and practice according to their strategic functions. Genealogy thus aims to explore the rational foundations of hegemonic systems through an analysis of the historical configuration of social practices through interventions of power which are also appropriations of knowledge. There is a three-fold movement in such analysis – an initial displacement of the "self-evidence" of a present state of a field of practice, the tracing of its constitution *as* self-evident (i.e., as the kind of thing we recognise it as being in the present), and the recovery of alternatives to the hegemonic ordering of practices and knowledge which could serve as the basis for alternative configurations.

The first movement involves a shift of focus familiar from constructivism, and can be dealt with fairly briefly. For Foucault, the constitution of fields of practice – and the artefacts, subjects, techniques, and structures of knowledge that make them up – is a contingent outcome of historical interventions (Foucault, 1994, 1972). Genealogy's task is to analyse these interventions insofar as they result in the formation of the familiar modern configurations of these fields. This involves locating in their history a "breech of self-evidence" – an exemplary historical order of knowledge, practices, and relations (like those constituting sexuality, punishment or medicine) which stands outside the logic of their contemporary ordering and represents a divergent rationality for them. This reveals any given order of things in a field of knowledge/practice as a "singularity" – a unique historical occurrence – rather than as the logical outcome of a necessary and linear development (Foucault, 1994: 226)[23]. For Foucault, as for Nietzsche, it is not immediately evident that criminals should be confined or

[23] Foucault makes this point clear in discussing the "irrationality" of public torture: "[T]he ceremony of public torture isn't in itself more irrational than imprisonment in a cell; but it's irrational in terms of a type of penal practice that involves new ways of envisaging the effects to be produced by the penalty imposed, calculating its utility, justifying it" (Foucault, 1994: 229).

madness treated as a form of mental illness, and there is no absolute basis on which we can apprehend what these procedures (or the relations, techniques, and objects of which they consists) *are* or *are for*, who is subjected to or authorised by them, nor how they are brought to bear in the world. Procedures are distinct from “systems of purposes”, and all knowledge involves the establishment of a dominant logic (or “perspective”) which grants “objectivity” to the things of the world – their historical reality. These things – their purpose, the practices sustaining them, a knowledge of them – *become* self-evident in their appropriation under the terms of a binding logic that inscribes them with a form of reason that constitutes their self-evidence, and renders them functional to a hegemonic order – one expressed materially in the practices themselves, and cognitively in the forms of knowledge that produce them and that they in turn produce. The present state of social practices, relations and forms of knowledge is thus not a logical culmination of developments from the past, but the result of a strategic selection among potential configurations of practices which bears specific effects for knowledge, practice, and relations of power.

3.2.1 The formation of self-evidences: Power and Genealogical Method

Genealogy’s second aim is to trace the passage of a field of knowledge and practice from a historically locatable point of difference towards its recognisable form – to uncover “the connections, encounters, supports, blockages, plays of force, strategies, and so on, that at a given moment establish what subsequently counts as being self-evident” (Foucault, 1994: 226-7). Foucault thus studies not the history of punishment, but the history of the *processes of penalisation* (Foucault, 1994: 227) – that is, the history of how the practical procedures, forms of knowledge, and techniques of punishment distinct to modern societies came into formation as such and in contrast to earlier forms of punitive practice. This history is understood with reference to "calculated, reasoned prescriptions" (Foucault, 1994: 231) that Foucault variously labels "strategic programmes", "strategies" or "discourses". These are, like "technological frames" or "network programmes", not only cognitive, but "induce a whole series of effects in the real" (Foucault, 1994: 232), which are generated by precise techniques in specific fields of practice, and which act as a basis for the ordering and development of such fields. In order to bring the methodological implications of this framework to light, we must first turn to Foucault's reformulation of power as the force behind the historical production of self-evidence in social practices.

At the core of Foucauldian genealogy is a critique of the classical liberal and Marxian concepts of power. Liberalism and Marxism see power in "economic" terms as the purely negative, repressive power of the State or Capital (Foucault, 1980: 88-9). In liberalism, power is seen as analogous to a commodity – a thing to be possessed, exchanged, used, abused; in Marxism, power gains expression, function and rationality from a "base" in the economy, and is ordered, like surplus value, in such a way as to foster its accumulation by capital while diminishing that portion allocated to labour (Foucault, 1980; c.f., Marx, 1967).[24]

[24] This is the same form of power which, as we saw in chapter 2, rationalises the development of industrial machines on the basis of a contingent social relationship, and which results in a technology that embodies the political relations of capital.

Foucault posits another view: power is not a thing to be possessed or accumulated; rather, "it only exists in action […] [I]t is above all a relation of force" (Foucault, 1980: 89). As such, Foucault insists that an alternate methodology be developed suitable to the analysis of power "in terms of *struggle, conflict,* and *war*" (Foucault, 1980: 90. Italics in original). To this end, he advances a number of "propositions" concerning power and a set of "methodological precautions" for the analysis of its operation in the constitution of self-evidences.[25]

The first proposition is that the exercise of power is neither homogeneous nor unidirectional; it occurs from "innumerable points, in the interplay of nonegalitarian and mobile relations" (Foucault, 1990: 94) that go "beyond the state and its apparatuses" (Foucault, 1980: 89). Power diffuses through society towards the most minute points of contact with objects, practices, knowledge, and individuals.[26] The focus thus shifts from monolithic power centres to the operations of power "at its extremities" (Foucault, 1980: 96) – the various "local centres" at which power becomes "capillary", and where it is directly articulated onto individuals through specific techniques deployed to order and manage action, agency, relation and subjectivity in the context of specific practices. In shifting focus this way, Foucault does not think away the "meta-powers" of State or Capital, but displaces them in order to highlight their diverse, microtechnical foundations.

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[25] C.f., Foucault, 1980: 96-102; Foucault, 1990: 98-102.

[26] E.g., child sexuality as it is constituted through the ordering of the relations among parents, doctors, and children (Foucault, 1990), or the prison, hospital, barracks, and school as sites at which diverse techniques of observation, examination and analysis are deployed for the control of individuals through the production of "deviance" and "normalcy" (Foucault, 1977b).

Second, when seen as a local exercise, power does not take the abstract form of law or prohibition, but becomes “embodied in techniques, and equips [itself] with instruments” (Foucault, 1980: 96). It is an *effect* generated out of concrete practices and techniques that offer affordances for instituting disequilibria in local social relations. It is immanent to and plays “a directly productive role” in local centres (Foucault, 1990: 94), constituting modes of control, forms of subjectivity, and orders of knowledge in them. The analysis of this positive, productive power involves tracing its constitution in the development of concrete practices and techniques insofar as they generate “effects of power” that lend stability and objectivity to local practices and relations. Genealogy aims “at the level of those continuous […] processes which subject our bodies, govern our gestures, dictate our behaviours” (Foucault, 1980: 97) – i.e., where social relations are structured through techniques that prescribe normative conditions for and knowledge of who subjects are and what they should do, and that lend objectivity to fields of knowledge.

A corollary of the localisation, heterogeneity and productivity of power is that it is not imposed from above but constituted from below. State and capitalist power are not unitary, pre-constituted, unproblematic. They consist rather “in the codification of a whole number of power relations which render their functioning possible” (Foucault, 1980: 122) – that is, in a harnessing of the effects of power generated by diverse techniques that render localised practices and relations functional to a system of domination. These techniques, themselves “designed in response to localised requirements” (Foucault, 1994: 231), are the objects of tactical appropriations which “becoming connected […] attracting and propagating one another […] end by forming comprehensive systems” (Foucault, 1990: 95).[27] Foucault thus insists on “an *ascending* analysis of power, starting […] from its infinitesimal mechanisms” and moving to a consideration of “how these mechanisms of power have been invested, colonised, utilised […], etc. by ever more general mechanisms and by global forms of domination” (Foucault, 1980: 99. Italics in original). Power should be understood as a force that operates between various tactical moves and a broader hegemonic strategy whose grasp on the concrete, heterogeneous and practical foundations on which it rests is never entirely settled or complete. Genealogy thus focuses on the tactical “codification” of diverse sites, relations, and techniques in a field of practice, their investment with a strategic logic, and their integration and linking into such a strategy. This reveals how historical self-evidences are produced in tandem with their functionalisation in a hegemonic order.

This dynamic operation of power is not, however, as simple as the direct appropriation of objects by a pre-constituted power, nor are the latter’s objects ever invested once and for all with a form corresponding to a hegemonic order. Rather, power relations are “matrices of transformations” (Foucault, 1990: 99). The codification of local practices, objects, subjects and techniques encounters resistances that condition both the exercise and ultimate forms of power (Foucault, 1990: 95-6). These resistances bear the same localised,

[27] Marx makes a similar point in discussing division of labour, which “acquires the best adapted form at first by experience […] behind the backs of the actors, and then […] strives to hold fast to that form when once found” (Marx, 1967: 399).

polymorphous and concrete quality as the tactical operations of hegemonic strategies – they are the odd term in the force relations by which the spread of power proceeds. Genealogy thus studies the constitution of dominative systems relative to the resistances they meet and the tactical modifications their expressions undergo as a result. It “seek[s] the pattern of the modifications which the relationships of force imply by their very processes” (Foucault, 1990: 96), paying attention to the plurality of resistances which, coming into abutment with tactics of domination, condition its exercise, supply terms for its tactical transformation, and lend their own weight to the formation of self-evidences.

For Foucault, then, power is exercised as a relation of force; it is heterogeneous in its forms, expressions and points of contact; it is constituted out of an encoding and linking of local centres; it is tactical in its interventions and strategic in its overall formations; it is productive and positive, investing bodies, practices and techniques with a functionality that permits them to be mobilised in strategies of domination; and it invokes resistances which constitute the dynamics of its development. By extension, genealogy involves locating and defining the “local centres” at which relations of force engage in constituting fields of practice, analysing the concrete techniques whose effects open them to tactical investment and mobilisation in a larger strategy, which is itself transformed through the specific resistances it encounters as a regular part of its exercise (Foucault, 1994).

3.2.2 The Objects of Genealogy: Discourse and the Politics of Truth

Foucault's concept of power and the "methodological precautions" attendant on it supply a basis for genealogy, but it remains to describe its field of application. The notion of a "codification" of relations, practices, and techniques as part of their appropriation into hegemonic strategies supplies a key here. Foucault states that in any society

> there are manifold relations of power which permeate, characterise and constitute the social body, and these […] cannot […] be established, consolidated, nor implemented without the production, accumulation, circulation, of a discourse. There [is] no […] exercise of power without [an] […] economy of discourses of truth which operates through and on the basis of this association. We are subjected to the production of truth and we cannot exercise power except through the production of truth. (Foucault, 1980: 93).

The operations of power outlined above are thus analysed in terms of the *production and functioning of truth in discourse*. This is not the active distortion of knowledge;[28] rather, "there is no power relation without the correlative constitution of a field of knowledge, nor any knowledge that does not presuppose and constitute […] power relations" (Foucault, 1977b: 27).[29] Knowledge is inextricably tied to power as both its fundament and principle object. Discourse is the figure through which forms of knowledge and practice are given the semblance of objectivity through their tactical investment in a logic corresponding to a strategic "power/knowledge" linked to a system of domination.

[28] I.e., it is not "ideological", not an obfuscation of a pure "truth" – *any* production of truth is an effect of power. C.f., Foucault (1980: 102, 118-19).

[29] In keeping with Foucault's insistence on the "non-subjective" nature of power, subjects, too, are implicated in the production of power/knowledge: "The individual […] is not the *vis-à-vis* of power; it is, I believe, one of its prime effects" (Foucault, 1980: 98).

"Discourse" supplies an analytic figure for Nietzsche's "systems of purpose" within which practices and techniques are given particular manifestation. It provides the terms under which various elements are incorporated and made functional to such a system. It is a logic that binds tactical moves and mechanisms in local situations to visible, strategic power formations, and that constitutes the historical manifestations and operations of the latter. It is that practice through which the microtechnical foundations of power are drawn into a framework that constrains their articulation and development in the terms of a dominant hegemony; and it is that through which the formation and transformation of this hegemony is traced. Like Nietzsche's "systems of purposes", discourse is not comprised of linguistic or logical rules; nor is it a "surface" masking a hidden intention. It "consists of a whole group of regulated practices" (Foucault, 1991: 63), emergent out of and acting as a constraint on the production of knowledge, and on the general set of non-discursive procedures and social relations within those fields. Discourses are modes of the regulation of knowledge and practice, polymorphous with respect to the plurality of relations and techniques, objects and subjects that they invest with function and meaning in a historically particular order of things.[30] Discourses comprise "regime[s] of practices", "places where what is said and what is done, rules imposed and reasons given […] meet and intersect" (Foucault, 1994: 225). Discourse is that practice in which "prescriptive effects" governing what is to be done in a

[30] The confinement of the insane, the treatment of the ill, the regulation of sexuality cannot be divorced from the techniques of analysis, calculation, and examination constituting *both* a knowledge of what insanity, illness and sexuality are in a particular historical dispensation *and* the function of the non-discursive practices of confinement, treatment and regulation as they are ordered or instituted in a "regime of practice" C.f., Foucault (1990, 1975, 1972, 1965).

particular situation fuse with "codifying effects" governing both what is to be known and how (and by whom) knowledge in a particular field is to be legitimately produced (Foucault, 1994). In this way, a "regime of practice" is linked to a "regime of truth" (Foucault, 1980).

Discourses are not, however, static or unitary structures. Due to the nature of power as a constitutive, localised relation of force to which resistances are immanent, they should be taken as dynamic fields in which occur the appropriation, mutation, transposition, and re-codification of the objects, procedures, subjects and techniques comprising fields of knowledge and practice. These appropriations, mutations, etc. often appear to be of a random or disconnected sort, but they produce regular "effects of power" which open them to generalisation and adaptation across a range of different practices. Insofar as it is able to grasp the array of mechanisms through which knowledge is produced, a hegemonic order comes to be "condensed" in techniques, artefacts, even physical structures.[31] Relatively stable relations and procedures are thus displaced from one order of power/knowledge into another, just as new techniques are innovated and implemented to harness and intensify the effects of power in the different fields in which they become operative. What looks on the surface like continuity in history is thus exposed as a series of discontinuities

[31] The paradigmatic example of this is the spread of "disciplinary power" across a variety of sites (prisons, hospitals, schools, factories) through the application and transposition of heterogeneous techniques of observation, measurement and testing, all of which are functional to a logic of "correction" and "normalisation" (Foucault, 1977b). Since I am concerned with the *formal* aspects of genealogy, I leave aside a discussion of "disciplinary society" in preference for exploring how the conceptual underpinnings of genealogy contribute to what will be a much narrower analyses of a specific practice – online education – and its various techniques and relations.

through which the operations of power/knowledge grasp relations and techniques, re-interpreting them through diverse mechanisms and redirecting them to new ends. Genealogy seeks to uncover the processes whereby, via the production of discourses, fields of practice are transformed from one mode of power/knowledge into another, and so take objective shape.

3.2.3 The Recovery of Subjugated Knowledges

The displacement of the self-evidence of fields of practice and the tracing of their objectification through the operations of power/knowledge at the level of discourse does not only aim to document the emergence of a dominant order. As we saw above, power is subject to immanent resistances which comprise an essential element of its formation and spread. This opens the possibility of a "re-codification" of tactical resistances under the terms of a hegemonic strategy (Foucault, 1980: 86). But there is another possibility: namely, that these resistances could be organised into an effective counter-strategy through which the effects of domination could be overturned, or at least diminished. In Foucault's words, "it is doubtless the strategic codification of these points of resistance that makes a revolution possible" (Foucault, 1990: 96). The third movement in genealogy, then, is to resuscitate the "subjugated knowledges" that remain as traces in hegemonic regimes of truth, that figure as negative poles in their articulation in discourse, and that offer existent potential for the "re-codification" of power relations in alternative orders of knowledge and practice.[32]

Subjugated knowledges are those which have "been buried […] in a functionalist coherence or formal systematisation" (Foucault, 1980: 81), or "disqualified as inadequate […] or insufficiently elaborated" (Foucault, 1980: 82). In the first case, alternative potentials afforded within fields of knowledge and practice are integrated into a dominant programme; in the other, oppositional knowledges are de-legitimised or externalised from the field. Either way, potentiality is located in the very mechanisms of power which are the building blocks of hegemonic discourses, which emerge now not as one-sided instruments of domination, but as politically charged objects around which forces struggle over the form of knowledge and practice. Subjugated knowledges stand against the homogenising tendencies of dominant discursive formations – against "a unitary body of theory which would filter, hierarchies and order them in the name of some true knowledge" (Foucault, 1980: 83).

And so the ultimate aim of genealogy is to identify subjugated knowledges and mobilise their latent potential to "emancipate historical knowledges from […] subjection, to render them […] capable of opposition and struggle […] in opposition to the […] hierarchisation of knowledges and the effects intrinsic to their power" (Foucault, 1980: 85). A key element of this formulation is that the resistance called up by the operations of power/knowledge do not stand in a

[32] For Foucault, "The essential political problem is […] that of ascertaining the possibility of […] a new politics of truth […] [changing] the political, economic, institutional regime of the production of truth" (Foucault, 1980: 133). This is not the end of power, but the constitution of a new order in which the dominative aspects of social relations could be minimised (Foucault, 1990).

merely theoretical relation to the actual expressions of domination. Rather, resistance is conceived here as a form of practice initiated within the localised spheres to which hegemonic discourses are addressed, and thus involves a mobilisation of subjects *within* those spheres, not simply against them. Transformations in power relations can only occur “where critique has been played out in the real” (Foucault, 1994: 236). Recovering subjugated knowledges is a necessary element here, since it is on the basis of these that a “recodification” of power relations can take place.

Genealogy thus strives to uncover and encourage those tactical resistances which are immanent to power, which ground the logic of its extension, but which also offer the potential for an alternative order of knowledge and practice. Despite this suggestion, however, Foucault is reticent to endorse such a project. This is not merely an analytic choice, but is tied to the grounds of his theory, exacerbated by his tendency to posit resistances only in relation to power as that which invokes them, and by his insistence that it is the very forms of power that constitute the individuals caught up in power relations. The oppositional force that Marxism and liberalism – even Nietzsche – ascribe to human subjects is, for Foucault, a residual property of the techniques, forms of knowledge and practices through which such subjects come into existence as objects of control and domination. If knowledge is always already power, and if this power/knowledge grants individuals their being and agency in the context of social relations and practices, then there seems to be scant possibility that the “subjugated knowledges” revealed by genealogy could be effectively mobilised in the overturning of a hegemonic order. As some critics have noted, this seems, despite Foucault's overtures to the contrary, to preclude the possibility of rational alternatives to hegemonic order, or even the viability of systematic rational critique (Dodd, 1999; Merquior, 1985; Ransom, 1997). As suggestive as Foucault's work is, then, it lacks a cogent theory of the transformation of dominative regimes of practice and truth as embodied in discursive and rational systems. To recover such a theory, while retaining Foucault's contributions to a critical history of online education, I turn now to critical theory of technology.

3.3 Critical Theory of Technology: Rationality, Power and the Transformation of Technology

Critical theory of technology combines elements of constructivist technology studies, Frankfurt School critical theory, and Foucault's theory of power/knowledge (Feenberg, 2005, 2002, 1999a, 1995). The central problems addressed in this synthesis are that of technology as a support for hegemonic power, and that of the potential for a democratic transformation of technology through popular interventions in the technical sphere. Developing constructivism's insistence on the imbrication of social and technical factors through Marcuse's critique of "technological rationality", Feenberg supplies a normative framework for the critique of the social construction of technology as a political process, while his conceptualisation of technology as embodying both "prescriptive" and "codifying" functions suggests a resonance between the substantive framework of critical theory and the genealogical method. Feenberg goes beyond Foucault, however, in identifying technology as open to democratic transformation and in theorising a kind of transformative agency grounded in user participation in technical practices at a variety of levels. Before turning to Feenberg’s work in detail, I will first situate it with respect to its grounds in Marcuse’s critical theory.

3.3.1 Technological Rationality and the Transformation of Technology

Constructivism insists that technology is an iterative process through which social values contingently coincide with concrete technical forms. This “dual aspect” can be interpreted through Marx and Nietzsche’s distinction between practices, techniques and relations and the “systems of purposes” or “determinations” whereby they are specified historically. In this reading, technology represents a forum for the concretisation of power relations, a manifest expression of a rational form of power. Foucault affects something similar: what counts as rational is, from the beginning, conditioned by the harnessing of “effects of power” generated at the microtechnical foundations of hegemonic systems. The coincidence of rationality and power in Marx, Nietzsche and Foucault reveals a normative political dimension to technology which Feenberg adds to constructivism by drawing on Marcuse’s critique of “technological rationality” (Marcuse, 1978, 1964).

Marcuse posits that Marx’s hope for a redeployment of capitalist machinery in an alternative social organisation of productive forces can no longer stand as the basis for a democratised society. The development of rational means has become so thoroughly ensconced in capitalist requirements for control that technical processes and values are in every case qualified by the need to extend relations of domination. As capitalist science and technology increasingly ground social development in general, these distorted values and the technical forms through which they are instantiated act to legitimate domination by installing it as an operative feature of basic social processes. To the extent that this process is successful, society becomes “one-dimensional”, empty of the possibility and denying the legitimacy of critical values and practices (Marcuse, 1964).

Despite this dire outcome, Marcuse held out some hope for individual and social liberation from the iron grip of capitalism. In an early essay, he contrasts technological rationality with an “individual rationality” premised on the desire for human freedom, and that could act as a basis for a transformation in the technical foundations of modern society in terms consonant with the liberation of the individual (Marcuse, 1978). The technical heritage of capitalism cannot be unreflectively implemented in an alternative social order; but neither would it need to be entirely scrapped, since “it remains the very basis of all forms of human freedom” (Marcuse, 1964: 231). What is required is a series of interventions in the values that bind technical forms and practices to hegemonic order, and an installation of values supportive of human freedom in the horizons of technical activity: “The qualitative change […] lies in the reconstruction of [the technical] base […] in its development with a view of different ends” (Marcuse, 1964: 232).

How are such interventions to be effected in an era characterised by individuals’ total acquiescence to rational forms of domination? As technique comes to ground the processes and relations of production, cultural practices, as well as "private speech and thought" (Feenberg, 2002: 67), a novel historical dynamic arises between the spheres of technical design and social appropriation. The latter retains potential for action directed by a desire for expanded freedom and creativity, and it is here that Marcuse locates the point of origin of the "new ends" towards which technology must be driven: "[T]hese new ends, as technical ends, would operate […] in the construction of the machinery, and not only in its utilisation" (Marcuse, 1964: 232). This indicates that the individual rationality operative in the sphere of appropriation can act to transform the horizons under which technical innovation occurs. It is in the appropriation of technology that new ends come into view; the challenge is to incorporate them into design. Marcuse does not pursue this claim to its conclusion in a critical theory of technical practice, and remains elusive on how such a practice might emerge. Feenberg's work, in part, responds to thus lacuna, and his reformulation of technological rationality throws open the door to a theory of the democratic transformation of technology which Marcuse left flirtatiously ajar.

3.3.2 Technology and Hegemony: Ambivalence, Technical Codes and Formal Bias

Like Marcuse and Foucault, Feenberg is concerned with the coincidence of social hegemony and rational systems. But while the former construct theories in which knowledge and technique are always already suffused with power, Feenberg follows constructivism to focus on the *social mediations* by which technology contingently converges with hegemonic power. Feenberg adapts to technology the now familiar notion that general categories, techniques and practices must be distinguished from their particular historical iterations. Key to this is the notion of the fundamental "ambivalence" of technology, which is based on a distinction between finished artefacts and the various "technical elements" – springs, levers, silicon chips, etc. – of which they are composed. Such elements "arise out of discoveries so basic that although they may first have served one or another specific purpose, they can be used for very different purposes in a wide variety of contexts" (Feenberg, 2002: 77-8).[33] They are "relatively neutral" to the interests of dominant and subordinate groups, and could conceivably be configured to reflect a variety of interests. Insofar as the technical elements are arranged to embody a specifiable social interest, this has less to do with the elements themselves than with the way that certain configurations of them appear desirable or logical in the particular historical contexts in which they develop. Technology's social qualities lie "not in the logic of its inner workings, but in the relation of that logic to a social context" (Feenberg, 2002: 79).

Technologies thus take shape through the configuration of ambivalent technical elements in such a way as to realise some contingent interest: "[T]he abstract technical elements must enter a context of social constraints" through which ambivalence is resolved one way or another so as to achieve a "fit" between a technology and its context (Feenberg, 2002: 78). The determination of this fit is an interpretative process, involving both the designation of "social

[33] Ambivalence contrasts both with neutrality and interpretative flexibility. Technology is not neutral because its ambivalence allows it to be granted social content in its very form. But this also means that any interpretative flexibility artefacts have is conditioned at the prior point of encoding in the design process.

criteria of purpose" (what an artefact is to do with respect to this or that social practice) and the definition of the social practice of which it is to be a functional part. Such designations, often involving complex and controversial questions of the nature of social processes, are drawn from a background of values, assumptions, priorities and interests constituting the "context of social constraints" through which the ambivalent elements pass, and which Feenberg terms "technical codes" (Feenberg, 2002: 74-88).

Technical codes comprise the frequently implicit horizons guiding the technical choices by which the fit between a technology and its context is achieved, and under which social interests are translated into concrete rational forms: "A technical code is the realization of an interest in a coherent solution to a general type of problem. The solution then serves as [a]n […] exemplar for a whole domain of technical activity" (Feenberg, 2002: 20). Technical codes have a cumulative, historical quality, instilling relative stability and momentum to technical innovation insofar as they successfully objectify contingent values and choices in technical forms which, in turn, constrain further development. Technical codes, like Foucault's discourses, combine "prescriptive" and "codifying" functions – true to the meaning of codes as both rules under which operations are to be performed and underlying meaning-making structures whose units gain significance relative to each other and to the contexts of their usage. Through the filter of technical codes, "[…] social purposes are embodied in the technology and are […] not mere extrinsic ends to which a neutral tool might be put" (Feenberg, 2002: 78). Coincidence of social hegemony and technical form is not, in itself, what makes technology political; rather it is the ambivalence of technology and the particular manner in which social values and technical forms converge in the design process that constitute a technological politics.

Feenberg terms the contingent alignment of technical form and social interest “formal bias” (Feenberg, 2002: 80-2). Artefacts and systems come to embody formal bias through the displacement or exclusion, conscious or otherwise, of significant aspects of the social contexts in which they are to function. Inclusion or exclusion of contextual factors is, like the resultant bias of the artefacts and systems themselves, a function of the code under which their design proceeds: “The essence of formal bias is the prejudicial choice of the *time, place, and manner of the introduction of a system comprised of relatively neutral elements*” (Feenberg, 2002: 81. Italics in original).[34] The resolution of ambivalence in design produces “effects of power”, in Foucault’s terms, which devolve not from the employment of technology, but from its contingently realised forms. This enables a dominant hegemony “to encode [its] technical base, not merely associating technology with certain signifiers, but installing these signifiers in their very structure” (Feenberg, 2002: 77).

In contemporary societies, the alignment of technology with social hegemony takes place largely in relation to the requirements of capitalism: “Capitalist social and technical requirements are condensed in a ‘technological

[34] Bias should be understood as *any* contingent interest embodied in rational form. The bias of technology does not always correspond to hegemonic interests; but concomitantly, no modern hegemony can be sustained without encoding technology in alignment with its interests.

rationality' or a 'regime of truth' that brings the construction and interpretation of technical systems into conformity with the requirements of a system of domination" (Feenberg, 2002: 76). Two of capitalism's requirements are the reproduction of management's strategic power over labour (which Feenberg calls "operational autonomy") and the extension or intensification of labour discipline as a by-product of labour's alienation from direct interest and decision-making power in the firm. These elements of a capitalist technical code come to inform both the realisation of biased technical systems (as Marx theorised), *and* the definition of technical values like efficiency, utility, progress, etc., which come to carry a similar bias with respect to the technical forms and practices to which they are applied.[35] If the microtechnical foundations of social order are to act as positive grounds for capitalist hegemony, they must be strategically encoded to embody a bias corresponding to these requirements.

But, as the Frankfurt School critical theorists argued, capitalist hegemony is no longer confined to production. As capitalism extends to embrace key processes of social reproduction, these must similarly be reinterpreted under the horizon of the capitalist code, whose terms may not be present in these processes in an unadulterated form. Rather, capitalism's general requirements must be translated into the more specific ones through which designations of "social criteria of purpose" are made with respect to this or that social practice and whereby ambivalent technical elements are subsequently configured: "[…] the connection between knowledge and power […] lies in the code that ensures

[35] For example, "[t]he assembly line only appears as progress because it extends a kind of administrative rationality on which capitalism already depends" (Feenberg, 2002: 89).

that they are co-ordinated in the application" (Feenberg, 2002: 80). Technological rationality is political rationality. But this is a product of the resolution of ambivalence through the embedding of technology under the horizon of contingent codes that define frameworks for technical choice and that serve a regulatory function in designating the normative terms of social practices and development paths in a field of innovation.[36]

3.3.3 The Varieties of Technical Code

If ambivalence and encoding were restricted to design, it would be a relatively simple matter for hegemonic groups to encode artefacts and systems in their favour by establishing institutional controls around the design process, ensuring that it could be effectively sealed off from influence by countervailing interests.[37] Ambivalence and technical codes are not, however, homogeneous concepts, but appear in three other senses apart from the microtechnical level of design and the broader level of capitalist hegemony – namely, social appropriation, the configuration of sociotechnical systems and practices, and technical expertise. These correspond to distinct yet related "levels" at which technology is invested with formal bias, and at which social interests struggle over the ultimate form and meaning of technology. The code's function at each level is to resolve ambivalence – to grasp affordances in order to align technical

[36] Of course, capitalism is not the only source of bias, nor is production the only site affected by bias in the formal structures of everyday life. Formal bias can be installed in and interpreted out of artefacts on the basis of the full range of divisions that characterise the social world – based on gender, ethnicity, institutional status, etc. – and which also comprise elements of technical codes.

[37] In many respects, this is precisely that in which the last 200 years of technological development has consisted, as has been argued by a number of critics and historians. C.f., Horkheimer & Adorno (1972), Marx (1967), Mumford (1962), Noble (1984, 1977) & Veblen (1965).

objects, systems and knowledge with contingent values, interests and goals. The hegemonic encoding of technology thus involves not only the direct conditioning of the design process, but the binding of these other levels within the framework of codes corresponding to a dominant hegemony.

Having passed through the design process, artefacts are not closed to further negotiation, but retain a degree of ambivalence which opens them to a variety of appropriations that may or may not correspond to their initial coding (Feenberg 1995: 4-5; 2002: 91-2). The everyday meanings of artefacts are not the result of their design, but must be produced out of a range of purposes to which artefacts can be turned.[38] As long as the social definition of the artefact – its "fit" within a set of practical meanings – remains in question, it may possess a greater or lesser degree of ambivalence where the course of its ongoing development is concerned. The ambivalence of artefacts may be more limited than that of their constituent elements, but nevertheless conflicts over their meaning in use-contexts can, and often do, act back on design.[39] Social appropriation is thus a key site at which conflicting meanings, values and practices cluster in attempts to encode technology – at the levels of *both* appropriation *and* design – in conformity with social interests and thus in alignment with a particular bias. Such biases can gain a degree of formality through legal or other regulatory mechanisms that establish normative contexts for the legitimate use of artefacts in diverse social contexts, and through the

[38] SCOT's "interpretative flexibility" clearly corresponds to this level of the technical code.

[39] If the turn-table, e.g., is defined as a means of *consuming* music, technical features for more detailed speed and pitch control or heightened balance will be unnecessary, though they are essential if the artefact is practically defined as a tool of musical *production*.

incorporation of technical features supportive of those mechanisms.[40] Like design, social appropriation poses problems and opportunities for the reproduction or subversion of hegemonic interests due to the residual ambivalence of artefacts. Even where the binding of design under a hegemonic code is relatively strong, the resultant artefact may not neatly extend hegemonic power, but forms a key site of struggle and negotiation over the ultimate meaning and form of the artefact itself.

Increasingly, of course, individual artefacts are encountered as components of complex systems – the second level at which ambivalence, technical codes and formal bias operate. As ANT recognises, such systems enrol, functionalise and configure diverse elements, sustaining and in part defining the practices conducted within them (Callon, 1986; Latour, 1986). Here, ambivalence lies in the manner in which network elements are integrated and functionalised, in conceptions of the network's purpose, and in definitions of the practices it is developed to mediate. The elements of sociotechnical networks are ambivalent insofar as their potential agency, association and function are not exhausted in any one configuration of them. A technical code is required to determine the relations between elements, the manner of their functionalisation, and the goals the network is meant to achieve (Feenberg, 2002, 1995; Hamilton & Feenberg, 2006).[41] The resolution of ambivalence at this level instantiates a bias in sociotechnical networks that stems from the contingent programmes

[40] Digital Rights Management (DRM), e.g., is a technical extension of a social interest in digital file sharing which also manifests in the regulation of technical practices through the legal system.

[41] ANT's "network programmes" and "problematisation" clearly correspond to this level of technical codes.

under which network components are enrolled, their functions defined, and overall network goals established. Where this resolution conforms to the requirements of a hegemonic order, such networks can be said to support that order. Network elements differ from the ambivalent elements mobilised in design in that they consist of previously coded artefacts and also human actors who, while they may be delegated functions in networks, also possess reflexive agency and situated interests that could serve to ground a viable “anti-programme” (Feenberg, 1999a). Bias in sociotechnical systems is thus immanently contestable, and in some cases reversible where human actors succeed in intervening in and expanding the horizons of the codes under which such networks take shape.[42]

The technical code of sociotechnical networks raises questions of the definition of the practices to which they are addressed. Such definitions are generally arrived at with reference to an existing knowledge base – the third level at which Feenberg articulates the concepts of technical code, ambivalence and formal bias. Part of what defines a technical profession is a set of assumptions, methods, techniques, and traditions that make up the background of that profession. Technical experts “represent the interests which presided over the […] technical choices that lie in the past of their profession. The results are eventually embodied in technical codes which […] shape the training of professional personnel” (Feenberg, 1999a: 139). Here, technical codes bind expertise and are invested in delimiting what is to count as legitimate knowledge,

[42] C.f., e.g., Feenberg’s discussion of the transformation of the Teletel system (Feenberg, 1995).

technique and method in a field of technical practice. The code is, in a sense, the *content* of technical expertise, shaping both what experts do and who they are.[43] It resolves ambivalences by specifying what is and is not to be included in the corpus of knowledge defining technical practice, externalising or suppressing alternative potentials in technical fields by designating what it means to engage in them professionally. This results in a formal bias insofar as it establishes terms for the inclusion and exclusion of knowledge from the cognitive horizons under which technical practice proceeds.[44]

The concepts of ambivalence, technical code and formal bias are differentiated, though not diffuse ones in Feenberg's theory. At each level, technical codes act as contingent constraints under which ambivalence is resolved in the realisation of formal systems. The result of the coding process is a coincidence of rational forms and a bias corresponding to a delimited interest. Where encoding conforms to the requirements of a dominant order, formal systems can be said to serve as foundations of social hegemony. But this is a complex and unstable process. The strategic encoding of technology in accordance with capitalist hegemony must effectively invest technical objects, systems, and practices at all levels. The range of affordances and potentials offered at these levels are not exhausted by, and can run counter to the interests of hegemonic groups. Technical codes should thus be understood as both binding structures, and as objects of social conflict and negotiation. It is this – the

[43] This is the level of technical codes most clearly corresponding to Foucault's "discourses".

[44] C.f., e.g., Feenberg's discussion of debates over child labour and the shifting boundaries of implicit knowledge included in the design of industrial machines (Feenberg, 2003).

ambivalence of technology with respect to the encoding process – that renders technology capable of historical transformation.

3.3.4 The Transformation of Technology: Agency and Participant Interests

Something like a recovery of subjugated knowledges is at work in critical theory of technology, where the identification of contingent codes binding social and technical functions reveals technology as a product of conflicts over meanings and values, and where ambivalence opens it to varied articulation in alignment with diverse interests. To complete the circle, Feenberg reinterprets genealogy's approach to power as a relation of force operative at the microtechnical foundations of social order in an effort to follow through on Foucault's suggestion of a "re-codification" of power relations as they are instantiated in rational forms. The key terms here are "strategies and tactics", "participant interests", "margin of manoeuvre" and the "symmetry of program and anti-program" (Feenberg, 2002, 1999a).

ANT and Foucault both address the dynamics operative between strategic and tactical levels of social order. For ANT, actor-networks form and transform relative to a strategic programme according to which their elements are enrolled. These elements bear a type of tactical agency in their acceptance or refusal of enrolment. Latour uses the term "anti-program" to define these network resistances (Latour, 1987). Likewise, Foucault's discourse is a strategic formation emergent out of effects of power at the tactical level of local centres, relations, and practices, supplying terms under which the latter are functionally integrated into a strategy of domination. Tactical resistance is immanent to this process, corresponding to the subjugated knowledges Foucault appeals to as a basis for the transformation of hegemonic order (Foucault, 1980). In both cases, tactical resistance is brought into view only in negative relation to the strategies that invoke it: Latour's anti-programmes appear primarily as refusals, while Foucault's subversive re-codifications remain at the level of pure potential in his theory.

Feenberg reconceptualises strategies and tactics, the positions relative to which these forms of agency are expressed, and the programmes of action on the basis of which they are engaged, and offers a theory of transformative agency in the technical sphere. The first step in this direction is the rejection of the model of society, common to Foucault and Marcuse, of society as a "gigantic machine", and its replacement with that of the game (Feenberg, 2002: 83). While the machine model figures the elements of social order as parts of a smoothly working whole, games "define the players' range of action without determining any particular move" (Feenberg, 2002: 83). Like games, "technology […] sets up a framework for permitted and forbidden 'moves' […] The technical code might be reconceptualized […] as the most general rule of the technical game, a rule that […] biases the play towards the dominant contestant" (Feenberg, 2002: 83).Technical codes, insofar as they resolve ambivalence, institute a space in which is produced the positions of and relations between a *strategic level* of technical practice occupied by subjects with a superlative degree of determining power over the codes, and a *tactical level* occupied by those whose moves are limited to "punctual, temporary, shifting actions that fall more or less under the control of the dominant strategy” (Feenberg, 2002: 84). As an array of sociotechnical networks come to enrol individuals in diverse situations and practices, these latter come to be interpretable through their arrangement of strategic and tactical positions.

The strategic position corresponds to the operational autonomy of management in organisations and of capital with respect to the values and interests which are regularly excluded as part of its investment of social practices. With respect to technology, occupying this position gives dominant groups a more or less unfettered ability to encode artefacts and systems in such a way as to reflect and embody their values and goals, and also functions to reproduce their hegemonic position. This is the position of ANT’s network-builders and of Foucault’s discursive formations. From such a perspective, the entire point of existence of subordinate actors and of the socio-technical networks to which they belong is the implementation and realisation of a strategic programme in hegemonic terms. However, the strategic encoding of technology is not a unilinear matter of subjects robotically implementing plans laid out for them by their betters. The ambivalence of technology at a variety of levels means that the determination of technical codes and the stabilisation of technology are ongoing processes forged out of encounters between strategic and tactical agencies. Feenberg thus theorises a different type of agency for subordinate actors, one which corresponds to the tactical operations they perform at the localised, microtechnical level at which strategies are implemented. Strategies are “subject to unintended usages that may subvert the framework [they] determine" (Feenberg, 1999a: 113). Such unintended usages can potentially "subvert the dominant codes from within by introducing unexpected delays, combinations, and ironies into the application of strategies", and ultimately pull technical development towards forms reflecting the interests of the subordinate actors (Feenberg, 1999a: 113).

Feenberg refers to this tactical agency as "margin of manoeuvre". Margin of manoeuvre is, itself, an ambivalent phenomenon: "[a]ction on the margin may be reincorporated into strategies, sometimes in ways that restructure domination at a higher level, sometimes in ways that weaken its control" (Feenberg, 2002: 84-5). Regardless of its ultimate outcomes, there is one primary requirement for tactical agency in the technical sphere – that is, *participation* in sociotechnical networks. Of course, everyone participates in many such networks on a daily basis, and our involvement in them links us with others in forms of association quite distinct from those we attribute to traditional concepts of citizenship or political community, and opens channels of involvement and resistance distinct from those we normally associate with civic action. A recognisable form of *political* agency is evinced in engaged action in sociotechnical networks, and takes shape with respect to local interests and values that are revealed through such practical engagement. Feenberg uses the term "participant interests" to summarise the concerns voiced by actors enrolled in technical networks. This concept

> refers to the diverse personal impacts of technical activity: side-effects, both beneficial and harmful, social preconditions and consequences, effects on life conditions […] Some of these are familiar, especially as they are articulated by unions in the sphere

> of production […] Parallel phenomena characterise every type of network participation in every technical domain. (Feenberg, 1999a: 140)

The notion of participant interests is suggestive of subjugated knowledges, but recovers the element of human agency which is missing from Foucault's account. Participant interests correspond to the position of actors whose engagement in sociotechnical networks is constrained by the strategic encoding of technology, but who are able to grasp concrete affordances in such networks outside of or in opposition to strategic programmes through the residual ambivalence of network elements. They are a foundation on which alliances can form between social actors, and through which tactical actions can be fostered and articulated into a viable counter-strategy for the transformation of technical codes.

Feenberg follows Latour in calling these counter-strategies "anti-programs", but leaves him in one crucial respect: "[t]he anti-program is […] not merely a source of disorder but can recodify the network around new programs that realise unexpected potentialities" (Feenberg, 1999a: 117). Unlike scallops, fuel cells or electrons, human actors "are capable of representing the system and acting on it from out of a lifeworld it does not encompass" – i.e., they are *involved* in a manner distinct from nonhumans. The tactical position of subordinate actors allows them to grasp potentials intrinsic to artefacts, systems and practices and, on the basis of their interests as participants in networks, work towards transforming, according to an "anti-program", the codes under which dominant groups attempt to bind technology. This is not, of course, an inevitable result – tactical recodifications are often interpreted from the strategic position as "breakdowns" and thus as objects for further strategic investment. But this outcome is contingent – tactical moves can result in a transformation of technical codes and forms in terms that favour subordinate groups. Critical theory thus adds a third symmetry to those of SCOT and ANT – a symmetry of successful and unsuccessful artefacts and of humans and nonhumans is complemented by one of "program and anti-program" – an inability to tell in advance whether an identifiable strategy for determining the nature and form of technology or technical practices will be successful. This third symmetry "is the basis of a democratic politics of technological rationalization" (Feenberg, 1999a: 119).

3.4 Conclusion: Genealogy, Critical Theory and Online Education

We are now in a position to explore how Foucauldian genealogy and critical theory of technology can be articulated in a framework for the historical analysis of online education. Generally speaking, critical theory contributes to this analysis a conceptual framework for analysing convergences of technical and social factors in the making of online education (the resolution of ambivalence with reference to technical codes), while genealogy supplies methodological terms by which can be traced the heterogeneous processes of the formation of discourses (now reformulated as technical codes) corresponding to strategic programmes for its realisation. In what follows, I will first draw out some basic commonalities in the two approaches and show how they reorient us to the history and politics of online education. I will then review some key differences between them, highlighting advancements made by critical theory through which we can reformulate the genealogical method. Finally, I will outline some general prescriptions for combining genealogy and critical theory in the historical analysis of online education by returning to Foucault's "methodological prescriptions", translating them into the terms of critical theory and applying them in general to online education.

The formal similarities between genealogy and critical theory of technology can be seen in their conceptions of rational systems as expressions of power (power/knowledge, formal bias); in their understandings of these expressions as having both material and discursive dimensions (discourse, technical codes); in their focus on tactical appropriations of heterogeneous elements and the configuration of the latter according to strategic logics (strategic codification/encoding); in their methodological insistence on a *constitutive*, empirically and historically grounded theory of power (the *ascending* analysis of power, the levels of formation of technical codes); and in their attempts to locate sources and currents of transformation in the concrete foundations of systems of domination (the recovery of subjugated knowledges, participant interests and anti-programmes). These similarities suggest that both approaches can be drawn upon in the analysis of rational configurations of power in concrete sociotechnical systems.

As far as the critical analysis of online education is concerned, the approach suggested by genealogy and critical theory cautions a rejection of any attribution of "essence" or unequivocal meaning for online education in its forms, its technologies, its practices or its implications. A critical history of online education must instead trace the formation of more or less stable frameworks that bind the forms, technologies and practices of online education to a more or less general programme within which its aims, goals, meanings, and processes are defined, and with reference to which certain of its ambivalent functions or potentials are selected over others in its concrete realisations. On this account, if online education expresses or supports the reform agenda identified by its critics, this is not the result of its essence, but of the incorporation into it of a formal bias corresponding to the terms of the evangelical discourse. Online education embodies such a bias only where the processes of its encoding bring it into alignment with development frameworks shaped through that discourse – which we can now conceive not only as a way of talking about online education, but as a foundation for its concrete development. It is the formation, development, and fortunes of these variable processes of encoding that a reformulated critical history of online education must trace.

This reorientation to the *history* of online education also implies a rethinking of “online education” as such. Rather than equating online education with *educational technologies*, as occurs in the evangelical discourse, we need to see it as a complex *sociotechnical system*, comprised of heterogeneous elements – technical things, yes, but also social roles and relations, institutional structures or requirements informing the organisation of education, theories of teaching and learning, concepts associated with those theories, practical prescriptions emergent in relation to these concepts, definitions of the objects and spaces of learning, an existing technical heritage in education, etc. Each of these is open to variable articulation and each must, if “online education” is to reflect a particular programme in relation to educational reform more generally, be articulated in such a way as to reflect, embody and operationalise the logic of that reform programme. The technical artefacts comprising the hinges of online education must be seen, then, as ambivalent – capable of integration into different kinds of system in support of different views on education as a social practice. This ambivalence is resolved only as the various elements comprising the sociotechnical practice of online education are brought together under a basic set of definitions of “education”, its processes, and the goals associated with it.[45] Seen in this light, the history of online education becomes a history of the development of technical codes under which its ambivalence is resolved according to broader strategic logics that take shape as certain of its potentials are grasped while others are excluded or marginalised. This process is not a functional product of the technical potentials themselves, but proceeds on the basis of localised concerns, values, interests, and meanings by which different technical functions come to be seen as logical and desirable in relation to an idea of what the sociotechnical practice of online education should be. We can trace the development of online education, then, in relation to the formation of contingent codes for its realisation that mobilise a range of elements – human, conceptual, procedural and technical – in a complex sociotechnical system, and

[45] While this may seem overly functionalist as an explanation, this process of resolution is, as we will see below, never fully closed, and the appropriation of technologies – educational or otherwise – under the terms of a hegemonic programme is often open to re-appropriation and re-direction.

through which these elements are integrated and functionalised according to – or in conflict with – a programme of educational reform.

But because the localised concerns, values, interests and meanings on the basis of which the potentials of online education are identified and appropriated will inevitably differ between actors caught up at various points in the sociotechnical network comprising online education, they can also serve as points of political contestation in its development. A change in the view of the *history* of online education results also in a change in the perception of where a *critical politics* of online education lies – namely, in the processes of encoding by which online education takes on more or less concrete form in relation to varying programmes and participant interests. We must thus locate in the development of technical codes of online education not only their positive expression in technical systems, but also those *other potentials* which are marginalised, subverted, or excluded from play as a dominant code comes into formation. These comprise the “subjugated knowledges” on the basis of which subordinated participant interests could ground a viable anti-programme for online education. In more concrete terms, if the evangelical discourse emerges as a dominant strategy for online education’s development, this only occurs as a result of the resolution of the ambivalence of online education – its configuration to exclude alternative meanings, values, and goals. It is conflict with these alternatives that the evangelical discourse takes shape, just as it is against a logic of commodification, automation and commercialisation that an alternative technical code of online education – an anti-programme for its ongoing concretisation –

can be identified and developed. The WBSI experiment, outlined above and detailed in Chapter 5, provides evidence of such an anti-programme and indicates a starting point for a different kind of politics of online education – one directed not at technology *per se*, but at the meanings, values and goals grounding its realisation.

It is in these general terms, then, that the approach developed in both genealogy and critical theory allows us to reformulate the history and politics of online education. But there are also several key differences between them which require attention before we can proceed. These differences cluster around three problems raised by Foucauldian genealogy for the study of domination and resistance in rational systems and practices, and to which critical theory responds in its own theorisation of rationality and power.

First, while Foucault is concerned with the “effects of power” produced by specific techniques deployed for managing, conducting and defining localised social relations, and thereafter with the linking and integration of these “local centres” into discourses as condensations of knowledge and power, Feenberg is more interested in the *ambivalence* of techniques and thus in the processes whereby they come to generate effects of power (to embody formal bias) in the first place. This shift in focus is of significance to a politics of rationality, since it identifies rationality with power while insisting on contingent historical sources for their convergence in concrete artefacts and systems. If we are to integrate genealogy and critical theory, we must understand the project of genealogy as involving *both* the identification of the sources and the tracing of the spread of formal bias in rational systems and procedures, *as well as* the identification of ambivalent potentials in such systems and procedures and tracing the formation of technical codes which revolve these ambivalences one way or another. The focus on *ambivalence* means that the "effects of power" expressed in rational systems and procedures such as online education are not inalienable, but merely displace alternative potentials that could act as concrete grounds for encodings consonant with the values, meanings and interests of subordinate groups. And so, a critical history of online education must focus both on the effects of power produced in the strategic encoding of sociotechnical systems and practices, and on identifying and tracing the fortunes of these alternatives.

Second, while Foucault moves a substantive consideration of the "meta-powers" of State and Capital beyond the frame of his theory, Feenberg insists on retaining a view of *capitalist power* as that hegemonic system with respect to which localised expressions of domination and subordination should be understood. A sense of capitalist hegemony is particularly important to retain with respect to technologies whose object is work processes or processes of social reproduction like education, which are increasingly articulated with and shaped through the requirements of production and the market. Where Foucault insists on the anonymity of the discursive formations within which the operations of power are contained, Feenberg counters that at the strategic level we are often faced with an increasingly generalised *technical code of capitalism*, and that the development and diffusion of technology often involves the "capillary" spread of this code in its appropriation of localised social practices and relations.

Integrating genealogy and critical theory, then, means not building up a picture of an anonymous “logic” of the appropriation of rational systems, techniques, relations, practices, etc., as Foucault does, but seeing how a strategic power specific to *capitalism* infuses the processes of appropriation by which technical ambivalences are resolved. In methodological terms, this means looking at how the general requirements of capitalist control (expressed in the critique of online education as commodification, commercialisation, automation, etc. and linked to the transformation of the relations of education to mirror those of the post-industrial production) are translated into the terms of localised discourses of educational practice and technological development – where, that is, the discourses of online education are not figured in the immediate terms of an *economic* discourse, but where the encoding of online education *as education* reflects the logic of the capitalist code, or where, by contrast, it stands outside of or opposed to that code.

Which brings us to the final aspect in which genealogy and critical theory diverge – that is, in their theorisation of transformative agency in settings where power takes on concrete, rational expression. For Foucault, the project of genealogy is to resuscitate the subjugated knowledges which are either functionally translated or excised as a result of the configuration of social practices according to strategic discourses. Subjugated knowledges are like frayed threads, the grasping of which can serve to pull apart the unifying framework of dominative discourses as logics for the rational organisation of such practices. The idea is that a *different kind of rationality* can undergird the ordering of social practices and the relations and techniques of which they are composed, and that this alternative rationality can be shaped, if not to dispense with power, then at least to ensure that its dominative dimensions are minimised. Feenberg theorises the foundations of transformation in a similar way, pointing out that the mode of power expressed in formally biased systems never fully exhausts the potentials those systems contain. Once such potentials are identified and grasped, they can act as foundations for an alternative encoding of and therefore an alternative path for development in a field of sociotechnical practice. If the evangelical discourse of online education is seen as a dominant rationality for the encoding of online education, then the WBSI case can be seen to express a kind of subjugated knowledge through which alternative potentials in the development of online education could be identified, grasped, and realised. The critical historical analysis of online education would then involve not simply tracing the rise to dominance of the evangelical discourse, but also locating existent potentials for the realisation of an alternative programme based on sublimated, excised or functionally translated knowledges, practices, or functions.

Genealogy encounters a problem here, since Foucault is adamant that what is at stake in the formation of discourses is not merely the rational systems in which subjects are caught up, but also subjects themselves, who are both the vehicles and the objects of systems of power/knowledge. Individuals are, like the techniques that subject those individuals, an “effect of power”, implying that the being and agency of social subjects is always already hemmed in by the wider discursive systems through which subjects engage in practical activity. Foucault does not deny that there is a thread leading us out of this labyrinth, but his theory does not place this thread where it can be readily grasped or even seen. This is the point where Feenberg's critical theory makes its most significant departure from genealogy. In rejecting the idea that individuals are mere effects of power, and in re-introducing a notion of reflexive agency that stems from the positions that individuals occupy in sociotechnical networks, Feenberg allows us to see where we might focus critical attention in the analysis of rational systems and practices as expressions of hegemonic power. The subjects caught up in rational systems in their practical activity are never wholly subsumed in such systems, but approach them out of a lifeworld which contextualises their participation in them. These social subjects play a mediating role that straddles their qualitative sense of the practices in which they engage, the meanings of the tools and systems they use in their practical engagements, and themselves in relation to the operations and outcomes of their sociotechnical practices. This gives them a margin of manoeuvre through which they can formulate tactical responses and engage in counter-appropriations in the ongoing process of technically mediated activity. Where these counter-appropriations are successful in recodifying "moments" in a technical practice in response to localised interests, they can also serve as a foundation for a strategic recodification – an anti-programme – of the practice as a whole. A critical history of online education must therefore locate both the concrete potential for such an anti-programme, describe the technical code on which such a programme might be based, and identify the participant interests on the basis of which it might be articulated.

Critical theory of technology makes significant advances to models of constitutive history – advances that can act as starting points for a rearticulation of genealogy as a method. In order to illustrate how this rearticulation will work in the analysis presented below, I will return to Foucault's "methodological precautions", translating them into the terms of critical theory and highlighting how a *rapprochement* of these two approaches will inform my historical analysis of online education.

It will be recalled that the first stage in genealogy is a displacement of self-evidence – a movement back in the history of a social practice to a point at which it bears marked *discontinuities* from a current configuration. Where such discontinuities exist, what must be explained is the transformation of the practice from one configuration into another. The WBSI experiment outlined above serves as this initial displacement from the overarching, universalising terms of the evangelical discourse, the emergence and rise to dominance of which is now that which seeks explanation. What I propose to do in the following chapters is to examine how these two models – two technical codes – took shape in the realisation of online education as both a field of knowledge and practice and a set of technologies.

The second stage in genealogy is to trace the historical processes whereby what is now self-evident comes to be so through the interventions of power. We must do so by focusing on the local centres at which the relations and practices of online education are ordered and shaped through the grasping of ambivalent potentials of its heterogeneous components. We must do so by identifying and describing the contexts within which certain ambivalent potentialities of educational technologies and systems come to be seen as definitive of online education, and by tracing how these potentials are integrated into a sociotechnical system whose formation bears the mark of a strategic programme for its realisation. In order to do this, the following chapters will each ask a similar set of questions. In what local centres and with respect to what relations were the ambivalences of online education resolved? How did the local contexts in which online education was concretised contribute to the formation of technical codes informing its realisation and development? Through the grasping of what technical potentials in what practical contexts or operations were the elements of online education as a sociotechnical practice appropriated and encoded? What general logic did these localised appropriations of technical potentials express, and how did this logic come to be generalised into a wider strategy for the field as a whole?

To answer these questions, the following chapters focus on specific instances of the development of online education as a sociotechnical practice – tracing how technical codes of online education emerged through the grasping of specific affordances of different technical artefacts and systems on the basis of prevailing assumptions, values and goals that were themselves defined under the horizon of existing sociotechnical standards for educational organisation and practice in specific institutional settings. Chapter 4 focuses on the appropriation of the computer as a technology in, of and for distance education in the late 1970s, and examines how dominant conceptualisations of the education process, dominant notions of the subjectivities and relations of teacher and student, dominant modes of the organisation of distance education institutions, and an existing technical heritage in distance education formed a background against which the meaning, value and potential of “educational computing” came to be defined. It is here that we can locate the beginnings of a technical code of online education that finds more general expression in the evangelical discourse. Chapter 5 looks at computer conferencing systems as tools for mediating communicative interaction in computer networks, and at how experimental initiatives in educational computer conferencing in the 1980s brought a different set of values, meanings and goals – a different definition of education as a sociotechnical process – to bear in realising online education. The result was a technical code for online education that stood in explicit opposition to an encoding of technology prevalent under the paradigm traced in chapter 4.

These two chapters serve to introduce two technical codes which, I argue, can be understood as poles on a continuum for the concrete realisation of online education and between which struggles over the meaning, nature and implications of online education and its relation to transformations in the university take place. Chapter 6 looks more closely at the development of the evangelical discourse and at how online education was transformed from a set of faculty-driven experiments into a lever for the total restructuring of higher education. It does so by examining heterogeneous sites at and developments through which the conditions of formation of online education shifted to support a programme of commodification, commercialisation, and deskilling/automation. It also traces how this programme was articulated as a general vision for technology-based university reform, and how it was supported in concrete developments at the technical and organisational foundations of online education.

The key analytic chapters of this dissertation, then, follow the development of the evangelical discourse and its strategic encounters with an alternative technical code for the realisation of online education. In the conclusion of the dissertation, I return to this alternative code and highlight three areas of recent development in online education that indicate the possibility of its reappearance and continued viability as a concrete path of development in the field – the development of a paradigm of “blended learning” for the integration of technology into the classroom; the emergence of open source educational technologies and systems; and faculty-driven university policies for the implementation of online education. These are three areas of intervention into the concrete processes and the broader horizons of development in online education in which we can see a shift in the terms of the predominant technical code, and in which it is perhaps coming to be aligned more with values, goals, concerns and understandings of critics of evangelical reform. Because these developments – like online education itself – are still in formation, I only sketch their main outlines. The intent is to explore how recent developments are shaping the logic within which online education comes to be articulated as a field of knowledge and practice, and therefore its concrete relation to a politics of educational reform. In identifying links between these three areas of development and the formation of the technical codes that shape online education, I will also identify directions for future research.

Genealogy and critical theory both caution us to attend to the potentials for the progressive transformation of rational systems while not losing sight of the roles such systems play in concretising modes of control and domination. It is the unresolved nature of this situation that makes the formation of sociotechnical systems like that comprising online education political. A politics of technology, on this view, always takes shape against a contingent background of values, meanings, goals and interests emergent in specific social contexts, and with respect to social groups engaged in technical practices. It is at the point of the earliest definition of this background for what later became online education that our history begins.

CHAPTER 4: THE AGE OF AUTOMATION: DISTANCE EDUCATION AND THE TECHNICAL CODE OF EDUCATIONAL COMPUTING TO 1980

What makes you think you need teachers in a system which is intended to promote learning?

- WBSI conference participant

4.1 Introduction: The Ambivalence of Educational Computing

In identifying a logic of commodification, commercialisation and automation as the essence of online education, critics partake in a venerable and well-established tradition in the critique of new communication technologies in teaching and learning, one stretching from Plato's attack on writing in the *Phaedrus* to the fear in the 1950s that television would usher in the era of the automatic student and the robot professor (Plato, 1973; Smith, 1958). What Plato has to say about writing differs little in substance from later critiques of educational broadcasting or computing, centring as it does on the way in which a new medium offers a static embodiment of knowledge and a vehicle for distributing it independently of lived social relations. Plato may well have been thinking of the educational application of computers when he prophesied that "pupils will receive a quantity of information without proper instruction" (Plato, 1976: 96). "Proper" instruction, as Plato volubly demonstrates, requires dynamic interaction in contexts of co-presence – anything else puts the educational endeavour at risk.

Nearly two-and-a-half millennia later, when the beneficiaries of Plato's legacy in Western thought have thoroughly interiorised the written word and the technologies surrounding it, the Platonic critique remains oddly persistent – in Noble's insistence that online education is little more than a sophisticated means of creating profit out of commodified information (Noble, 2002); in the location of an impoverished pedagogy of information delivery and acquisition as a threat posed by networked educational technologies (Blake & Standish, 2000; Robbins & Webster, 2002); and in Aronowitz's portrait of the technical basis of computer-mediated education:

> Lessons are divided into units, which include the text of the lecture [and] questions and problems for the student to answer […] The student never talks to a person but responds to packaged material, and is not encouraged to become a critical, autonomous learner (Aronowitz, 1999: 153; 155)

Like their revered ancestor, these critics base their critiques on a primary conception of communication technologies as things understandable with reference to how they act on information. Whether the medium in question is Egyption papyrus or digital networks, whether the technology is the Ionian characters or network computers, the technical objects at the centre of these critiques are seen in terms of their *representational* affordances. Attention is paid to how they embody information; how they allow it to be represented, distributed, controlled and consumed; how they externalise knowledge from its creators, and displace it from the spheres of contextual reference and social encounter in which it was created and where its "original" value and meaning reside; how they separate the skills involved in knowledge transmission from the persons whose professional subjectivity had previously been guaranteed and defined by those skills; how they encourage learners to interact with information as a consumable good rather than gain knowledge as a quality grounding identity, agency and professional practice.

Given the power and tenacity of this critique, it is perhaps unsurprising to find it at the wellsprings of online education at the end of the 1970s, the point where our history begins. Here, it is first and most vehemently directed at the *computer* and its relation to transformations in the form, practice and relations of knowledge production. Jean-François Lyotard makes the paradigmatic statement of this critique in his 1979 study, *The postmodern condition* (Lyotard, 1984). There, he characterises the computer as reducing knowledge to “quantities of information”, effecting a “thorough exteriorisation of knowledge with respect to the knower” (Lyotard, 1984: 4). The abstract properties of computers portend a rigorous translation of knowledge into binary code – the only form in which it can be made operational in a computerised society. This will result in the disappearance of knowledge that either resists or is unable to be so translated. On this basis, Lyotard predicts an identical litany of consequences as do later critics of online education, the descriptions of which are worth quoting at length:

> **Commodification:** The relationship of the suppliers and users of knowledge to the knowledge they supply and use […] will increasingly tend to assume the form already taken by the relationship of commodity producers and consumers to the commodities they produce and consume – that is, the form of value. Knowledge is and will be produced in order to be sold, it is and will be consumed in order to be valorised in a new production […] Knowledge ceases to be an end in itself, it loses its ‘use value’. (Lyotard, 1984: 4-5)

> **Commercialisation:** The notion that learning falls within the purview of the State […] will become more and more outdated with the increasing strength of the opposing principle, according to which society exists and progresses only if the messages circulating within it are rich in information and easy to decode. The ideology of commercial 'transparency' […] goes hand in hand with the commercialization of knowledge. (Lyotard, 1984: 5)
>
> **Marketisation:** [T]he pertinent distinction will no longer be between knowledge and ignorance, but rather […] between 'payment knowledge' and 'investment knowledge' […] between units of knowledge exchanged in a daily maintenance framework […] versus funds of knowledge dedicated to optimising the [efficiency] of a project. (Lyotard, 1984: 6)
>
> **Deskilling/automation:** […] an organized stock of established knowledge is the essential thing that is transmitted [in education] […] To the extent that learning is translatable into computer language and the teacher is replaceable by memory banks, didactics can be entrusted to machines linking traditional memory (libraries, etc.) and computer data banks to intelligent terminals placed at the students' disposal (Lyotard, 1984: 50)

The logic extended through the educational application of computers and leading to these outcomes is one of efficiency.[46] Digitised information is an input that shapes the efficient operation of both computer systems and the social systems to which they are applied (Lyotard, 1984: 46). As a material condition of the computerised society, the requirement of efficiency introduces a new logic into the foundations of higher education's functions and structure, guaranteeing that a new mode of education will arise in tandem with the application of the computer. The essential purpose of this new mode of education is its "optimal contribution […] to the efficiency of the social system" (Lyotard, 1984: 48) – the instrumentalisation of education to the economy. The practical result of this is that "[k]nowledge will be served a la carte to adults who are already working or

[46] Lyotard's translators generally render this as "performativity".

expect to be for the purpose of improving their skills and chances of promotion" (Lyotard, 1984: 49). While a contribution from education to the economic prospects of individuals and societies is to be expected, its reduction to this sole function promises a real impoverishment of higher learning, subordinating it completely to the requirements and dictates of the informational economy. For Lyotard, "[…] it is hard to see what other direction contemporary technology could take as an alternative" (Lyotard, 1984: 7).

It is this final note of despair to which later critics of online education succumb. However, Lyotard's seemingly fatalistic take on the computerisation of society can be read in another way – as a challenge. It is in this spirit that the discussion of the early history of online education contained in the following two chapters reads his words. In these chapters, my focal point will be on the computer as it came to be imagined, appropriated and realised as an educational technology, and on two distinct ways in which this process occurred. It is my contention here that the computer, as a basic component of online education, is ambivalent with respect to its educational potentials, value, meaning, and applications – at least as these were imagined and implemented in the opening stages of development in online education. This is not to say that computers could be turned to any purpose that educators may have had, but that what emerged in the early 1980s as "educational computing" (and subsequently as "online education") was contingent on a deeper logic grounding its development on the basis of links – perceived and actualised – between technical functions and aspects of the contexts into which these functions were integrated (pedagogical theory, teaching and learning practices, the structure of institutions, etc.). The computer's educational value had to be realised out of the device through interpretations of its functions and potentials. These latter took shape out of practical and meaning-making frameworks derived from the contexts of the computer's appropriation and from the reigning state of affairs in those contexts. While this was an indeterminate and contingent process, it is possible to locate both an early application that stood as a resolution of the computer's ambivalence in education, and a relatively well-defined field of organisation, knowledge and practice with respect to which that resolution made sense. The application is computer assisted instruction (CAI) and the field of reference for its development is distance education.[47]

In this chapter, I will explore the degree to which Lyotard's description of educational computing was borne out in actual developments in the field in the form of CAI. I will not be interested here solely in the function and nature of CAI systems, but in how they represented a "fit" between a set of technical affordances and a broader background against which those affordances were seen as desirable and logical in the early development of computer-mediated education. The determination of this "fit" was not a simple process of linking abstract, pre-established technical functions to teaching and learning practice. Rather, it involved mobilising a set of theoretical frameworks for imagining the education process, a number of prescriptions for pedagogical practice, and a set

[47] The analysis that follows does not claim to characterise distance education as a whole. My intent is merely to focus on those aspects of theory, pedagogy, and organisation in that field that contribute to the formation of a technical code of educational computing expressed in CAI.

of structures typifying the institutional organisation of distance education – the initial “local centre” for the formation of early technical codes of educational computing.

I will first introduce CAI as a form of educational computing, describing its basic functions and focusing on one of its more widespread applications – the PLATO system (Rahmlow *et al.*, 1980). To explain CAI as a form of educational technology, however, it is also necessary to trace the background against which these functions gained value and meaning for education – how they expressed a certain idea of education which they both embodied and extended. And so, in subsequent sections, I link the form of CAI systems to a background of theoretical definition, pedagogical practice and institutional organisation in the field of distance education. Here, I examine efforts to differentiate distance from conventional education, the specification and elaboration of techniques for distance teaching and learning that derive from these distinctions, and the description of optimal organisational and institutional structures for the conduct and management of distance learning as a peculiar kind of educational practice. It is out of specific elements drawn from each of these areas that a technical code corresponding to CAI emerges. I conclude this chapter with a critical summary of the principle elements of this code.

4.2 The Form, Function and Foundations of Computer Assisted Instruction

CAI was a form of computer-mediated education in which learning materials were programmed into a central host computer, and structured through a range of interactive features through which students could review, practice and be tested on these materials. Students would access the system remotely, using phone lines and dumb terminals (Alessi & Trollip, 1985). Students' progress was managed by the system itself through pre-programmed tests and feedback mechanisms. But they could also be monitored remotely by a tutor, who was able to intervene through a messaging system, and aid the students in their passage through course content. Most CAI systems hosted a similar palette of tools and functions: tutorial (presenting and guiding students through material); drill and practice (delivering memory and skill exercises relating to that material); inquiry (posing questions and checking answers against a database); dialogue (posing *and* answering questions in turn, tracking responses and supplying additional information); simulation (modelling situations and testing student understanding); games (competitive situations relating to course material); and problem-solving (presenting problems for students to work through). While communication functions such as email and chat were added to later CAI systems, they were primarily conceived to facilitate the information delivery and monitoring functions performed by human teachers.[48]

The first CAI system – the perhaps ironically-named PLATO[49] - was developed by Don Bitzer in 1960 at the University of Illinois Urbana-Champaign (Rahmlow *et al.*, 1980). From the beginning, "the goal of PLATO was to deliver cost-effective computer-assisted instruction" (Kinzer *et al.*, 1986: 26) – a goal

[48] C.f., Alessi & Trollip (1985), Buchanan (2004), Cotton (1991), Darack (1977), Pagliaro (1983), Rahmlow *et al.* (1980) and Woolley (1994).

[49] The acronym is often thought to stand for "Programmed Logic for Automated Teaching Operations", though neither its original designers nor the Control Data Corporation ever formally acknowledged this attribution. C.f., McNeil (n.d.) and Rahmlow *et al.* (1980).

which was supported technically by the centralisation of standardised, but flexible instructional resources, and by increases in central processing power to handle large numbers of simultaneous users (Woolley, 1994). PLATO was initially designed as a mainframe system and remained so even after the advent of personal computing – programming capabilities and information storage thus remained concentrated in the central host even after it became technically possible to distribute greater interactivity and control to remote users (Pagliaro, 1983; Rahmlow *et al.*, 1980). Cost-effectiveness and control over both information processing operations and course information were thus posited as twin variables in the development of the system.

The goal of cost-effectiveness was not, however, only a matter of technical concern. It was also supported socially by the manner in which the processes of course design and delivery were organised (a point to which I return below) and by the increasing drive towards exploiting the system's commercial prospects, particularly after its acquisition by the Control Data Corporation (CDC) in 1976 (Pagliaro, 1983). By the mid-1970s, it appeared as if the general goal of the system was being realised – single PLATO installations could simultaneously handle around one-thousand users and were in operation for a range of courses offered through CDC Learning Centres worldwide, and the sharing of resources between these facilities meant that PLATO courses could be designed for and delivered to an expanding audience (Darack, 1977; Woolley, 1994). With the introduction of minicomputers, PLATO software developed to shift some of the processing and operating functions to the PC, while course shells and data remained on central hosts (Alessi & Trollip, 1985). This allowed some distribution of control over functionality and performance; but more importantly, it eased the pressure placed on the host computers and opened the possibility of greater expansiveness in its student base. By 1980, in one account, PLATO was "the most widely used computer system for instruction" (Rahmlow *et al.*, 1980: v).

Overall, what drove the development of PLATO, at both the pedagogical and technical levels, was the desire to host as many simultaneous users as possible (a logic of massification) for the purpose of creating cost-effective, marketable computer-assisted instruction (a logic of efficiency and commercialisation). If massification focused attention on developments in processing power and speed, commercialisation and efficiency shaped the way that instructional processes were realised in computer systems and networks. In the end, meeting the larger goal of expansive, commercially viable and cost-effective CAI required a set of technical developments – increases in central processing power, enhancements in processing and transmission speeds – which supported a set of pedagogical and organisational choices through which CAI came to embody, at the technical level, a particular understanding of teaching, learning and the structure and management of education.

The organisation of instruction in CAI – its development, delivery and the relations sustaining it – was a product of the manner in which the education process as such was conceived by its designers. The basic principle in systems such as PLATO is to leverage the computer's information storage, analysis and representation functions for the structured presentation of content. Within a single instructional module in PLATO, “teaching” would take place through presentation of information and through student engagement in drill and practice exercises and tests related to that information:

> Students are first tested on module objectives. If all objectives for a module are not mastered, the student selects and utilizes learning resources covering unmastered objectives […] After the student has utilized learning resources for study of those objectives not mastered, another test is administered and the cycle continues until the student reaches mastery on all objectives (Rahmlow *et al.*, 1980: 31)

The system could also be programmed to provide hints to the student in the event they answered a question incorrectly. This guided them more clearly towards the right answer or referred them to information on the basis of which they could correct themselves. Throughout this process, there was very little – if any – need for interaction beyond that conducted between the student and the system, since the latter had been designed to handle all transactions dealing with the presentation of information, evaluation and the staging of the learning process. The instructor could track statistical data on student performance and intervene in cases where students seemed to be struggling. But in general, once education was reduced to structured content, testing protocols, and feedback mechanisms, the teacher could take up a position as a kind of Newtonian God – winding up the works, drifting away and observing the drama from a safe distance.

It is important to note that this conception of the educational process was neither new with CAI, nor specific to technically-mediated education. Indeed, the notion of automatic “teaching machines” had been a dream of pedagogues and designers since the 1920s (Petrina, 2004).[50] And the breaking down of education into stages mediated and characterised by frequent testing and drill and practice had previously been expressed in the behaviourist notion of "programmed instruction" (Bullock, 1978; Gagne, 1970). Associated with the work of Robert Gagne, programmed instruction is predicated on the behaviourist credo that learning is a process of behaviour modification affected through stimulus and response (Ally, 2004; Chen, 2006), and that the functional processes of learning can be planned logically into pre-established stages, allowing for instantaneous reinforcement of correct answers through regular exercises and tests (Orlich *et al.,* 1990). It is this ordering of teaching and learning, *not* the use of a programmable technology, that is most generally implied in the term and the method. This latter point is important to emphasise – technology is not the basis of programmed instruction, but rather the latter provides goals, guidelines and a framework for imagining education as a mechanical activity, and so provides a foundation on which certain kinds of "teaching machines" can be designed and developed, on which the pedagogical potentials of technical tools and systems can be ascertained, and whereby the manner of their incorporation into education can be specified. That the teaching process can be broken down into discrete and definite performances or moments, and that these latter can serve as the basis for designing programmable teaching machines (or technical systems for teaching and learning) were thus historical possibilities lying behind the particular kind of computer-mediated education realised in CAI (c.f., Burton *et al.*, 2004).

[50] Yevgeny Zamyatin, in his 1928 novel *We*, comically depicts just such an automaton in the character of "Pliapa" an old and worn-down robot who performs its duties so well that it has even taken on the persona and habits of the stereotypical doddering professor.

Programmed instruction added another element to the background against which CAI developed, and this was in relation to the organisation of teaching. At the heart of programmed instruction is an analysis of the teaching process as a set of performances which can be isolated, described, broken down, and rationalised into simple functions to be included in teaching systems. The clearest iteration of this kind of analysis is provided in Gagné's "nine events of instruction" (Gagne, 1970). These consist of functions basic to teaching – gaining attention, clarifying learning objectives, stimulating recall, presenting material, guiding learners through material, eliciting performances to actualise knowledge, supplying feedback, conducting assessments, and enhancing the retention and transfer of learning. These descriptions serve as a basis for the programming of learning events, whether by a live teacher or a technical device, and suggest ways in which the functions themselves could be delegated across an instructional system.

Indeed, it is on the basis of these kinds of functional events that systems like PLATO are designed and operate. They gain the attention of the learner through constant prompting; they clarify learning objectives by connecting them explicitly with informational resources to be mastered; they stimulate recall by instituting pre-test structures that tell the system where to position the student; they present material through the ordering of instructional modules; they guide learners through material by a series of pathways grounded in frequent evaluation, pointing students to areas where they need more work; they elicit performances by making progress conditional on satisfactory mastery of content;

they supply feedback in the form of pre-programmed responses to student successes and failures; they conduct assessments by drawing on pre-scripted test items measurable through computer algorithms; and they enhance the transfer of learning through problem solving exercises and simulations (Cotton, 1991; Rahmlow *et al.*, 1980). The specification of teacher functions in programmed instruction thus supplies a basis whereby these functions can be rationalised and delegated, partially or wholly, to an automated system. They supply a foundation in theories of teaching and learning for a view of education as a process amenable to mechanisation, and for the realisation of a form of computer-mediated education where the computer stands in functional analogy to – and can be inserted into the education process in place of – the teacher. Indeed, the insinuation of the computer into the position of the instructor was not limited to the latter's functional performances, but also answered to failings perennially associated with human teachers:

> The computer is in some ways an ideal schoolmarm since it has infinite patience and will never rap a child over the knuckles for misbehavior or false answers. Also, it will know all the answers, unlike the schoolmarm, and will repeat them […] until they sink in. No frustration between student and teacher can arise; no personality conflicts are possible. The computer can be programmed to be all-wise, all-understanding, infinitely docile, without salary demands, never absent (or if it breaks down, quickly replaceable), available after hours for consultation and as fresh as a daisy under every circumstance. (Darack, 1977: 1)

The replacement of teachers by docile, all-wise machines did not only forebode change in the processes of teaching and learning or relations between teachers and learners. Because CAI systems were designed to perform teacher functions, they also allowed for changes to be made in the organisation of course design and delivery – changes related to an intensified division of labour and a re-delegation of teaching skills across various points in a sociotechnical system, and which were reflected in the way in which CAI systems organised education as an informational process. CAI systems were essentially modular in nature, organising education according to discrete and cumulative blocs of information resources and system processes. The basic component of learning in CAI systems like PLATO was the instructional unit, which consisted of a set of objectives, a set of information resources covering these objectives, test items designed around these resources, and a set of feedback mechanisms for guidance, performance evaluation and staging the learner's passage through the system. Such units were compiled together to create modules, which in turn were assembled into courses, which could be grouped to comprise curricula in different subjects areas. This modular structure both necessitated and was supported by a division of labour in teaching and learning – the primary division being that between authors and instructors or tutors. Authors were charged with creating instructional units and modules – that is, with assigning learning objectives, gathering and evaluating materials, assembling these materials into a progressive structure, designing tests, and generally performing those tasks which relate to subject matter expertise. Course authors generally worked closely with the central PLATO design teams, and supplied local installations with the specialised resources needed to offer whatever courses were required. These resources then became permanent and transferrable across all PLATO systems (Rahmlow *et al.*, 1980).[51] By contrast, "[t]he instructor's primary function [was] to

[51] This had the benefit of meeting two of PLATO's primary goals – cost-effectiveness and

select and administer curricula to students" (Rahmlow *et al.*, 1980: 34). Instructors could review and select various modules available on the PLATO systems to which they had access, they could order modules from other systems, they could develop sequences of modules, monitor student progress, and manage evaluation. The modular organisation and management of course design and delivery thus drew upon the functional analysis of the teaching process to instantiate certain teacher functions in machines and delegate professional practices across two distinct and hierarchically organised positions in a production and delivery model recognisable from other areas of technically rationalised activity.

CAI concretised a model of computer-mediated education that conformed well to what Lyotard expected the computer as such to imply for education – its reduction to pre-packaged information, the functionalisation of teaching and its whole or partial automation, the appeal to behaviourist models of education and techniques of learning drawn from programmed instruction, the production of education as a commercial prospect driven by cost-effectiveness, profitability and economies of scale, and so on. Describing CAI in these terms, and locating a general set of motivations and social and technical foundations for it does not, however, tell the whole story. The specification of CAI as a model for the realisation of computer-mediated education drew also and in a more integral and detailed way on a set of elements derived from the field of education in which the

commercial profitability: "[C]urriculum materials can be disseminated to students throughout the world simultaneously and […] economies of scale can be obtained by widespread use of existing materials. In addition, modifications or improvements in course material can be implemented simultaneously and quickly on a worldwide basis" (Rahmlow *et al.*, 1980: 21).

application of computers as components of instruction was first attempted – that is, distance education. While programmed instruction supplies a general background against which certain tendencies in CAI can be understood, it is ultimately in the filtering of computer functionality through theoretical, pedagogical, organisational and technical frameworks in distance education that the technical code embodied in CAI can be most clearly discerned.

4.3 Forming the Horizon: Delimiting Distance Education

While computers gradually began to filter into use in conventional education in the 1980s, their integration outside computing science departments was primarily as objects of study or as means of carrying out learning tasks in particular disciplines – their pedagogical potentials were not foregrounded since they themselves were the objects of traditional pedagogical practices carried out in traditional institutional contexts (Riel, 1986). Bringing out a meaning and value for the computer as an *educational* technology – that is, as a device bearing specific *pedagogical* potentials and amenable to integration into the actual processes and organisation of teaching and learning – was of more interest in that area of educational practice where the relationship between technical media and teaching and learning processes had been a perennial concern and where technical mediation was seen as a defining element – namely, distance education. To understand how distance education was constituted as a local centre for the encoding of computer-mediated education, as well as how the delineation of this local centre related to the formation of the technical code of

CAI, we can begin by examining the differentiation and definition of distance education as a particular field of educational practice.

A critical, indeed defining question for distance education has been that of its relation to conventional campus-based teaching and learning – on both pedagogical and organisational levels. Addressing this question has involved attempts to define distance education as either a "mode" of education (subject to organisation, theorisation and evaluation with reference to conventional pedagogical practices and institutional forms), or "a distinct field of educational endeavour" (Keegan, 1996: 79), in which case theory, pedagogy, assessment and organisation need to be developed *ab ovo* and on wholly endogenous terms. With some exaggeration, it could be said that these alternatives comprise two developmental possibilities for distance education – one building on its commonalities with conventional practice and another whose elaboration has been contained by a hard distinction between distance and conventional education, and built upon what are seen as logistical, organisational and procedural elements specific to distance contexts. It is this second position that dominated the definition, theorisation, and organisation of distance education during the early appropriation of the computer, and that is thus of interest in tracing the background of CAI, in examining the formation of a technical code corresponding to it (and which it embodies), and in locating some of the origins of the evangelical discourse of online education.

By the late-1970s, a more or less absolute differentiation of conventional and distance education had emerged as a starting point for the theorisation and definition of the field, the articulation of pedagogical strategies suited to it, the specification of its optimal organisation and the formation of frameworks in which the role of educational media could be discerned. The origins of this distinction date back to the 1960s and to the identification of characteristics of distance education which were seen to make conventional approaches to educational theory and practice inappropriate to it. The most fundamental, and obvious, of these distinctions, and that from which the others tend to follow, is the separation of the teacher and the “learning group” (Keegan, 1996: 8). This separation creates both the possibility for realising what many see as the ideal educational relation – i.e., a one-to-one relation between a teacher and an individual learner[52] – and also the conditions for an array of the characteristic features of distance education practice and organisation out of which a technical code for educational computing arises.

The separation of teaching and learning means that these can be ordered as linked but relatively independent activities. This passes a much greater responsibility on to students as individualised, autonomous learners – a situation that is emphasised by the latter’s separation also from the learning group and that creates novel conditions for the particular kind of teaching and learning required in and the kinds of students who tend to succeed in distance education – practically-oriented, disciplined, active, independent (Hiltz, 1994). The separation of teaching and learning also means that teaching must be “delivered”

[52] Indeed, individualisation is often seen in distance and conventional learning as an ideal to be attained, a historical origin to be revived, and a measure of success. C.f., e.g., Laurillard (1994).

in some objective form to learners – the separation of “teaching behaviors” from “learning behaviors” allows and perhaps even requires at least some of these teaching behaviors to be installed in technologically delivered learning materials (Moore, 1973: 664) – rendered as informational content that can incorporate pedagogical functions in conformity with the structure of the technical medium use to deliver it. The separation of teaching and learning thus also enables an objectification and technical rationalisation of teaching, as well as a differentiation of the various “moments” of teaching – those involving planning and design can be prised apart from those that involve tutorial functions. And so a situation can be instituted in which “a technical device […] teaches instead of the teacher” (Peters, 1994: 203). The centrality of and particular role played by technical media is thus another key distinguishing feature of distance education and a foundation for theory and practice in the field.

The informatisation of education and the co-requisite use of technical media in its delivery open up different kinds of organisational possibilities and qualities in distance education than obtain in conventional contexts. Insofar as the design of materials is a central aspect of the teaching process, the production of these materials becomes a key area of concern in distance education, as well as a source of unique organisational models (Moore & Kearsley, 1996; Peters, 1994). Learning materials become objects of processes of technical rationalisation, in terms of both their form and their production. Distance education is able to realise cost-effective teaching and learning to the extent that it can mass produce high quality materials and distribute these to large numbers of students – the larger the number, the lower the unit costs of production will be (Moore & Kearsley, 1996). This also serves to distinguish distance from conventional education – in the latter it is impossible to generate either a standardised product or the same kinds of economies of scale available when teaching can be partially installed in materials and technical systems (Peters, 1994). Subjected to processes and modes of organisation familiar from industrial production, the very form of distance education distinguishes itself from the craft form of conventional teaching and learning.[53]

One other result of this is the changing importance and role of the educational institution in both the management and the conduct of distance teaching and learning. The institution plays a much more central role in organising the production, design and delivery of materials, and also acts as the primary locus of communication with the student (Holmberg, 1980, 1981; Keegan, 1996). While in conventional education form is given to the educational process most immediately by the relationship between teacher and students, in distance education it is provided by the institution, which organises the production and delivery of materials, provides counselling and support for students, and implements the tutorial structure out of which monitoring, feedback and evaluation take place (Gunawardena & McIsaac, 2004; Kaye, 1988). These processes are largely incorporated into the technical infrastructure insofar as it allows for a kind of feedback and two-way interaction to occur between the

[53] Moore and Kearsley describe this in relation to a concentration of craft skills in a single subject: "[Teachers] try to be effective communicators, curriculum designers, evaluators, motivators, group discussion facilitators, as well as content experts. This is an extremely wasteful use of human resources, when the content and objectives of so many courses are identical, and it produces wide variation in quality of education" (Moore & Kearsley, 1996: 7).

institution and the student (Keegan, 1996). In sum, then, distance education is defined by a number of characteristics that provide positive foundations for its theorisation and practice and that act as boundary markers distinguishing it from conventional education:

- The separation of teacher and learner (and of teaching and learning processes);
- The separation of learners from one another (emphasising the individualisation of the learning process);
- Use of technical media to deliver instructional materials (and as a focus for the production of such materials);
- The importance and influence of an institution (to co-ordinate and manage the production and delivery of materials and the provision of support to students);
- The institution of feedback mechanisms (as allowed through the technical media utilised and as mediated through institutional support structures);
- The organisation of education as a process of industrial mass production of teaching and learning materials.[54]

On the basis of these characteristics, distance education is effectively cordoned off from conventional education –the latter's theoretical constructs, organisational forms, conceptual foundations and pedagogical techniques are displaced and externalised from the field. The separation of teacher and student and the increased student autonomy this implies leads Moore to state that whatever commonalities exist between the "families of activity" into which education is divided, "a theory explaining one cannot satisfactorily explain the other" (Moore, 1977. Quoted in Keegan, 1996: 24). Peters' early analysis of distance education through categories taken from conventional contexts

[54] C.f., Gunawardena & McIsaac (2004), Kaye (1988), Keegan (1996).

prompted him to the conclusion that “the usual theoretical criteria for the description of traditional instruction do not help very much” in defining the nature of distance education (Peters, 1971a: 225). And Holmberg, focusing on the pedagogical role played by the distance learning institution and by media, distinguishes distance from conventional education on the basis of the restructuring of the roles and relations between teachers, learners and institutions that results: whereas the primary relation grounding pedagogical theory and practice in traditional education is that between teacher and student, in distance education it is that between students and the institution, mediated by instructional materials (Holmberg, 1983). This condition begs for a unique pedagogical theory and practice.

The strict separation of distance from conventional education and the formulation of a distinct definition of distance education – comprising the separation of teachers and students, the reliance on technical media for instruction, the greater role played by the institution, and the subsequent reliance on industrial models of organisation – effectively displaces the concerns of conventional from distance education as potential elements in the latter’s formation and realisation. Taken together, these distinguishing features serve as a basis for articulating normative pedagogical guidelines as well as organisational and technical strategies for distance education. And the articulation of these latter plays a powerful role in shaping the background against which interpretations, appropriations and implementations of educational technology are made – where their value is located, how their potentials are specified, and how they are configured and integrated into the processes of teaching and learning. I will deal with each of these – pedagogical practice and institutional organisation – in turn in the sections that follow.

4.4 The Pedagogical Heritage: Distance Education as Autonomous Learning

The basic characteristics that distinguish distance from conventional education also inform how distance education is conceived as a practice, how teaching techniques (and prescriptions for successful learning) adapted to it are developed, and how technical media are appropriated and employed in it.[55] As with the basic differentiation of distance and conventional education, the pedagogies predominating in the field are grounded in the fundamental separation of teacher and student.

This separation means that learning takes place in conditions of much greater individual autonomy and independence than is the case in conventional settings. As such, these categories – autonomy and independence – become central to distance pedagogies, technologies and organisational strategies. Distance education theorists such as Charles Wedemeyer sought to enhance autonomy and independence through distance teaching and learning processes. For Wedemeyer, the group learning typical of conventional education promotes a dependency of the individual on the learning group, and particularly on the professor. Such a situation encourages conformity to the norms of the group as defined by the instructor rather than supporting real independence of thought. By

[55] C.f., Garrison & Shale (1987), Gunawardena & McIsaac (2004), Keegan (1996), Moore (1990, 1973), Moore & Kearsley (1996), Peters (1994, 1971a), Wedemeyer (1978, 1971).

contrast, distance education provides an environment in which greater control, autonomy and freedom over learning could and should be delegated to learners in order to foster self-direction and self-regulation. According to Wedemeyer, this kind of individualisation was part of a general process of individual *liberation*, and thus situated distance education as the true inheritor of the liberal humanist tradition, the highest aims of which are freedom of thought and action as foundations for engaged democratic citizenship. For Wedemeyer, the realisation of such freedoms can only be achieved by breaking down the space, time, and social constraints of conventional education through the use of technical media in distance learning. The separation of teacher and student is thus seen not only as a logistical problem, but as a basic precondition for the organisation of education as an autonomous process focused around the independent self-activity of a student guided remotely via a technical medium (Wedemeyer, 1971). Autonomy and independence in the learner are thus qualities to be encouraged in distance education practice through the introduction of technologies supportive of *individualised* learning; and for their part, technical media gain value and are implemented in order to support individualisation and foster an educational practice predicated on the individual as the basic unit in the educational relationship. Individualisation can thus be identified as a key component in the formation of distance education and the design and implementation of educational media.

Emphasising individualisation in distance learning means adapting the latter to a set of basic requirements. Teaching and learning activities *must* be separated in order to encourage self-determination on the part of the learner; teaching and learning *must* be conducted through technical systems that support both the extension of autonomy to the learner and individualisation in the pacing, flow and direction of the learning process; teaching *must* be tailored to individual students at least insofar as it is made available to students in a way that it is convenient to them and in a form that they can customise to their own purposes; and learning *must* occur through the agency of the learner rather than at the demand of the teacher, stemming from the learner's own self-conscious actions (Wedemeyer, 1971). On the basis of these imperatives, Wedemeyer offers six essential characteristics of distance education as a form of independent learning:

1. The student and the teacher are separated.
2. The normal processes of teaching and learning are carried on in writing or through some other medium.
3. Teaching is individualized.
4. Learning takes place through the student's activity.
5. Learning is made convenient for the student in his own environment.
6. The learner takes responsibility for his progress, with freedom to start and stop at any time and to pace himself. (Wedemeyer, 1971: 76)

The separation of teacher and learner is thus transformed from a basic condition into a set of pedagogical and organisational imperatives which inform the design of distance pedagogies and implementations of distance media. To approach how this is manifest in both technology and pedagogical strategy, it is important to understand how autonomy and independence are linked in distance education theory through the notion of control – a theme pursued in the work of Moore (1973) and Holmberg (1986, 1983, 1978).

For Moore, the extension of learner autonomy and independence necessitates a parallel and pre-requisite extension of control to the learner over areas of education previously adjudicated by teachers, including such elements as the setting of learning objectives, choice of the methods of instruction, and evaluation (Moore, 1973). The individualisation of teaching is thus not a simple matter of breaking the time and space constraints of traditional institutions in the name of convenience, but of re-delegating agency and determination across the teacher-student relationship so as to grant learners key *pedagogical* and *professional* functions of the instructor. Such an organisation of education corrects for a concentration, in instructors' hands, of control over learning, while creating a need for distance institutions to "provide the appropriate structure of learning materials" to allow control to be redelegated to independent, individualised learners (Moore & Kearsley, 1996: 205-6). The realisation of a key element of humanistic higher education (namely, instilling cognitive conditions for active citizenship in individuals) is thus paradoxically fused with an organisational model that effectively transforms individualisation from an *end* of the educational process as a subjective *Bildung* into an *operant condition* of education as a user-driven sociotechnical practice. Such a condition must be reflected in both teaching materials and technical media, which, in order to be integrated into this pedagogical framework, must be designed and implemented to support (and presume) both learner autonomy and individualisation as well as the transfer of control over the education process from teachers to students:

> The teacher hopes that his/her material will meet the goals established by learners and will be used in their [learning] activities.

> In distance education, whether or not the material is used remains outside the distant teacher's control, and is dependent almost entirely on […] the material, as distant learners accept only […] material that meets their goals. (Keegan, 1996: 72)

The theory of independent, individualised learning and the basic conditions underlying it was effectively distilled in a pedagogical strategy developed by Holmberg and referred to as "guided didactic conversation" (Holmberg, 1986, 1983). Initiated by Holmberg's concern for the problems of (and limits on) interactivity and communication in distance learning, this strategy effectively supports the enhanced individualisation of distance education by focusing on the possibility of *simulated interactivity* in the design of distance teaching materials and media. Individualised learning necessitates, as we have seen, an extension of control to the learner. But in order to achieve social legitimacy as a forum for real learning and accreditation, distance education must retain enough of a collective character to be distinguished from mere self-study. Distance education could maintain such a distinction, Holmberg claimed, by implementing some form of conversational relation between the student and the "tutorial organisation" as an integral part of the distance learning process (Holmberg, 1978). In conformity with the notions of autonomy and control, and in support of the central role played by learning materials and processes of materials production in distance education, Holmberg surmised that this relationship did not have to take the form of a two-way interaction between student and instructor. It could instead be installed in materials and technical media which simulate communicative interaction by making it a condition of learner engagements with such materials and media (Holmberg, 1978). In situations of increased autonomy, didactics can become a function of the design of materials through the transposition into these materials of the kinds of conversational and interactive elements found in the traditional classroom. Embedded in materials, interaction and conversation can be actualised by independent, individual students at times, places and paces of their own choosing (Holmberg, 1978). Guided didactic conversation, then, refers to “the interaction of individual students with texts and the conversational style in which preproduced […] texts are written (Gunawardena & McIsaac, 2004: 360).

As Peters points out, guided didactic conversation is a feature, or at least an aim, of all educational interactions (Peters, 1994). With respect to distance education, however, it takes on a different aspect insofar as its realisation must account for the separation of teacher and student – in essence, it must be simulated through the embedding of interactive elements in a text or technical system. The basic imperative of the design of materials for distance education is thus the incorporation of conversational and interactive elements that can simulate interactions between teacher and student. The correlate of this is that the concept of conversation must be translatable to the media utilised in distance education (Holmberg, 1986). As with programmed instruction, the notion of guided didactic conversation invites designers to look at educational materials and media as functional analogs for the teacher. If programmed instruction allows for the analysis of teacher functions as moments in the educational process, guided didactic conversation provides terms on which these can be objectified in learning materials and media. This could be as simple a matter as breaking up a study text with exercises, quizzes and questions to allow the independent learner to actualise the information contained in an instructional unit, or as complex as the ordering of instructional materials and drill and practice tools in a CAI system. Regardless of its manifestation, the basic idea remains the same – the objectification of teacher functions in materials and media. This transforms a moment of social interaction into a more or less mechanically reproduced interactivity, encourages the organisation of education as a production of interactive materials, and supports an interpretation of media functions in terms of their capacity to enhance or extend interactivity.

Predictably, this has an effect on the role of the teacher, as well. The design of distance learning materials and media to incorporate didactic and interactive functions supports a delegation of labour across a variety of components in a complex, technically mediated educational system – course authors, instructional materials, technical tools, distance tutors, students and the institutions that organise and co-ordinate the relationships between and processes undertaken by each of these elements. Unlike in conventional education, where the act of teaching is summarised in a human figure whose performances frequently disguise the sociotechnical and institutional nexus that produces such performances, the acts of teaching in distance contexts are an explicit product of the entire set of dynamic relations between the various components comprising the system. At the extreme, teaching becomes less an individual action than a systemic performance. In the estimation of one early theorist, "[t]he world of distance education […] has little of the characteristics of ‘teaching’ because there is, in general, no teacher in the system and the functions relating to student learning within the helping organisation are performed by a variety of machines, people, and materials” (Keegan, 1996: 58).[56] The requirement that materials be designed with didactic functions thus supports a particular division of labour in distance education systems – and particularly that between course authors/designers and tutors. The former are required to be content experts, to have a working knowledge of the technologies of mediated education, as well as to be versed in the instructional principles at the heart of distance education – their role, in other words, is to manage course content in such a way as to leverage the interactive features of technical media and effectively prescribe didactic functions that are both useful to and useable by learners (Moore & Kearsley, 1996). To the degree that learner autonomy is a presupposition of the distance learning process, and to the degree that social interaction is transposed into a pre-packaged, technically mediated interactivity, “the teacher’s role is that of respondent rather than director and the institution becomes a helping organisation” (Keegan, 1996: 71). Tutors, by contrast, are required to possess a different set of skills – those associated with instruction as a process of content delivery, guidance and performance evaluation – at least where these features are not entirely taken over by technical systems.

Wedemeyer’s own notions of how such systems should optimally be realised include a central role for the instructor – a preservation of the basic interactive relation between instructor and student is essential to his theory of

[56] This passage is written in reference to the work of Rudolf Manfred Delling.

distance learning (Keegan, 1996). However, in technical realisations it is more often the case that interpersonal interaction is transformed into mechanical interactivity, with the machine acting as a functional replacement for the live instructor and integrated into a division of labour in education that principally responds to concerns of cost-effectiveness, mass production and economies of scale while retaining some semblance of “interaction”, “autonomy”, “individualisation” and other much-vaunted liberal educational values. CAI supports “individualisation” and “interaction”, it is true; but it also completely transforms their practical meanings by embedding them in technical systems privileging massification and mechanical forms of learning:

> In CAI, the student is communicating with a program in the computer which may provide tutorial, drill and practice, or simulation and modelling exercises […] Typically, after every screen of information, the student must react and provide some input in order to continue. At the very least, the student must press the carriage return key, which demands watchful attention. More generally, cognitive processing is required in order for the student to make an appropriate response to the material presented: a menu choice, or a numeric, text, or graphical input. (Hiltz, 1994: 21)

The implications of the translation of social interaction into technical interactivity in CAI systems is made dramatically evident here. In the background of this account of the “watchful attention” and “cognitive processing” involved in waiting for the right moment to press a button lies the theory of the technical realisation of conversational elements of teaching and learning. The cognitive goal of learner autonomy is realised in technical practice as the individualisation of instruction in CAI and by the incorporation into such systems of interactive features which simulate (and so displace) social interaction while also enhancing learner control and self-direction. But they do so principally by introducing a functional restructuring that extends an existing division of labour in the field of distance education, that focuses on an interpretation of technology on the basis of identifiable teacher functions, and that positions technology as a functional substitute for the teacher.

4.5 The Organisational Heritage: Distance Education as Industrial Practice

The background against which CAI emerged as desirable and logical was not only comprised of the pedagogical strategies adopted in response to the separation of teacher and student in distance education. Indeed, these pedagogical strategies and the technical media developed and deployed for actualising them took shape against particular features of the organisation of distance institutions, systems and processes. Once these features came to be subjected to rigorous analysis beginning in the 1960s, they were posited at the centre of a definition and description of distance education as an *industrial process* – a definition that has since had a powerful and lasting influence on theory, pedagogy, and institutional organisation in the field.[57] In the mid-1960s, when distance education had not yet received concerted analytic attention at the general level of institutional practice, Otto Peters began a series of descriptive studies of distance education institutions and systems (focusing on their

[57] First formulated by Peters in the early 1970s, this description has not only become canonical in definitions and theorisation in distance education, but in its institutional organisation – specifically in the large distance and open universities that emerged beginning in the late-1960s of the which the Open University UK is the flagship. C.f., Kaye (1988), Keegan (1996), Mason & Kaye (1989) and Moore & Kearsley (1996). Gunawardena & McIsaac go so far as to state that the twentieth century can be identified as the “industrial era” in distance education, in conformity with Peters’ analysis (Gunawardena & McIsaac, 2004: 359).

organisation of the production and circulation of materials and on institutional structure), the aim of which was to examine distance education's potential for meeting societal needs for more educated people (Peters, 1994). These studies[58] comprised the first systematic attempt to document distance education as a unique area of educational endeavour, and they led directly to Peters' later attempts at a reflective analysis of the field as a whole.[59] Peters began this latter project in an effort to understand distance education with reference to conventional institutions. This resulted in no more than a negative definition of distance education – distance education was "a reduced […] denaturalized form of face-to-face instruction" (Peters, 1994: 9). Such a definition did little to ground understandings of distance education or specify what its optimal practices or organisation might be.

The inadequacy of conventional education as a basis for understanding distance education meant that another point of comparison was needed, one that had been suggested by Peters' earlier work: industrial production. Peters noted three ways in which distance education related to industrialisation. First, as in industrial production generally, the principle of division of labour is a key feature of distance education, where teachers are functional specialists whose actions are co-ordinated with other elements in a larger system. Teaching is a systems

[58] Peters (1965, 1968 & 1971b). I have not consulted these in the original German, but reference them here to specify the originals. I have consulted portions of the texts available in translation (Peters, 1994), summaries of them in English (Peters, 1971a), and a variety of secondary accounts (Gunawardena & McIsaac, 2004; Keegan, 1996; Moore & Kearsley, 1996).

[59] Peters rejects the idea that his is a "theory" of distance education – he merely analysed and described it according to a set of categories derived from industrial production. This did not, however, prevent him from extending his analysis to distance pedagogy and to questions of the optimal organisation of distance teaching and learning (Peters, 1994).

function the moments in which are distributed between various specialised posts. It operates through a technically supported serial organisation, the management of which is carried out by a group of administrators positioned above the system itself (Peters, 1994). Second, the industrialisation of society creates a demand for kinds of skilled labour not supported by conventional education. Distance education is a key component of industrial societies insofar as it fulfils a need for training and education brought into being in such societies. Further, the industrial infrastructures of communication and transportation *enable* distance education as a particular kind of mass mediated educational practice – industrialisation thus also provides the *material* conditions for distance education. And finally, the production and distribution of distance learning materials is a process of industrial production in its own right. Organised around the production of objectified and technically adapted materials, instruction becomes “a commodity and an object in trade”, subject to requirements of standardisation, quality assurance, cost-effectiveness, and profitability (Peters, 1994: 4). Thus, education could and did benefit from technical rationalisation to the same degree and in the same manner as other production processes (Peters, 1994). This also bears an influence on the organisation of distance institutions, which tend to be inherently expansive, taking advantage of profitable economies of scale to be achieved through the reproduction and wide dissemination of a product of “constant quality” (Keegan, 1996: 81). Such institutions and systems also tend to be managed as industrial facilities through a logic of efficiency, productivity, and centralised co-ordination and control – a new set of values shaping educational development. So tightly intertwined do industrial values and the processes of distance education become that “unless industrial methods are used, distance education will not be optimally successful” (Moore & Kearsley, 1996: 198). Industrialisation is thus not only a quality of distance education – it is one of its basic and formative conditions.

How do these general similarities with industrial production tie in specifically to the organisation and practice of distance education? As we have seen, the most basic condition of distance education is the separation of teacher and learner. This separation correlates directly to a need to deliver individualised, self-paced, self-directed instruction to large numbers of students distributed over a wide area, a need to which the techniques of industrial mass production and distribution respond. However, this can only occur where learning materials themselves are produced and delivered as concrete objects, and where technical media are implemented to distribute such objects. These in turn require a mediating institution that can order the production, delivery and (in part) consumption of educational materials via complex technical systems. These basic conditions undergird the industrial organisation of distance education and supply a foundation on which the major features of industrialisation – technical rationalisation, division of labour, scientific controls, mechanisation/automation, massification, planning, alienation, standardisation and functional specialisation – can be realised as constitutive aspects of distance education systems and practices (Peters, 1994).[60]

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[60] See also Keegan (1996).

Distance education is *rationalised* like other sectors of industrial production insofar as it is ordered around the mass production, distribution and consumption of commodified materials – “teaching”, in Peters’ words, “becomes an object which can be manipulated” (Peters, 1994: 205), and subjected to standardised, mechanised production and delivery processes. The technical rationalisation of educational production enables forms of manipulation, duplication, analysis, measurement, accounting, and adaptation familiar from the production of standardised industrial goods. The objectification of teaching in commodified materials also imposes a separation between various stages of education – planning, organisation, design, and delivery. The result is an intensive division and serial organisation of labour similar to that found in industrial factories, as well as the necessity of a relatively autonomous, centralised co-ordinating body to evaluate and manage the operation of what is more or less an assembly line production process (Peters, 1994).[61] This division of labour also becomes the focus of analysis and development in the education process – the basis for identifying functional relations between parts of the system, for delegating functions across its various elements, and for integrating both human and technical elements into a working whole. The fact that Peters offers this not as a theory but as a *description* of distance education only underscores the resonance between this mode of organisation of distance education, and the theory of programmed instruction which stands at the heart of

[61] In Keegan’s words, “the staff remain at their posts but the teaching (manuscript for example) is passed from one area of responsibility to another and specific changes are made at each stage” (Keegan, 1996: 81). Note that a process (teaching) has here been magically transformed into an object (manuscript) without apparently losing any of its characteristics as a process.

CAI. The industrial model of distance education, like the theory of programmed instruction, thus presents a focus for appropriations and iterations of educational technology consonant with CAI – a technical realisation which reflects both the pedagogical logic of programmed instruction and the organisational logic of industrial mass production, commodification and administrative control.

Teacher functions, for example, are divided between knowledge provision (carried out by subject experts acting as authors), delivery (conducted by programmed materials, technical systems and media), evaluation (carried out by tutors), and counselling (provided by designated programme advisors) (Keegan, 1996) – skills that were once concentrated in a single subject are now distributed across several narrowly specialised groups with greater or lesser status and position in the organisation. Division of labour also necessitates abstract co-ordination and control of the flow of activity between functions, institutes a pattern of organisation that distributes knowledge and skills between various areas, and suggests how technical media should optimally be integrated into the system – i.e., either to serve instructional functions previously performed by professional teachers or co-ordination and control functions in the management of the educational process, or both. The functional analysis and breakdown of the education process enables the delegation of functions across its various moments in such a way as to stabilise a serial form of organisation in which the technology has a very clear role: in industrialised education "a technical device is used and takes over some of the functions of the teacher", or in a stronger formulation, a technical medium "teaches instead of the teacher" (Peters, 1994:

203). In distance education, then, "[n]ot only was the term [industrialisation] taken over, but also the very procedures and techniques it denotes", a feature that reveals it as "the most industrialized form of teaching and learning" (Peters, 1994: 10).

According to Peters, this description "characterizes a structure common to all objects to which this term [i.e., industrialised distance education] should be applied" (Peters, 1994: 11), influencing the variety of moments, functions, practices, tools and roles of which it consists. Included here are, of course, technical media and the manner of their integration into educational processes and structures – specification of their desired functionality, their incorporation into teaching and learning practices, their role in the production of learning materials, and their development as key aspects of industrialised education systems. For Peters, the introduction of technical media – specifically radio, television, and computers – into distance education was a strong indication of the coming of industrialisation to the practice. In what he called a "technological model", "the institutions of distance education would use technical mass media and begin the era of mass education – just as industry developed techniques of mass production" (Peters, 1994: 7). The employment of technologies in education was not just analogous but *identical* to their employment in industrial production – they would support and concretise the insertion of a principle of mass production, distribution and consumption at the heart of the education process; they would support the production, distribution and consumption of the mass-produced educational commodities that would be the stock-in-trade of the education industry; they would aid distance education in realising profitable economies of scale by maximising the distribution of such commodities; they would enhance and "perfect" the industrial production models of correspondence study by introducing increasingly sophisticated forms of rational control and administration; and they would allow the mechanisation or automation of certain functions within the teaching and learning process in conformity with both the inherent expansiveness of and the concern for efficiency endemic to industrial production (Peters, 1994). On the one hand, then, the guiding principles behind the selection, implementation, integration and use of technologies in education are derived not from conventional pedagogies but from the requirements of industrial production. On the other hand, they are derived from a set of educational precepts (individualisation, autonomy, control) and strategies (programmed instruction, guided didactic conversation) which ground the application of industrial techniques of production and organisation to the processes of teaching and learning.

Against this background, the kind of computer-mediated education instantiated in CAI appears to be a perfectly logical adaptation of the computer's inherent capacities – a "natural" educational appropriation of it. Indeed, what makes CAI "educational" in the first place is a model for the organisation and practice of distance education as a kind of industrial practice. CAI both develops in response to and appears as desirable within such a model. It conforms in practically all instances to the description of distance that education Peters develops – it supports and enhances division of labour in education; it reduces teaching and learning to commodified materials; it integrates technology in the functional position of the teacher; it redistributes the roles and performances of human professionals across a variety of system components; and it supports the concentration of managerial control of the education process in centralised host institutions. This form of educational computing was something which Peters himself figured into his description of industrialised distance education without explicitly mentioning CAI systems or even CAI as a general approach to computer-mediated education. For Peters, computers were merely the latest in a long line of educational technologies designed to rationalise and embody, more or less effectively, the functions and roles of teachers: “computer-based tuition [represents] the highest level of mechanization, namely automation” (Peters, 1994: 205). What Peters identifies as a quality, however, is better described as a set of potentials which appear as qualitatively distinguishing from within a particular framework of assumptions, values, structures and goals for defining and organising education – a technical code for the appropriation of the computer in a model of distance education that had already been set in place in appropriations of print and broadcast media.

It should be noted that Peters himself was ambivalent about the industrialisation of education. While on one hand he associated it with the possibility of extending education to a wider population, he also noted several deleterious tendencies within it. Industrialisation would dehumanise education; it was inherently incompatible with local organisation in the education process, and thus tended to be homogenising; it foreshadowed greater alienation (of both structural and psychological varieties) in teaching and learning; it signified a triumph of formal rationality and bureaucratisation over interpersonal interaction and humanistic *Bildung*; and it opened the possibility for a seizure of highly centralised and rationalised education systems by powerful political groups. Further, the increased dependence on technology tends to over-emphasise and reduce learning objectives to the functional parameters of technical devices and media, to fragment and compartmentalise learning, and displace “critical rationality” from learning (c.f., Peters, 1994: 196-7). These misgivings are not, however, voiced to instigate a normative critique of industrialisation or its potential extension to educational practices and technologies. Peters is merely pointing out the negative outcomes of an inevitable process. Moreover, the inevitability of industrialisation is not limited to distance education, but is part of a greater narrative of social development that will eventually engulf all levels and forms of educational provision: “industrialized forms of imparting knowledge will, by and by, also permeate and finally partly substitute for face-to-face instruction on all levels” (Peters, 1994: 16). For Peters, industrialisation creates the milieu in which take shape both distance education as a technically mediated practice and the form, function, and employment of the technical systems designed to support it. The industrialisation of distance education thus contributes another significant set of terms to the technical code of educational computing distilled in CAI.

4.6 The Technical Code of CAI and the Design of Educational Technologies

The preceding analysis has attempted to show that the kind of commodified, deprofessionalised form of computer-mediated education represented by CAI is not the result of the pure properties of computers as applied to teaching and learning and the organisation of education systems and institutions. Rather, the extent to which CAI may have appeared as a logical and desirable iteration of computer-mediated education – i.e., the grounds on which it could have been applied and developed in the first place – was contingent on the convergence of a variety of pedagogical, institutional, and technical factors in the field of distance education which, taken together, comprised a “technical code” under the horizon of which understandings of the abstract value of the computer for education, assessments of its potential role and function in teaching and learning, and concrete applications such as CAI could take shape historically.

CAI emerged out of a logic of educational computing grounded in the computer’s representational affordances – its capacities for processing, storing, structuring and distributing information. These capacities are extended in educational systems like CAI where education is likewise seen in terms of its informational dimensions and organised in terms of its informational processes – where teaching and learning are reduced to the delivery and acquisition of information, where connecting learners to information is seen as the key problem to be addressed in educational media, and where a particular mode of the production and distribution of didactic information predominates and is legitimated through a particular set of pedagogical and theoretical precepts. The representational affordances of the computer draw it into functional analogy with the live teacher, whose operations in the classroom are seen as merely less efficient versions of the same basic processes available through computers. The computer is not the “cause” of this analogy, but merely an occasion for its extension and reiteration – it having already been installed in a series of educational media (print, radio, television) and in various pedagogies of distance education. The computer thus enters into education in the position of the instructor on the basis of a perceived functional equivalence grounded in interpretations of education as information processing and of computers as information processors. Functions, systems and implementations that support this logic come increasingly to be encouraged – especially where they also promote or reflect established organisational values (increased efficiency, centralised control, standardisation, economies of scale) and established pedagogical approaches (guided didactic conversation, programmed instruction, independent learning). In this manner, a concrete path for the development and appropriation of educational computing is established and concretised in CAI. This historically contingent situation creates an artificial antinomy between teachers and machines that critics like Lyotard – foreshadowing later critics of online education – associated with the intrinsic properties of computers.

These qualities of CAI systems and their political implications are easy enough to interpret *a posteriori* out of the systems themselves. But the *possession* of such qualities by such systems is only one part of a politics of educational technology. While in a sense it could be said that the computer itself bears a relation at the level of its functions to the commodification of information and the automation of teaching, this should not be seen as an intrinsic quality, but as a penchant or inclination – something to be brought out through a resolution of the range of ambivalent affordances contained in the object itself. The degree to which this inclination is realised in actual technical systems – and thus the degree to which the practices mediated by such systems are subject to commodification and deprofessionalisation – is relative to an encoding process undertaken with more or less implicit reference to a set of tenets, principles, organisational assumptions and pedagogical practices derived from distance education. Together, these comprise a *technical code* for the realisation of educational computing – a code condensed in CAI as a particular application. The elements of this code as identified in this chapter are:

- A clear and absolute distinction between conventional and distance education, and the subsequent externalisation of conventional pedagogies and modes of organisation and practice from the field of distance learning;
- Theoretical understandings predicated upon the fundamental separation of teachers and students, and of teaching and learning;
- Pedagogical approaches that focus on learner autonomy and the design and production of "programmed" media and materials with semi-autonomous didactic functions;
- Ideal learning situations based on a one-to-one relationship between learners and information, mediated by an instructor;
- Conceptualisation and organisation of institutional systems around core units involved in the mass production of commodified learning materials;

- Description and instantiation of the institutional system and education process as one of product and process management;
- A consequent definition of distance education as an *industrial* process, and the autonomisation of administrative positions and functions;
- Adoption of standardised modes of the social organisation of labour predicated on the separation of course creation (authorship) and delivery (instruction);
- The existence of a technical heritage and infrastructure adapted to this institutional and organisational form.

These elements comprise, at the most general level, the technical code of CAI. The function of this code is to suggest a set of technical requirements, potentials and values to which educational applications of the computer must respond, correspond or conform, at least ideally. Such codes, as explained in Chapter 3, supply both a meaning to be interpreted out of educational systems, and a foundation for identifying, evaluating and realising the value of computers in educational practice. They provide a framework out of which CAI appears as a logical and desirable iteration of educational computing.

In this code can easily be recognised the political qualities identified in online education by evangelical critics – the code of CAI, in this sense, comprises part of the historical foundations of the evangelical discourse as a reform programme mobilising educational technologies for particular political-economic ends. But the code itself – as a horizon guiding concrete realisations of educational computing – must be seen as a contingent foundation for the educational appropriation of the computer. Within the field of distance education, which the above analysis locates as that “local centre” within which the code of CAI takes shape, there was no consensus guiding interpretations and appropriations of the computer. Indeed, the ambivalent qualities of the device – and particularly those that arose from its embedding in telecommunications networks – almost guaranteed that there would actually be a great deal of contention in the course of its appropriation. If CAI focused on the computer’s representational affordances and on education as an informational process, there were, beginning in the early 1980s, other appropriations which attempted to resolve this ambivalence with respect to its *relational* affordances – its integration into communication networks and its capacities for supporting interaction and dialogue between people. Out of this approach to the *network* computer, an entirely different set of elements was brought into play in its educational application, an entirely different code was established guiding its appropriation, and an entirely different path was opened up for its ongoing development.

CHAPTER 5: THE AGE OF AMBIVALENCE: EARLY EXPERIMENTS IN EDUCATIONAL COMPUTER CONFERENCING

What can be done to overcome the apparent proclivity to treat this medium as a book to be read rather than like an electronic seminar classroom meant for active participation?

\- Star Roxanne Hiltz

5.1 Introduction: An Alternative Programme for Educational Computing

The previous chapter introduced CAI as an early educational application of the computer which resolved that artefact's ambivalence in favour of potentials aligned with certain organisational and pedagogical features of distance education. This "coding" of educational computing dovetailed with and confirmed early critical appraisals, such as Lyotard's, that identified the computerisation of education with commercialisation, commodification, deskilling, even automation (Lyotard, 1984). But where critics posited these as inherent properties of computers and inherent outcomes of their application in education, a perspective adopted from genealogy and critical theory suggests that they should rather be understood as potentials actualised through contingent development processes. Through these processes, a set of concepts, values, goals, assumptions, forms of organisation, etc. derived from distance education – that "local centre" at which computer-mediated education first took shape – emerged as lenses through which the educational potentials of computers were identified, grasped, and concretised in realisations such as CAI. An understanding of education as a process of stimulus and response (Ally, 2004); a focus on information delivery and on technical facilities for it in response to the separation of teacher and student (Gunawardena & McIsaac, 2004; Keegan, 1996); the designation of individualisation as the ideal learning relation and an attendant shift of control to learners (Laurillard, 1994; Moore, 1973); an analysis of teaching as a functional process to be broken down, serially re-organised and conducted as programmed instruction (Bullock, 1978; Gagne, 1970); the development of practices like guided didactic conversation as paradigms for installing pedagogical functions in objectified materials and media (Holmberg 1983); the industrial organisation of educational production in mass distance systems (Peters, 1994) – all of these supported a coding of educational technology evident in CAI, and thus confirmed Lyotard's critique.

However, while these elements of the technical code of CAI can be drawn back to distance education, they do not in and of themselves define that field as a whole. If aspects of distance education were drawn upon to resolve the computer's ambivalence in CAI, *network computing* also introduced into distance education potentials which, for some, augured a major transformation in its pedagogical and organisational conditions.[62] For some early innovators, it was clear that the standard distance model was not the only possible foundation for computer-mediated education, nor was CAI the only, or even the most significant educational appropriation of the computer. In the early 1980s, a number of experiments began which – beginning from an alternate set of pedagogical

[62] C.f., Harasim (1990), Mason & Kaye (1990, 1989), Smith & Kelly (1987).

precepts, social and professional values and technical systems and tools than those documented in the previous chapter – realised a form of computer-mediated education that stood in marked opposition to CAI and that refuted rather than confirmed Lyotard's fatalistic predictions of the implications and meaning of educational computing.

Using computer conferencing systems as media for teaching and learning, these experiments re-imagined educational computing on the basis of the network computer's potential as a communications device and through a basic definition of education as a process of *social interaction* rather than information processing. Emphasising network computers' *relational* affordances – their capacity to bring people together in dialogue and community – these experiments developed a form of online education that operated outside the terms of critiques derived from the CAI paradigm. This alternative realisation was, like CAI, grounded in a logic for encoding both computer-mediated education as a practice and the technologies underlying it – a logic developed in relation to educational goals, professional values, pedagogical strategies and conceptualisations of the teaching and learning process. In contrast to the logic informing CAI, however, the logic of this alternative was adapted from conventional modes of education and in rejection of the CAI model and the conventions of distance learning informing it. The result was an alternative technical code for computer-mediated education and, more importantly, the foundations for an alternative development path for online education.

This chapter explores the development of this alternative technical code in early experiments in educational computer conferencing. I begin with a description both of conferencing systems – their functions, developmental trends and areas of application – as well as of a discourse of cultural transformation accompanying their emergence as early forms of virtual community. I then discuss the educational potentials identified in computer conferencing in relation to pedagogical goals identified by early adopters and linked to this wider discourse. To illustrate how these potentials were negotiated, I present more fully the case of the School of Management and Strategic Studies (SMSS) at the Western Behavioral Sciences Institute (WBSI).[63] The SMSS is unique in the history of online education for one key reason – while it was initiated to explore the educational potentials of an untried technology, the challenges it encountered in developing online education led WBSI to a much deeper involvement in *technical design* as well as innovations in online pedagogy. As such, the SMSS stands as a key "local centre" at which both the practice and infrastructure of early online education were articulated – at which an alternative technical code of online education emerged in contrast to CAI.

Tracing the formation of this code will require attention to the innovation of both *social mediations* for the practice of online education (the appropriation of the ambivalent functions of conferencing systems in a framework for their realisation as pedagogical tools) and *technical systems* in support of the online pedagogy developed at WBSI (the development of an original software

[63] This will be complemented, where relevant, with consideration of other early initiatives.

application for online education). I argue here that it is out of these two areas of innovation that an alternative technical code of online education emerged at WBSI – one that was not localised there, but that also informed other early experiments in educational computer conferencing, and that supplies a foundation for an engaged critical politics of educational technology in the present day. I outline this alternative technical code in the conclusion of this chapter.

5.2 Alternative Technical Foundations: Computer Conferencing

By 1980, PLATO had emerged as one of the most widely used instructional systems, serving thousands of students in hundreds of courses at sites around the world (Rahmlow, 1980). The model of education it represented thus appeared to define what educational computing would be. But while critics penned jeremiads against the automation of instruction and the commodification of knowledge, other critical interests took a different approach. Instead of decrying educational computing with reference to CAI, some educators, researchers and computer enthusiasts were busy innovating new models of computer-mediated education around the alternative affordances of network computers and a different kind of technical system than CAI – computer conferencing.

Developed first in the 1960s, computer conferencing was a form of text-based, asynchronous computer-mediated communication organised for facilitating small group processes (Hiltz & Turoff, 1978).[64] The first conferencing system, EMISARI,[65] was designed in 1971 by Murray Turoff to support information sharing between regional offices of the US Office of Emergency Preparedness (OEP) (Meeks, 1985). EMISARI was, in essence, a virtual space in which information could be accessed remotely at any time, within which users could engage in collaborative development of information resources, and through which users could exchange information in clearly delimited groups (Meeks, 1985). Unlike email, EMISARI supported many-to-many information exchange and communication; and unlike later Bulletin Board Systems (BBS), it also permitted diverse interactions within closed groups. It thus both supported information exchange, and, in providing two basic components of social groups (well-defined boundaries and many-to-many communication), constituted a form of networked community.[66]

It was these community potentials that early systems like Portacom, Caucus, Participate, Confer, the Electronic Information Exchange System (EIES), Notepad and CoSy emphasised. Like CAI systems, conferencing systems resided on central host computers that managed user and group processes.[67] Users would register accounts and access the systems remotely by dial-up

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[64] Their contemporary equivalents are Web discussion forums and social networking sites. Like these later services, conferencing systems combined features of information transfer and user-profiling with communication facilities and community support tools.

[65] "Emergency Management Information System and Reference Index" (Meeks, 1985).

[66] In their discussion of the nature of online community, Feenberg & Bakardjieva, referencing the work of Mynatt *et al.* (2004), identify several dimensions of online community that can be usefully applied to the assessment of virtual communities – durability in time; meaningful structure over time; divisions between groups; diverse modes of communication; and the ability of users to configure their social space (Feenberg & Bakardjieva, 2004: 19).

[67] Packet-switched conferencing systems emerged later in the 1980s, and were quickly adopted over the mainframe model which predominated their early development and application.

connections from dumb terminals. Subscription fees were paid to system operators (in addition to whatever phone charges were levied), and these financed system operation and development (Meeks, 1985). While these features bear structural similarities to CAI, there was one simple, yet critical difference – where CAI focused on user interactions with information, conferencing systems relegate information to a secondary role – it is not that *with* which people interact, but that *through which* they connect with one another (Feenberg, 1989; Levinson, 1989). As we will see, this introduced a range of new possibilities and challenges into educational computing.

Conferencing systems possessed three types of communication and community-support functions – messaging, group management and user-profiling (Hancock, 1985). Their messaging functions differed little from those of word processors, email, or BBS – composing, formatting, editing, sending, forwarding and organising messages; and up-loading, attaching and downloading documents (Cook, 1987). Messages were ordered chronologically, and could be posted and accessed by all group members; in this way groups would engage in ongoing interactions. What made these basic communication functions unique in conferencing systems – and what made such systems attractive as potential educational media – were their embedding in parallel facilities for user profiling, group management, and system analysis.[68] It was this combination of functions that provided conferencing systems with their unique *social* structure.

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[68] Facilities falling into this latter category included a tool for generating statistics on the use of the system by individual users and by user-groups, which gave system managers and conference moderators a dynamic sense of interactions among group members.

Conferencing systems defined online communication *sui generis* as a group process taking place in discrete forums. These forums – or "conferences" – could be either public (open membership) or private (closed membership) and could contain any number of participants. This encouraged the organisation of individual conferences along one of two lines – open or closed conferences organised according to a topic of interest, or (mostly) closed conferences organised according to the boundaries of previously existing social groups.[69] Depending on the needs of the group and the nature of its exchanges, conferences could be brief, targeted affairs run like meetings, or ongoing exchanges with their own unique patterns of development and organisation. This allowed computer conferencing systems to play host to a range of different groups – formal or informal, short-term or ongoing, community- or interest-based (Meeks, 1985). The inclusion of user-generated profiles provided another support for community interactions, giving each participant the ability to define aspects of their identity for the purposes of online interaction (Hancock, 1985). Conferencing systems were thus not only communication systems, but community systems – embedding functions that gave definition to groups, identity to participants, and substance to interactions.

These community functions were not only embedded in technical features, nor did online communities grow naturally out of them. Conferences were presided over by moderators – the inaugurator of the conference, a person designated by the group, or even an abstract position shared by participants –

[69] These two basic categories of conferencing are extrapolated out of surveys of conferencing applications to be found in Cook (1987), Hiltz & Turoff (1978) & Rheingold (1985).

whose responsibility it was to manage the group and its interactions. The moderator's role was defined both technically and socially. Technically, the moderator had a position "above" other participants, and could access functions not available to others – tools for organising messages and members into sub-conferences and adding or deleting messages or participants; decision-making functions such as poles and voting; and statistical and tabulation tools.[70] These allowed the moderator to track and analyse discussion and to document group interactions. While technical features supported the moderator's group management activities, the definition of conferences as *communities* required *social mediations* for establishing discussion in the first place. These took the form of more or less explicit norms relating to aspects of communication such as level and manner of participation; mode and tone of address; opening, closing and organisation of discussion; placement of messages in discussion threads; grounds for adding and deleting members, archiving messages, etc. (Feenberg, 1989; Kerr, 1984). While the technical features of conferencing systems enabled group communication, it was the communal definition of normative guidelines for interaction that defined conferences as communities. For some, this fusion of technical and social factors merited a novel designation for the technology: "groupware" (Johnson-Lenz & Johnson-Lenz, 1981 & 1980; Johnson-Lenz *et al.*, 1978).

[70] These latter included tools for collecting data on user activity – who had read what messages, when members had last logged in, who had contributed what to the conference, etc. Moderators also had the ability to collate messages based on keywords or subject headings - these tracking and analysis features were specific to the moderator's role as it was defined technically.

How did users interface with conferencing systems? Users would access the systems and their various conferences by dialling-in remotely to central hosts from dumb terminals.[71] This meant that interpersonal communication was predicated on a primary *technical* mediation between individual users and the system itself. This mediation was embodied in command codes through which system functions were performed. Mastery of these codes was an unavoidable condition of the use of the systems. Such codes were numerous, non-intuitive, and unique to each system, rendering their use frustrating for new users. User manuals listed dozens of commands – the so-called "quick reference card" for EIES, for example, was 16 pages long (NJIT, 1986). This meant that the most simple communication processes required the mastery of a technical language whose correspondence to the operations performed through it was not always obvious. The result was a level of technical complexity that translated into a high level of intimidation for users with little or no experience of computers. To make matters worse, the command codes were also intrinsically expansive – every time a new function was added, a new code would have to be introduced, ensuring that the systems' development would only intensify the difficulty of using them (McMannis, 1985; Hancock, 1985). Moreover, because each system's code-set was unique, because each system hosted a unique set of conferences, and because each tended to develop a unique "personality" (Meeks, 1985), users who wanted to participate in communities in conferences through different

[71] These would have few native functions other than those orchestrating connections and display. Some users would have accessed conferencing systems with microcomputers, but this would have made little difference (at least in early conferencing) in terms of where the primary conferencing functions resided – i.e., on the host mainframe.

systems had to learn multiple languages. While the systems' flexibility made them adaptable to users' needs, the price was increasing complexity – flexibility and usability were thus initially organised as mutually exclusive variables in conferencing systems. As one early conferencing advocate put it:

> One of the first reactions many people have to the discovery of a[n] […] easy-to-use conferencing system is a sense of relief. Encountering a manual easier to read than the Dead Sea Scrolls, coupled with commands that make sense and get the job done is a rare pleasure […] (Brochet, 1986: 2)

The later development of graphical interfaces and the wider diffusion of micro-computers off-set some of these difficulties; but in the early 1980s, when conferencing was first applied to education, interface complexity was typical.

These complexities of use tended to mean that computer conferencing was by no means widespread beyond small groups of enthusiasts, academics and members of large organisations with access to the technology.[72] Despite this, however, the potential of computer conferencing for social interaction – and for novel "virtual" communities and identities – was at this point beginning to be recognised outside of core user groups (Rheingold, 1985; Turkle, 1984).[73] Indeed, conferencing was, along with services like Bitnet and Usenet, one of several online services which helped to popularise computer networking in an array of contexts – from gaming to business, hobbyists' clubs to research groups (Abbate, 1999; Hiltz & Turoff, 1978, Rowland, 2006). The social value attributed

[72] In 1981, for example, there were only 700 subscribers on EIES (Johnson-Lenz & Johnson-Lenz, 1981). Of course, these small numbers might also explain the sense of community among participants, for which a *lack* of diffusion might have been a support.

[73] One indication of this was a rapid rise in revenues from system subscriptions. In 1980, the total revenues generated in this way was $150,000USD; by 1985 it was $10-million (Cook, 1987)

to conferencing at the time was one that is now universally taken-for-granted – namely, that it transformed computers from information processors into communications media and environments for social interaction and community formation, thus opening computers to different kinds of integration into and development for social practices of all kinds. This obvious feature of the technology bore, at the time, great significance for the alternative form of educational computing imagined through conferencing systems.

As computer conferencing gained in popularity, and as conferencers began to reflect on the significance of their activity, the social potential of conferencing came to be linked directly to abstract features of the systems themselves – their capacity for text-based, distributed, small group communication, the affordance of increased anonymity in interaction, and the capacity for open, interest-based communities. These features were seen to bear intrinsic benefits independent of the contexts to which they were applied. Asynchronous communication displaced interaction from time and space constraints that delimited conventional social practices, allowing for increased levels of efficiency and convenience in operations requiring small-group information exchange (Johnson-Lenz & Johnson-Lenz, 1980). Distributed communication allowed for groups to form purely on the basis of shared interest rather than the accidents of contiguity, enabling new “virtual” communities to emerge (Rheingold, 1985). Text-based communication and increased anonymity blinded interaction to embodied identity markers, promising more egalitarian, pluralistic forms of interchange – a form of disembodiment that could also support experiments with virtual identities, expanding the horizons of experience (Turkle, 1984). And the reduction of communication to the written word would allow a deeper cognitive resonance between users, supporting wider scope for intellectual development (Levinson, 1989). Overall, computer-mediated communication appeared to promise a new era in social interaction, community formation, and identity.

At the beginning of the 1980s, systematic educational applications of computer conferencing had not yet been tried.[74] But their increasing popularity in and success at supporting communication and community in other contexts suggested to some that it was not a great leap between assessments of their *general* utility, potential and value and expectations of their *educational* utility, potential and value. As a communication technology, conferencing suggested that computer-mediated education could be organised around social interaction instead of pre-programmed interactivity. In fusing technical functions and social norms, they suggested that computer-mediated education could be modelled on familiar teacher-student roles and relations. As forums for discussion, they suggested that computer-mediated education could be modelled on the classroom as an interactive space rather than instruction as a functional process. As dialogic systems, they suggested that computer-mediated education could be grounded in humanistic pedagogies centred on discussion and debate rather than in information delivery and acquisition. In brief, they suggested a form of computer-mediated education in stark contrast to CAI. Before these possibilities

[74] A few informal courses had been offered on The Source and on EIES (Feenberg, 1993).

could be realised, though, the general potentials outlined above had to be translated into educational terms. It was only on this basis that a set of expectations and goals for the concrete practice of online education could be developed and tested in practical contexts.

5.3 The Educational Potential of Computer Conferencing

In the early 1980s, when CAI was the dominant mode of educational computing and when computer networks were just beginning to emerge as forums for social interaction, a number of academically-based experiments were undertaken to test educational applications of computer conferencing. These included teacher training courses at the New Jersey Institute of Technology (NJIT); some adult and continuing education courses at the New York Institute of Technology (NYIT); a few graduate courses for on-campus and distance students at the University of Arizona; a series of graduate courses at the Ontario Institute for Studies in Education (OISE); the Connected Education (ConnectEd) program at New York's New School; and some experiments at the University of Guelph.[75] The first fully online academic programme, however, was WBSI's School of Management and Strategic Studies (SMSS). Together, these were among the first articulations of "online education" as a form of educational computing distinct from CAI.

Because educational applications of computer conferencing had not been tried, these early initiatives were in the unique and difficult position of having to

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[75] Clearly, this list is far from exhaustive. It is meant merely to indicate the variety of early initiatives in educational computer conferencing.

define what online education would be through their own experience, and so to cobble together both pedagogical and technical models for it. Doing so led them into a process of experiential interpretation that shaped both online education practice and the technical systems that underlay it. While each of the early initiatives went about this in a different way using different systems, all began with comparable guidelines on the basis of which they arrived at roughly similar notions of online education. These guidelines were provided first by the abstract technical affordances of conferencing systems, the benefits of which were translated into expectations of their pedagogical value and potential; second, by an explicit contrast of computer conferencing and CAI; and third, by analogy to conventional educational practices, roles, relationships and values.

As with the popular discourse of virtual community, the educational potentials of computer conferencing were largely understood with reference to abstract features of conferencing systems. The dynamic social interactivity typical of the traditional seminar class could be fused with the benefits of self-direction and self-pacing characteristic of distance learning, promising to create an new kind of educational space (Harasim 1989, 1990). Asynchronous communication could displace time and space constraints in education, allowing it to move beyond the “place-based book-paced” contexts to which it had been confined in conventional systems, and altering the flows of educational communication to foster greater learner agency and choice (Levinson, 1989). Anonymity online would aid the extension of education to marginalised groups and promote active, pluralistic forms of learning through the removal of identity and status markers (Hiltz, 1994). Interaction through writing would oblige students “to formulate [their] ideas, thoughts, reactions, and opinions […] in such a way that their meaning [would be] clear to other people who [were] not physically present” – as such, it introduced the potential for “computer communications [to] lead to an improvement in literacy levels and writing skills” (Kaye, 1989: 10). Since conferencing systems stored all messages permanently, they would also allow for the emergence of a “collective intelligence” through the ongoing creation of “a common and modifiable group memory” (Kerr, 1984: 2-3), with archived messages comprising a “living database” (Kaye, 1989: 12), a “social memory” of the group’s experience in a “written world” (Feenberg, 1989: 25; 23). And the fact that discussion online could only proceed through participation led some to claim that conferencing encouraged active learning: participants could not “just sit there passively and ‘tune out’: they must keep doing things in order to move through […] the course (Hiltz, 1994:12). The general expectations surrounding early experiments in educational computer conferencing were that it would, despite the lack of experience educators had with the technology, result in a more accessible, widely distributed, pedagogically nuanced, interactive form of computer-mediated education than was possible in CAI. The basis for this faith was conferencing’s ability to open distance education to pedagogical practices and educational structures that were previously unavailable to it.

If CAI concretised traditional concerns, organisational models, and pedagogies from distance education, computer conferencing enabled a restructuring of distance learning through forms, values, relations, and pedagogies familiar from conventional classrooms. The apprehension of a potential revolution in distance learning was thus a key feature of the early conferencing experiments. The previous chapter showed how some distance education theorists began by distinguishing distance from conventional education. In contrast to this, early conferencing experiments focused on the problems of distance education – high attrition rates, exploitive labour practices, technocratic organisation, lack of social interaction – as a basis for understanding the potential of network computers. While it is the admirable task of distance education to provide learning to underserved populations, in practice it is often realised in a way that is little different from industrial production. A logic of industrial production has influenced the pedagogies, the organisation, and as we saw above, also the technologies of distance learning – and particularly CAI.

Conferencing systems, however, introduced a new technical basis for distance education, one which was more attuned to the processes and pedagogies underlying face-to-face education. Some innovators, for instance, saw conferencing as allowing distance learning to be “a more intimate and cooperative form of group-based learning (‘real’ university education) […] extending the resources of the [traditional] classroom” to distance contexts (Kaye, 1989: 9). Likewise, the founders of NYIT’s networked learning initiative saw computer conferencing as transposing “the ‘public’ communication which commonly occurs in a classroom between faculty and students” to distance education (Deutschmann et al., 1985: 1). Experiments at OISE adopted the model of a traditional graduate seminar in their online courses, drawing on pre-existing expectations students may have had from face-to-face learning (Davie, 1989). In an EIES conference initiated as part of NJIT's research into educational computer conferencing, one participant noted the importance of "[a]ctive facilitation on the part of an online instructor" in the success of online courses (Kerr, C303, cc33 [Whitescarver], March 13, 1982).[76] Indeed, the role of the moderator in computer conferences was already available as a model for the pedagogical relations and roles involved in educational conferencing (Feenberg, 1989; Kerr, 1986, 1984). A WBSI staff member put it this way when describing the conceptual framework of the SMSS: "What's the metaphor we're using? As with other attempts by educators to use a non-traditional medium, we're using the classroom analogy. That automatically sets up the faculty/student roles and relationships" (Kerr, C303, cc21 [Icenogle], Feb. 25, 1982). On the whole, then, early conferencing experiments saw that their work was not about importing a technical model into education, but integrating technical systems into conventional understandings of teaching and learning processes.

This approach to educational conferencing not only implicated traditional approaches to distance education. It also transformed the meaning of the computer as an educational technology and brought CAI into focus as a model to be actively avoided. What early innovators in educational conferencing tryied to

[76] Much documentation consulted for this chapter consists of unpublished transcripts of computer conferences on EIES, Participate, and CoSY held at the Applied Communication and Technology Lab at Simon Fraser University. Where these sources are quoted or referenced, I will maintain, in citations, the format the conferencing system uses. In EIES, this format is (moderator's name, conference number, comment number [comment author's last name], and date.

realise was a form of educational computing in which people interacted with one another via computer networks, not one in which they were connected with information via a machine. This latter approach had pedagogical implications that the conferencing experiments were keen to avoid. CAI concretises a particular relation between learners and the education process: in CAI, “the computer is programmed to programme the learner – to corner the learner into learning whatever is ‘contained’ in the box” (Kerr, C303, cc6 [Icenogle], Jan. 27, 1982). Here, learning is, at best, a passive process of memorising routines. At worst, it involves “forcing an individual into […] behavior that others […] view as desirable, yet may not be necessary for the individual” (Kerr, C303, cc35 [Pritchard], March 17, 1982). Innovators in educational conferencing recognised that this was related to the way in which CAI positions the computer in education, that is “as a substitute for the TEACHER […] rather than as a source of liberation to the LEARNER” (Kerr, C303, cc6 [Icenogle], Jan. 27, 1982). They also recognised that this substitution was itself based on a limited definition of the teacher: “to think that a good teacher is someone who drills and repeats without fatiguing is to misunderstand the […] significance of the teacher’s role” (Kerr, C303, cc41 [Icenogle], March 19, 1982). CAI was thus seen as “a tool for defining [an] intellectual territory, not traversing and living in it” – this latter was something “that we [i.e., teachers and students] will continue to do for ourselves” (Kerr, C303, cc26 [North], Feb. 25, 1982), supported by the communication and community functions of computer networks.

Early experiments in online education began, then, from three basic premises – an assessment of the educational potential of conferencing systems based on their abstract features, the relation of such features to aspects of traditional education, and a rejection of CAI as a model of educational computing. These comprised boundary markers in the articulation of an alternative technical code that emerged from these experiments. Within these boundaries, the experiments defined a pedagogical approach based on a critical, humanistic, dialogic, group-based pedagogy that took as its model not the teacher as a unit in a functional process, but the classroom as a space in which that process played out. Instead of sitting passively at isolated computer terminals, students would interact virtually in learning communities; instead of being replaced by computers, instructors would perform familiar functions in the new medium. Educational computer conferencing was thus framed as a revolution in distance education – a means of extending familiar models of educational practice to distance teaching and learning. To illustrate this and to trace the development of the alternative technical code of educational computing, I will now turn to a case study of WBSI's School of Management and Strategic Studies.

5.4 WBSI and the SMSS: Context, Structure and Development

WBSI was founded in 1959 as a private, non-profit research and education centre specialising in group psychology, behaviour and leadership (Harrington-Hall, 1967). Its approach centralised open communication in the development of group dynamics and behaviour, integrating research into communication with the analysis of social relations and collective problem-solving (WBSI, 1990). As the Institute developed, these concerns remained key to its model of consensus-based learning which drew on the diverse experience and knowledge of participants as opposed to the delivery of a pre-determined content (Harrington-Hall, 1967). It was in an extension of this legacy that, after a lull in its fortunes in the 1970s, WBSI initiated its online programme – the School of Management and Strategic Studies (SMSS).

The SMSS was a two-year continuing education programme for executives in the private sector, government and academia. Its aim was to encourage critical thinking and problem-solving by the advancement of humanistic understandings of and collaborative approaches to social, cultural and political-economic issues now commonly associated with globalisation: the growth of "post-industrialism"; the multinationalisation of economic activity; the growing centrality of computers and telecommunications, etc. (Farson, 1984; Rowan, 1983). The SMSS comprised four six-month courses organised around major themes – "The Private Sector and the State", "Management of Scarcity and Abundance", "Globalism and Interdependence" and "Technology, Progress and People" (WBSI, 1990). The courses were further broken down into month-long seminars moderated by faculty, who led discussion around issues and cases under the rubrics provided by the courses. Also included in the seminars were faculty discussants – or frequently *agents provocateurs* – whose role it was to promote dialogue, cross-fertilise discussion among course themes, and develop an enhanced sense of community (Rowan, 1983). SMSS faculty came from diverse academic and professional backgrounds and included psychologists, linguists, policy-makers, business-people, climatologists, philosophers, and government officials – a diversity that was in line with WBSI's practice of sharing multiple perspectives as an aid to group learning and problem-solving (Lean, 1983).

Each semester began with a ten-day orientation meeting at WBSI to introduce the students to each other, to faculty and staff, to the courses, and to the conferencing technology. At first, the SMSS was hosted on EIES, using Apple IIEs and 300-baud Hayes modems (Feenberg, 1993) – slow enough that users could watch text scrolling up the screen as they read their messages. EIES shared the high degree of complexity common to other systems, but it was preferred at WBSI due to the flexibility it brought to conferencing (WBSI, 1985a, 1984, 1982b) – it was possible to use features selectively and to design environments tailored to local needs (Barney & Cross, n.d.). EIES functioned both as a communication system and as a research lab, incorporating functions for analysing system use and participant activity (Hiltz & Turoff, 1981). These functions included tracking (which allowed moderators to see who had read what) and statistical features (which generated data on system use) (NJIT, 1986). The flexibility and recursiveness of EIES allowed both the conduct, study, and refinement of online communication – something that would come in handy for the SMSS, as we will see.

The SMSS was inaugurated in January of 1982 with a modest 8 participants (mostly from the US) and about as many faculty. At first the experience was mixed – the majority of seminars demonstrated a paucity of dialogue, a situation that, contrary to expectation, was common in early educational conferences.[77] As we saw above, the flexibility of conferencing systems came at the price of a high level of interface and operational complexity, which tended to alienate many first-time users and prevent the kind of active dialogue that the SMSS was meant to foster. That the participants were mostly busy executives made their having to learn a cumbersome new technology that much more detrimental to the programme's success. Faculty at WBSI soon realised that the difficulties of communication in this new medium necessitated a high degree of explicit reflection by and among faculty, staff and participants about the processes of online communication (Feenberg, 1989). This reflection was part of the seminars, and also the subject of a conference for seminar leaders, which acted as a forum for sharing successful and unsuccessful strategies and for developing pedagogical techniques (WBSI, 1982b). This conference became a regular teacher-training forum and acted as the crucible for articulating WBSI's online pedagogy, which was eventually distributed in a widely referenced moderator's guide (WBSI, 1989).

As WBSI's pedagogy was refined, the SMSS began to expand – one measure of its success. By 1984, it had over 150 students from two dozen countries, many of whom, after completion, continued on in the discussion groups as alumni or even returned as faculty (WBSI, 1990). As the programme expanded, WBSI exported its model of online education outside the SMSS. In

[77] The question of participation takes up almost the entirety of discussion in the first three months of NJIT's "Computers in Education" conference, and is often the starting point for moderator's guides published for educational conferencing in the 1980s. C.f., Brochet, (1985), Feenberg (1989, 1982), Hargreaves (1985), Kerr (1986, 1984), Richards *et al.* (1985), WBSI (1989).

1983, the Institute organised a conference on issues of productivity for the US Department of Commerce (WBSI, 1983a, 1982a), which included around 50 representatives from prominent American corporations as well as government departments and agencies. WBSI also proposed a training course for the US Army, who did not accept the proposal, but who sent several officers to the SMSS (WBSI, 1986c). The Institute also allied with the University of California San Diego (UCSD) to conduct research on the application of computer conferencing to literacy programmes (WBSI, 1986b), and later collaborated with UCSD again in developing the Advanced Management Network – a for-credit version of the SMSS (WBSI, 1990).

In 1985, WBSI began an initiative to embody their online pedagogy in an original software application – a terminal interface for computer conferencing called "Passkey". An version of Passkey ran on EIES beginning in 1985, but the following year, WBSI submitted a proposal to the Digital Equipment Corporation (DEC) to design a version for the VAX Notes conferencing system (WBSI, 1986a & b). The SMSS subsequently shifted from EIES to DEC's VAX computer and communication systems.[78] The general aim of Passkey was to simplify the interface for conferencing systems and make their use more intuitive for new or inexperienced computer users. But in designing the software, WBSI also included functions that related more or less directly to their online pedagogy, thus concretising the social mediations they developed for online education in a technical system. In 1987, WBSI completed the first stage of the DEC project – a

[78] An ancillary factor here might have been economic – the costs of EIES rose "steeply" with each additional user (Barney & Cross, n.d), something that might have curtailed the SMSS's growth.

report examining social factors in computer-mediated communication and suggesting design features for communication systems, including ones specifially tailored to education and based on the guidelines for online pedagogy developed through the SMSS (WBSI, 1987, 1989).

By 1987, the SMSS was ranked in Harvard's top five management schools in the US, along with Stanford, Aspen and Harvard itself (Meeks, 1987) – a gesture towards admitting the legitimacy of a model which, four years previously, Harvard had dismissed as a poor alternative to residential programmes (Gottschalk, 1983). Despite its success, however, WBSI and the SMSS suffered a number of ultimately fatal setbacks in the late-1980s and early-1990s. The development of Passkey became harried by disagreements over the desired nature and direction of development, and by some disorganisation in the technical team charged with programming and testing it. This slowed development considerably and by the end of the 1980s, with a range of similar applications either already available or in development – including DEC's own terminal interface for VAX Notes based on Passkey – the initiative was dismantled.[79] In the early 1990s, WBSI lost some major sources of funding, closing its doors in November 1991 (Feenberg, 1993).

5.5 Concretising Online Education: The WBSI Case

While the SMSS's success might appear in hindsight only to prove what is now common knowledge about the educational value of computer networks –

[79] It is less important here that the application failed than that an application like it was seen as desirable. The core ideas of Passkey have since been developed into a Web-based discussion tool called TextWeaver (www.textweaver.org). C.f., Feenberg & Xin (2002).

increased access and quality, user enthusiasm, the pedagogical benefits of networking – WBSI owed less to the technology than to their interpretation and active appropriation of the affordances and limitations of conferencing systems through particular pedagogical and social values. WBSI faculty realised that the information processing functions of network computers could effectively be placed in the service of social interaction. But while the *potential* of conferencing systems for interactive online distance education seemed clear, and while such systems had been used successfully for social interaction of an informal kind, it was not at first obvious what a viable online pedagogy would look like.

Like other experiments, WBSI established basic guidelines for the kind of online education they wanted to achieve (interactive, dialogic, participatory) and to avoid (CAI). They also specified two goals: “maintaining participation, and preventing the conference[s] from fragmenting into disconnected monologues” (Feenberg, 1982: 9). Pedagogically, *participation* and *coherence* were the key criteria for educational computer conferencing: they were values informing the practice of online education, goals to be achieved in it, and measures of its success. Participation reflected WBSI’s commitment to an interactive pedagogy, while coherence constituted a principle of unity whereby the conferences could take on the cumulative, directed form of educational communication. These values were initially understood with respect to abstract technical features – the emptiness of conferencing systems and their asynchronicity would compel participants to contribute, while the nature of conferences as spaces for discussion would allow for focused dialogue around topics, issues, or themes.

Identifying boundaries and general values was, however, a different matter from realising the pedagogical approach that WBSI had specified. This pedagogy had to be achieved through the appropriation of technical systems that had not been used in or designed for education. It was quickly discovered that, in practice, there were as many limitations to conferencing systems as potential benefits. What was more, these limitations arose from the same technical functions with which the benefits had been associated – asynchronicity, distributed communication, and text-based discussion. Against the benchmarks of participation and coherence, these features played an equivocal role, and were less in need of implementation than *negotiation* in the achievement of a viable online pedagogy. This process took place on two fronts – the development of *social mediations* (moderating functions) for the realisation of WBSI's pedagogical goals, and direct engagement in *technical innovation* (Passkey) embodying elements of the WBSI pedagogy. The following analysis treats each of these in turn.[80]

5.5.1 Defining Moderation at WBSI 1: The Problem of Participation

Distributed, asynchronous, text-based communication is the mode of interaction afforded by conferencing systems. Today, there is a standard idea of the educational advantages of this mode of interaction: flexible anytime/ anywhere learning, increased time for formulating considered responses, emphasis on critical reflection in text-based communication, increased

[80] It should be noted that pedagogical and technical developments at WBSI were not strictly separated. However, for the sake of simplicity, I begin with an artificial distinction between the two the better to show how online education emerged as a sociotechnical practice in the SMSS.

participation by the removal of the pressures of co-presence, enhanced potential for collaboration, flattening of educational hierarchies, etc.[81] In practice, however, these features were ambivalent in relation to education. Distribution and asynchronicity also meant the absence of a context and a devaluation of passive forms of participation. Situational cues and norms that contextualise face-to-face interaction – facial expressions, physical attitudes, a hand in the air – are absent in text-based communication, making it awkward and intimidating for new users (Feenberg, 1989). And so while pedagogical potentials were easy to identify, the ambivalence of the technology raised a number of pedagogical challenges for the SMSS. Nowhere were these challenges more evident than in the matter of participation in online discussion.

In CAI, a kind of participation is prescribed in the structure of the system as a shell for organising content and evaluating student performances (Rahmlow, 1980). In computer conferencing, by contrast, there are few prescriptions for participation at all, no content except the contributions of participants, and no replication of teacher functions to stimulate discussion. The system provides tools for interaction and communication but no more. In the absence of technical prescriptions or social norms for participation, interaction was by no means a given – and yet, participation was a basic requirement if even the simplest of foundations for education (demonstration of comprehension) was to be realised (Richards *et al.*,1985). Where a limited type of human-machine interaction is

[81] These qualities constitute something like a mantra for researchers and practitioners in online education today, to the point where they once again have come to appear as innate properties of technology, their social origins having effectively been buried in technical functions.

simply imposed in CAI systems, interpersonal interaction based on active participation – the fundament of online education at WBSI – is a very real *problem* in conferencing. It is not predetermined technically, but must be actively achieved.

The “emptiness” of computer conferences – their lack of “content” beyond the participants’ own messages – placed a high premium on active participation. The nature of distributed, text-based conferencing means that what counts as legitimate participation is very narrow – the active posting of comments and messages. However, the conferencing medium itself presented ample opportunity for participants to bow out or remain invisible – to merely read along and therefore to disappear in the eyes of other conference members. Passive participation of the sort regularly encountered in face-to-face learning is experienced in computer conferencing as absence (Kerr, 1984) – as failure of communication:

> […] response – any response – is generally interpreted as success while silence means failure […] The problem is aggravated by the asynchronous character of the medium […] This technical improvement, which makes rapid exchanges possible, also makes unusual delay a sign of rejection and indifference since there is no mechanical excuse for silence (Feenberg, 1989: 23-4).

Asynchronous, distributed, text-based communication displaces the contextual cues we rely on in face-to-face contexts, making it difficult to know how or even when to participate. WBSI faculty recognised that some analogue for familiar educational processes was necessary for active participation in virtual discussion: “[…] participants are uncomfortable unless they can act as if they were substituting writing for speech in some more familiar setting […] without a reassuring ‘communication model’ they are fearful of writing the wrong thing and withdraw into the perfect silence of a blank screen” (Feenberg, 1993: 192).

Early on in the SMSS, two such models were tried in attempts to achieve active participation. The first was rooted in the expectation that conferencing systems’ open structure required a “low-impact” moderator and that pure interest would drive interaction in the SMSS as it had in other online forums. Participants were asked, having completed a reading assignment, to craft a contribution based on their reading. The moderator had posted questions on the reading along with a fleeting introduction, the extent of which was “Greetings! Here we go!”. No context was given, no basis on which participants could understand what was expected of them, nor how they might engage in discussion; no norms were established by which they could understand their roles and responsibilities in this strange environment. And in the absence of the pressures of co-presence, there was no real compulsion to engage at all. Little participation resulted from this initial attempt. While the experience of special interest or hobbyists’ conferences had created a lot of enthusiasm for computer conferencing, these seemingly could not supply a viable model for its educational application, as one early advocate noted: “[…] it is easy to assume that all that has to be done is get an interesting conference under way is to announce the topic and invite the participants” (Brochet, 1986: 2). It was clear that educational conferencing required a greater degree of structure than did more informal appropriations of the technology.[82] The second model used in the SMSS to encourage participation came from the opposite direction, assuming that the emptiness of the environment needed to be filled with content that could provide a basis for participants' reactions. A series of lengthy messages, analogous to a lecture, was sent out and followed up with a set of questions and problems to which participants were invited to respond. Whereas the "low-impact" approach did little to diffuse the anxiety produced by the blank screen, this "high-impact" approach increased the presence of the moderator to such a high extent that it left little room for participation at all, but transformed the conference into a vehicle for the delivery of content, and defeated one basic pedagogical objective of the SMSS. Once again, little participation resulted.[83]

Given the failure of these initial attempts at interactive online education, it became clear that interaction was not going to emerge *sui generis*, and that something needed to be done "to overcome the apparent proclivity to treat this medium as a book to be read rather than like an electronic seminar classroom meant for active participation" (Kerr C303 cc14 [Hiltz], Feb. 21, 1982). Developing techniques for doing so did not turn out to be easy. One solution was the implementation of "software structures" that would force participation, putting "pressure on participants to behave in certain ways" (Kerr, C303, cc18 [Hiltz], Feb. 24, 1982). Technical features could be introduced that denied users the

[82] As one self-described "hardcore advocate of CAI" put it, "Do you want free-form thinking to self-generate structure? If so, I think you're […] optimistic" (Kerr, C303, cc7 [Richards] Jan. 28, 1982).

[83] A similar approach was used by a participant in NJIT's Computers in Education conference, who complained that of the 58 messages in his online seminar, he had contributed almost all of them, but who also complained that a technical limitation of EIES – a limitation on the length of messages to 57 lines – meant that he had to break his posts into 3 or 4 separate messages.

ability to read new messages until they had contributed substantively to discussion and had their contributions approved by a seminar leader.[84] The choice of participation would thus be delegated to the system. This elicited a strong reaction from some who saw it as a return to CAI, as a real sacrifice of the openness of conferencing in favour of centralised control, and as a subversion of the goal of collaborative learning espoused by WBSI, who rejected it for these reasons.

This technical solution was not, however, the only one on offer. The ConnectEd programme at the New School chose to adopt structural compulsions to participation familiar from the conventional classroom – namely, attaching a grade value to it and assigning a minimum number of contributions (two per week) (Meeks, 1987). While there was no obligation for students to contribute, it was expected that their conscientiousness about performance would be sufficient to promote lively dialogue. This strategy had the benefit of delegating decision-making power to the student rather than the system, avoiding the technocratic overtones of the technical solution. However it shared with the latter a dependence on extrinsic motivations for participation rather than promoting an intrinsic interest in the conferences, a key aspect of WBSI's approach to collaborative learning (Lean, 1983). While it would be naïve to hope that such an interest for all subjects lies dormant in all students, this strategy was unviable at WBSI for another reason – there was no evaluation of any kind in the programme

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[84] To prevent a deluge of variants on "I agree".

(Rowan, 1984). Where technical prescriptions were undesirable for pedagogical reasons, the structural solution fell outside the framework of the SMSS.

This did not mean that no solution was available. But the solution pursued at WBSI was of a different sort than a prescriptive strategy for achieving participation as a pedagogical goal – namely, the development of a set of communicative functions that corresponded to a specific and unique social subject in educational conferencing – the moderator. The moderator's role had been developed in non-educational conferencing, and it was one that offered a concrete solution to the problem of participation by formal analogy to the seminar leader in conventional education. Like the latter, "[t]he moderator must chart a path between two extremes: offering so little structure and direction that participants play it safe by remaining silent; offering so much structure and material that participants are effectively excluded" (Feenberg, 1982: 17). But unlike the leader of face-to-face seminars, the online moderator needed to chart this path in virtual conditions that called for specific kinds of communicative performances. In the early years of the SMSS, these were summarised in a set of moderating functions for encouraging participation – opening discussion, setting norms, recognition and prompting, and metacommunication.

In everyday social encounters, a rich variety of non-verbal and situational cues exist allowing interlocutors to contextualise their interactions. Greetings, for example, don't just communicate information; they create an opening into which interlocutors can move. Similarly, classroom layouts automatically set up a relationship between teachers and students, reaffirming their roles and providing a context for their interactions. In the real world, communication depends upon *situation* as much as *information*. Computer conferencing strips interaction of its familiar contextual elements – a situation dramatically captured in the black screen and blinking cursor. A great deal of explicit context needs to be provided up front just to ease participation at the outset. At WBSI, it was the task of the moderator to *provide context* by performing key communicative functions – setting the tone of interaction, establishing a framework for it, and soliciting introductions from participants – in order both to initiate the course, invite participation and solidify the social group (WBSI, 1989). The SMSS seminars thus began with explicit appeals for low-stakes introductory contributions from participants that would accustom them to online discussion and allow them to begin establishing a "presence" online.

The introductory functions performed by moderators could open conferences to participation, but this still left the question of how such participation was to go forward. For this to be resolved, basic *norms* and *expectations* for discussion would need to be established. This meant defining for participants the norms of tone and procedure, for length, style, and relevance of contributions, and for creating branch conferences around new discussion topics (WBSI, 1989). Setting norms also meant bounding the *time* of conferencing. In an asynchronous medium, participation is often distributed unevenly between frequent and occasional contributors. From an instructor's point of view, the difference may be experienced as one between active participants and "lurkers"; but from the learner's perspective the issue is different. One SMSS conference participant who was only able to access EIES infrequently, found that between his sessions the volume of messages had increased beyond his ability to keep up. A desire to participate was thus frustrated by the odd patterns of access and contribution typical of asynchronous dialogue. In the end, an appeal to the conference moderator led to the introduction of a “conferencing week” of five days to aid users in managing review and contribution of messages (WBSI, 1982c). This was not a pre-existing feature of the system – in fact, it contravened one of its supposed benefits: asynchronicity. But it was necessary in order to promote participation and realise WBSI’s desired pedagogical approach.

Cues situating interaction are not the only ones conferencing removes from play. It also removes tacit signs whereby we know how and when to contribute to discussion and gauge others’ reactions. Such signs are not “of” the message, but allow us to adjust delivery, recognise if the message is being received, and continue the flow of dialogue. Their primary condition is the instantaneity of face-to-face communication. In computer conferencing, however, instantaneity and co-presence become *delayed* instantaneity and *asynchronous* co-presence. While these were much-lauded features, in the practical contexts of online education, they were frequently in tension. In asynchronous systems, communication is only instantaneous from the perspective of the user in relation to the system, not in relation to other users. Delays in response thus both defeat “instantaneity” while increasing the anxiety involved in confronting the blank screen. At WBSI, it was quickly realised that when participants did not receive explicit acknowledgement of their contributions this could easily be taken as a rejection. As such, it was necessary to give participants “a sense of audience” (Kerr, C303, cc17 [Hughes], Feb. 22, 1982) through *recognition* and *prompting* of participant contributions (WBSI, 1989). At WBSI, this activity was distributed among participants though initiated by conference moderators, the idea being that interaction should not only be with a “teacher”, but with the group as a whole. This gave the communicative functions of recognition and prompting a larger significance in the normative structure of educational conferences.

The functions of opening discussion, setting norms, recognition and prompting all focused on problems of transforming mute texts into units of dynamic interaction. The fact that conferencing participants “focus on the message […] more than the messenger” (Harasim, 1989: 60) made these communicative strategies necessary in order to contain or contextualise the limitations of the technology. But achieving participation often required these limitations to be made explicit in the conduct of online education. Whereas in face-to-face contexts little communication about communication is needed, when talk is reduced to text, the chances of misinterpretation, miscommunication and thus failure of dialogue are relatively high. This meant that, in the absence of context, messages had to be clear and unambiguous. This was not only an instrumental necessity for efficient information transmission, but was related to cohesion in online groups: “disruptions are an important […] stage of true group formation. The real challenge lies at the level of learning how to “be” together, rather than simply focus on getting the job done” (McCreary, 1990: 123-4). Encouraging *metacommunication* on the challenges of conferencing let participants see their experience as both shared and definitive of the group as a whole. To support this while keeping focus in the seminars, WBSI created a “meta-conference” for everyone involved in the SMSS. Its purpose was to provide a common space for dialogue on the problems of online communication, to aid in the solidification of the group and to produce potential solutions that could mitigate these problems (Feenberg, 1993). In this, WBSI continued its legacy of open communication around problems of process and allowed a wide scope for problem solving that realised the latent potentials of technology within an existing social and institutional framework.

Where other initiatives suggested prescriptive strategies for participation, WBSI developed a set of social mediations for it which both leveraged the potentials and mitigated the challenges of conferencing systems, while creating a unique social role derived from the experience of face-to-face education. Faculty in the SMSS realised that, unlike interest-based discussion groups, educational computer conferences begged for the strong, active presence of a live teacher employing self-conscious pedagogical techniques designed to maximise interaction in an unfamiliar medium. Participation was not a function of the technology, but rather of the active appropriation and negotiation of abstract technical features in a particular context, for a particular end, and by a particular subjects – that is, an online teacher rather than a teaching machine. Establishing norms, providing background, and monitoring progress – standard dimensions of conventional education – were thus reinterpreted in computer conferencing as means of facilitating and sustaining educational interaction.

5.5.2 Defining Moderation at WBSI 2: The Value of Coherence

In the early 1980s, it was the popularity of computer conferencing as a medium for special interest forums that caught the imagination of educators. But appraisals of the technology's educational potential were also derived from the contexts of business and organisational communication – spheres that were central to the development of and that supplied a language for conferencing (Meeks, 1985). In such contexts, conferencing systems were seen as tools for introducing efficiencies into meetings and committee work, and to support focused communication among well-defined groups (Barney & Cross, n.d.; Cook, 1987; Romero, 1982). Online business meetings were so narrowly bound in time and so standardised in form that there may have been little concern about or need for active maintenance of cohesiveness in the flow of conversation in them. Where temporal limits and the control exerted by an agenda enabled communication to be well-defined, the benefits introduced by asynchronicity, distribution, and the archiving of messages were relatively easy to actualise. By contrast, the SMSS had to maintain a sense of flow in open-ended discussions taking place over weeks, months, even years. The problems associated with maintaining a level of coherence, movement and direction in conferences conducted for this duration were quite serious ones at WBSI.

As a pedagogical goal, coherence was related to two foundations of education: a sense of movement through and development of discussion in a field of inquiry; and the provision of a sense of unity among individual contributions to dialogue (WBSI, 1985a). Achieving coherence was also seen to relate to two features of conferencing systems: the ability to index and organise messages according to keywords, which could give a sense of relation among various contributions (Feenberg, 1989); and the archiving of the messages in the conference, which was seen as a means for building an organic, self-generated and shared "knowledge base" among participants (Kaye, 1989; Johnson-Lenz *et al.*, 1978). These features were believed to support coherence and progression in online education. In practice, however, this support relationship did not immediately or easily play out, in part due to the basic problems of asynchronous communication.

Unlike in face-to-face settings, there is no contiguous context for interaction in asynchronous media – the nature of such media is that "autonomous users determine their own participation rates and topics" (Kerr, C303, cc62 [Kerr], June 20, 1982), and that individual contributions occur out of phase, in a staggered, "rolling" present (Kimball, 2002).[85] And so, while conferencing supplied an environment for communal interaction, users confronted and appropriated it in the same individuated and idiosyncratic way that distance learners might engage with printed texts they received in the mail, resulting in a tendency for conferences to be fragmentary and multi-threaded. Moreover, the concrete nature of text-based interaction made this fragmentation visible to all, as was reflected in participants' contributions to the conferences

[85] This phenomenon was identified in WBSI's faculty training conference, where it was associated with tensions between the experience of time and the management of discussion in computer conferencing. C.f., WBSI, C348, cc583 [Henry], June 24, 1984.

and to the sense of coherence that was (or frequently was not) realised in them, as some early innovators noticed:

> comment after comment seems to proceed as if […] the previous comment doesn't exist and […] when associations with previous comments [are made] it is more as a springboard for a new idea rather than building on or critically evaluating the previous comment (WBSI C348, cc583 [Henry], June 24, 1984).

The realisation of online education as a cumulative process of working through ideas or building a common knowledge base was thus not a simple matter of using an abstract technical feature. So what was it that was going on?

WBSI faculty recognised that individual messages, despite a lingering presence as data on the system, had a relatively abbreviated lifespan as active elements in discussion. This lifespan could be traced by seeing how many subsequent messages were associated with or built upon an original message. They found that a message might elicit some direct comments, but after a few days it would reach a "point of exhaustion" and "get stuck in the past" (Feenberg, 1984). And this was a best case scenario – many messages were not associated with other messages at all, with the result that conferences often seemed like disjointed monologues. At the same time, the irregularity with which users accessed the system meant that they would often sign on to find a raft of new messages to sift through – an experience foreign to contiguous learning situations where guidelines for politeness and speaking in turn usually prevent people from talking over or interrupting one another. In asynchronous media, however, there is no direct experience of talking over or interrupting, since the accumulation of "talk" is mapped by the system in a linear fashion that suggests (perhaps falsely) order and flow. This disjuncture between system function and social practice illustrates how a technical feature of apparent benefit was experienced in practice as detrimental to a socially defined goal. If everyone used the system according to individual convenience, any semblance of coherent discussion would quickly disappear. The problems that WBSI needed to address, then, were the fragmentation and information overload that derived from unbounded user appropriations of conferencing. As with their approach to participation, they addressed these problems, in part, by developing communication functions condensed in the figure of the moderator. Two of these – *setting norms* and *metacommunication* – were also addressed to issues of participation, while two others – *agenda-setting* and *weaving* – were specific to problems of coherence (WBSI, 1989).

A lack of situational norms in conferencing contributed to problems of coherence in virtual discussion: how often should contributions be made; should contributions *not* be made at particular times; how should contributions relate to each other; how could distributed individuals see themselves as part of a group; what should the “time” of conferencing be? Such questions had little to do with technical functions, but a lot to do with the establishment of a normative context in which those functions could effectively be understood and appropriated to meet pedagogical goals. At WBSI a variety of such norms were suggested, implemented and compiled into basic frameworks for the social mediation of online education. Some of these had to do with the structure of discussion, while others related to the content of conference comments – all aimed to establish guidelines for engaging in and contributing to an educational conference “as a single text with many authors rather than a collection of singly authored texts” (Feenberg, 1982: 7). For instance, a five-day conferencing week was established in response to information overload, reducing the volume of contributions and making it easier to focus discussion. Other norms included those governing the creation of keywords for subject-headings that could allow an easy apprehension of thematic discussion threads and that clearly associated messages with one or more topic (WBSI, 1982b).[86] Setting these norms was a social activity undertaken by the moderator to place the use of the technology in context for those attempting to gain some educational value from it.

The contextual elements of educational communication also include standardised structures for managing time – the syllabus, the 13-week semester, the class schedule, the work week, the 2-hour lecture. In the evangelical discourse these are interpreted as authoritarian strictures on learning which it is the task of asynchronous technology to overcome. But in the experience of the SMSS, it was precisely the lack of such strictures that created problems for participation and coherence. Rather than obsolescing them, new technology seemed to necessitate their extension in order to lend online education coherence and cohesiveness over long periods of time, as was noted in the WBSI faculty training conference: “Agenda setting is necessary to centralise discussion around a few themes. Entry points into these themes must be carefully selected and delivered in such unambiguous forms that participants

[86] At this point, there was no feature that included the subject line of an original message automatically in the reply and that therefore strongly associated one message with another.

succeed in relating to a single discussion rather than each carrying on a monologue. Interaction and direction go hand in hand on EIES" (WBSI, 1982b). Defining a succession of topics, a momentum for moving through readings, defining when discussion on one topic will end and be placed in an area subsidiary to the main conference – these functions were established as basic to the moderation of educational conferences. And all replicated basic tasks of conventional instructors (WBSI, 1989). Through them, participants would be oriented to exactly what would take place when, giving concrete temporal definition to a space whose "timelessness" was a serious challenge to the education process.

But, as noted above, overcoming the problems of online communication was also a matter of focusing explicitly on them. The absence of situational cues establishing movement from one topic to another, guiding discussion, providing contextualisation for participants' contributions, and ensuring the transparency of interaction – which we have seen was a problem for attaining and maintaining participation – also proved challenging for realising coherent discussion. The high risk of miscommunication in conferencing was a tax on coherent dialogue. This was not only a feature of the dialogue itself, but also of the degree of stability in social relations between group members. The more established these relations were, the more directed and attentive online interactions became (WBSI, 1987b). The pre-SMSS meeting at LaJolla served to establish some basic social context for their online interaction, easing distributed communication by giving participants a concrete foundation for forming ongoing virtual relationships.[87] This in itself, however, did not allay the tendency towards fragmentation typical of early computer conferencing, and so a number of metacommunicative functions were also established to aid the achievement of coherent communication in distributed groups. Reflexive metacommunication drew attention to those aspects of online discussion – information overload, the risk of monologuing, the problems of linking and associating messages, etc. – and in doing so, could engage participants in an awareness of their position in a group communication environment in which they were experientially alone. It was the task of the moderator to identify tensions in the communication process, highlight these, and spearhead discussion around potential solutions to them amongst the group (WBSI, 1987b). The WBSI "meta-conference", mentioned above, further served to ensure that meta-communication did not overwhelm the substantive discussion in the seminars.

The multi-threadedness of online dialogue was also experienced by early innovators of online education as a serious problem which strategies of establishing norms and agenda-setting were implemented to manage. However, as many educators know from experience, multi-threadedness is not only to be interpreted as fragmentation – it is also a *pedagogical opportunity*: "Each strand [in a conference] represents a participant's personal path into the conference. To arrest the free flow of such a conversation with frequent calls to order is likely to produce only vexed withdrawal" (Feenberg, 1993: 192-3). Multiple comments covering various angles on an issue, which can be seen from one perspective as

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[87] This strategy was also used in OISE's early experiments.

fragmentary, can thus be seen, from another perspective, as *leitmotifs*, whose implicit relation to each other and to a general topic can be drawn out through explicit reflection. And so the challenge was to maintain coherence in discussion while enabling multi-threadedness in order to promote collaborative learning. As one of WBSI's staff put it: "If many [threads] were attended to simultaneously, we might actually improve on classroom discussion" (Kerr, C303, cc22 [Icenogle], Feb. 25, 1982). This challenge led to the development of one of the most pedagogically important moderating functions – weaving.

At WBSI, weaving was discovered as the "key to online pedagogy" (Feenberg, 1993: 193), ensuring that online discussion could respect the individual contributions of participants while also linking those contributions back to pre-established course themes and directing the discussion in a progressive fashion. Weaving essentially involves the intermittent review and summary of contributions, the identification of either explicit or implicit commonalities between them, the specification of the contribution they make to a shared understanding of a theme, issue or topic to which they relate, and the clarification of how they tie in to the development of discussion as a whole. As a pedagogical activity, it enhances participants' progressive understanding of the development of their ideas, aids their sense of relation between ideas, and solidifies the bonds between participants by fostering interpersonal connections:

> Weaving comments are essential to giving on-line groups a sense of accomplishment and direction. They supply the group with a code for framing its own past, and thereby establish a common boundary, shared by the whole group, between past, present and future […] By reviewing what has been said so far, the moderator supplies a unifying discourse, interprets and integrates participants'

> contributions, and perdiodically 'retotalizes' the unfolding discussion by drawing its various strands together in a temporary synthesis that can serve as a starting point for the next round of discussion. (WBSI, 1989: 7)

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The experience of online education at WBSI posed specific challenges to staff, faculty and participants based on disjunctures between the perceived benefits of the technology and their practical value relative to a dialogic pedagogy. It was discovered that EIES contributed as often to withdrawal as it did to the promotion of dialogue. And it fostered the fragmentation of communication as often as it upheld unity in discussion. While the temptation to implement technical solutions to these problems was strong, WBSI chose to develop positive social functions – opening discussion, setting norms and an agenda, recognition and prompting, metacommunication and weaving – that were distilled into a particular social role – that of the moderator. The significance of this strategy is that a set of functions for the social mediation of educational conferencing were delegated, *as a function of the appropriation of technology within a particular pedagogical framework*, back to professional human subjects who took on active roles as instructors in online education. Active leadership of a similar kind as that found in the seminar classroom was seen as a basic requirement of interactive dialogic online education, and as a guarantor of the twin values of participation and coherence that grounded online pedagogy in computer conferences, as many early innovators noted:

> […] if a group leader went on vacation or otherwise disappeared for more than a week at a time, the conference activity tended to become disorganized and then drop off sharply. The group

> conferences need a strong, active leader to keep the discussion organized and moving […] (Hiltz, 1981: 131)

> The nature of the medium […] create[s] the need for […] active leadership. The lack of adequate leadership is one of the factors sometimes responsible for conference failure; unless a moderator sets an agenda and keeps the group working toward its goal, nothing much will occur. (Kerr, 1984: 5)

This recognition had important impacts on the way in which the social relations of online education were imagined in the early experiments, as well as in the articulation of both pedagogical models and technical systems developed to support such models.

5.5.3 Implications and Diffusion of Moderation in Early Online Education

At the outset, two assumptions guided the pedagogical strategies employed by SMSS seminar leaders – that the spontaneous interest seen in non-educational online forums could easily be replicated in educational contexts; and that teaching techniques modelled on familiar classroom practice would be appropriate to the new medium. These assumptions were quickly defeated. Unlike interest-based online forums, educational conferencing begged for the strong, active presence of a live teacher employing a self-conscious pedagogy. And unlike in the traditional classroom, educational conference moderators had to be attentive to the peculiarities of the technology in the realisation of a pedagogy based on participation and coherence in a forum where many of the latent structures of social interaction are missing. Successful online education was seen as a function of the moderator's ability to achieve presence and invite participation, to maintain coherence and direction, and to contextualise, both intellectually and socially, a highly ambiguous communication environment. Moderators had to take on contextualising, prompting, synthesising and facilitating functions and an active leadership role so as to provide enough structure to engage participants and enough openness to admit them into dialogue (Feenberg, 1989; Kerr, 1984).

Providing context, establishing norms for interaction, outlining a programme and a set of goals, monitoring progress – standard aspects of teaching in the off-line world – were thus reinterpreted in the conferencing medium as means of sustaining educational interaction. Contrary to the division between “process” and “content” that informed both CAI and critical assessments of the impacts of the computer on the teaching profession, it was recognised at WBSI that moderators could not carry out these functions without being experts in an academic field. Prompt response to questions and contributions were needed in order to sustain participation in and the coherence of dialogue in a context that tended towards passivity and fragmentation. But in the SMSS, dialogue consisted of humanistic inquiry into philosophical, social and political-economic issues of information societies. This meant that response could not be a mechanical activity, but called for an ability on the part of the moderator to evaluate and synthesise abstract concepts, give historical context, and survey arguments in a field of inquiry.[88] These functions could not be carried out at a lower level of professionalism and skill than that held by experts in scholarly disciplines. Educational computer conferencing could not rest on the deskilled

[88] For an account of the relation of communicative and relational functions in educational conferencing, see Xin (2003).

labour force that was a possibility with CAI, but supported a form of online education that required an extension of the professional instructor’s role into the new medium:

> The personality and commitment of the moderator has [*sic*] great bearing on the success of the conference. Knowledge of the subject area and the time to devote to the conference are only some of the qualities to look for […] The abilities to take many tangential conversations and bring them into focus, and to bring out the talents of the group are invaluable. (WBSI, 1989: 1)

Far from displacing the instructor through processes of technical rationalisation, dialogic, interactive online education through computer conferencing imagined the technology as a platform for articulating professional subjectivity and expertise in new ways. As it was approached at WBSI, then, online education comprised “an extension of the personal and social psychology of learning” (McCreary & van Duren, 1986: n.p.).

WBSI faculty realised, however, that in the conferencing medium expertise bore a different relation to the education process than in conventional classrooms. In order to maintain a coherent flow of dialogue and high levels of participation, the contextualising, synthetic, and reflective activity of moderators had to be more “punctual” than persistent, but no less incisive than in traditional educational contexts. Perceptions of the limitations of the technology for dialogic pedagogy guided how subject expertise was brought to bear. Moderators needed to guide and facilitate discussion based on the contributions of the participants, and so expertise took on a quality of responsiveness that it does not always have in information-delivery models of computer-mediated education. With the computer in charge rather than the teacher, “expertise” is programmed into the system before the education process begins and students simply respond to it as unalterable content. Far from playing out an agenda of deskilling and commodification, however, WBSI’s model of online education innovated an active social role for the instructor in response to the specific affordances and constraints of the conferencing medium.

This approach to online education was by no means limited to WBSI. Many early experiments came to roughly similar understandings of the role and function of online instructors, and developed similar social mediations that guided how technical functions were appropriated and how the practice of computer-mediated education was articulated. For example, a moderator’s guide for the Participate system lists functions resonant with WBSI’s: setting context and norms, monitoring members, encouraging participation, refining, summarising and weaving discussion, and explicitly recognising the constraints of the medium. These functions were employed to realise a basic pedagogical goal: “to get as many people in the conference to participate as much as possible as long as that participation is useful” (Hargreaves, 1985: 2). For early innovators at NJIT, the moderator “encourages participation from all members, moves them to consensus, and includes all those interested in the formation of policy” (Kerr, 1984: 5). NJIT’s moderators guide reflects the idea that successful educational conferencing requires strong leadership, and arrives at a similar set of social mediations for online education condensed in the moderator’s role: establish expectations for participation; administer the membership of the conference;

create and foster conference branches as discussion develops; spell out norms for interaction; specify responsibilities and roles; synthesise comments; clarify problems with communication; and track the development of the group as a whole (Kerr, 1984). Recognising conferencing as "a vulnerable […] medium" *viz.* participation and cohesive interaction, educators experimenting with CoSy also articulated a role for the moderator in the structure of educational conferences (Brochet, 1985). Agenda and norm setting were prevalent, but were extended beyond the context of interaction style and the general structure of contributions to include definitions of pedagogical goals and learning outcomes. Functions of weaving, metacommunication and prompting were also included.

On the whole, the practical experience of educational conferencing was built, in its various instances, on the goal of achieving a dialogic online pedagogy, and extending to distance education forms of social interaction familiar from the classroom. In trying to achieve this goal, and in the absence of clear precedents, early experiments focused on a set of abstract functions with respect to which they identified general expectations of the pedagogical value and meaning of the technology, and on the basis of which they constructed a general framework for their initiatives – a rejection of CAI and an appeal to conventional education processes, roles and relations. They established as measures for their success two basic requirements – participation and coherence – through which they could chart and understand what they were doing, the role of and the dynamics introduced by the technical systems, and the strategies they adopted in realising online education. Trial and error led these initiatives to realise that neither the technology itself nor familiar pedagogical techniques were enough to realise the kind of online education they sought to develop. Success, they discovered, resulted from responses balancing, on the one hand, the limitations of the technology and, on the other, the social values, goals and priorities they had espoused. The result was the development of active social mediations condensed in a new kind of professional subject – the online moderator – whose role and position emerged out of the negotiation of abstract technical functions in the realisation of a dialogic online pedagogy and the need to adapt traditional seminar dialogue to a new communications environment. Moderation, wherever and however its development took place, was a key component of early online education as a socio-technical practice – as a practice whose realisation called for a particular configuration of technical and social elements within a specific pedagogical framework and set of assumptions about the role of the instructor in the education process, online and offline.

But WBSI also saw that the development of moderation, while an important step towards realising a dialogic, interactive online education, was not in all cases enough. This was, in part, because the difficulties posed by the medium for active participation and coherent dialogue were not confined to the sphere of appropriation, but were, more fundamentally, associated with the design of the conferencing systems themselves. Encouraging participants to adopt a communication model from conventional education was thus only part of a necessary strategy in developing online education:

> Participants in teleconferences typically […] [reduce] the strangeness of the medium by agreeing on a familiar system of

> roles and rules imitated from everyday life. To employ a communication model in teleconferencing, it is necessary to translate […] some of these roles and rules into groupware. (Feenberg, 1982: 7-8)

And so, in order to meet their pedagogical goals, WBSI would have to go beyond the adoption of social mediations from conventional education and to engage more directly in the process of designing technical functions that could support those mediations more effectively than existing conferencing systems did. It was this recognition that led WBSI to engage in what was to be a major development initiative – the creation of an original application for educational computer conferencing based on their online pedagogy.

5.5.4 From Social Mediations to Technical Functions: The Development of Passkey

The analysis presented so far re-inscribes the traditional antinomy of human and machine. But this distinction, useful as it is in highlighting interpretative dimensions of the appropriation of technology, does not fully describe the WBSI case. The moderator's role was defined through a set of functions to be performed towards realising a dialogic online pedagogy. It was quickly realised that these functions, in order to be effectively performed, would need to be complemented by technical features that supported them and that facilitated WBSI's pedagogical model. And so, as faculty and staff worked out social mediations for online education and condensed these in moderating functions and roles, it became clear that they would also have to engage directly in the development of computer conferencing if their enterprise was to succeed. The result of this engagement was an original software application designed specifically for educational conferencing – Passkey. Designed with the experience of the SMSS in mind, Passkey was a technical expression of the social, pedagogical and programmatic framework developed over the first four years of the WBSI experiment. It provides a useful counter-example to critics of online education, illustrating not an acquiescence of human agency to technology, but the adaptation of technology to the needs of a specific user group. In what follows, I will first describe the technical challenges with respect to which Passkey emerged and then outline the process of its development and provide a description of its basic structure.

One problem of early conferencing systems was the complexity of the interface. This looked much like a DOS interface, with several menu options, a blinking cursor, and a set of command codes for operations listed in a help menu or a brochure. EIES, the system used in the SMSS, was no exception here: instructions for signing on took up an entire page; and once online, users faced lengthy sets of commands for things as simple as writing, editing, printing, sending, receiving, and attaching documents (NJIT, 1986). The size of the user manual did not aid the fact that the information it contained was relatively abstruse compared to the natural language and iconic interfaces of today. The need to memorise non-intuitive commands for the performance of what in other contexts were intuitive social acts set a high bar for communication. As noted above, however, EIES' complexity was of a piece with its flexibility. EIES was "organic" in that features could be added in response to needs identified by the communities it served. But doing so meant adding new menus and commands, to the point where flexibility reflected the competencies of designers rather than the interests of students and teachers for whom technical features should have been transparent means to a socially defined end.

The problem of interface complexity was compounded by the fact that most early conferencing systems were designed to serve generic communication purposes, as staff and faculty at WBSI recognised early on in their experiment:

> [C]onferencing systems are not yet designed as social environments […] Like any truly new product, CMC must be conceptualized first through metaphors to existing products […] these metaphors are misleading because they encourage designers to view CMC as merely another communication technology, competing with other technologies such as phone and mail and available as a travel substitute. From that standpoint, the CMC designer's task appears to be similar to that of the designer of a telephone, who must achieve a general adaptation of his device to the relevant human factors involving hearing, keypads, and so on. Just so the typical CMC designer seeks ideal, generically adapted solutions for 'human' users, rather than socially specific solutions for this or that type of user engaged in this or that type of activity. (WBSI, 1987: 5-6)

The problem with this approach to system design was that, unlike the telephone, whose generic functions adapt well to different contexts (c.f., Rowland, 2006), the peculiarities of text-based communication tended to highlight conferencing's limitations when employed for specific purposes such as education. Far from being generic, communication differs from situation to situation and is, in practical experience, *defined* by the situation in which it occurs. In education, communication is a fundamentally different kind of process than it is in dinner-table conversation, business meetings, or debate in public forums. The generic interpretation of communication in conferencing systems failed to take these differences into account. The social and pedagogical functions of moderation answered to and in part derived from this situation. But they also acted as a framework within which certain design features became desirable, as we will see in a moment. These general problems of conferencing systems were attended by specific ones relating to the way the different systems ordered the communication process. So diverse were these latter that I will mention only two aspects of EIES that were of key concern at WBSI.

First, in EIES the conferencing software – the brains of the communication system – resided on a central host accessed via dial-up from dumb terminals using modems running at no more than 1200-baud (WBSI, 1986b). Control over the interface and functions like archiving was delegated to the host and not subject to customisation. As a result, manipulation of conference content through indexing or searching features tended to take time and thus (given the high rates phone companies charged for access) to be expensive (WBSI, 1986b). The time and expense incurred in using features that otherwise would be of great pedagogical value led conference participants to use them infrequently if at all (Feenberg, 1993). Here, a generic definition of communication functions (access to and manipulation of content) impeded the realisation of their potential benefits through the mode of their technical organisation. Moreover, users were not given data storage space on the host, and were most readily able to engage with content in terms that were either momentary (i.e., immediate and fleeting products of searches that used up costly connection time) or determined by conference leaders and administrators (and therefore not necessarily conducted in terms that reflected the interests of participants). This made indexing and searching either costly or virtually useless to participants' own self-defined engagement with information on the system (WBSI, 1986b).

The second feature of EIES that turned out to be problematic for WBSI was the way it structured the conferences themselves. EIES ordered comments chronologically, so that when users signed on they would be presented a list of comments beginning with the most recent (NJIT, 1986). This feature reflected a temporal rather a thematic bias in conference structure, which meant that it could not easily handle thematic connections among contributions (Cook, 1987). This was a major problem for WBSI and other early experiments: "[…] in an educational setting where students are trying to learn how to do something, or how something complicated works […] itinerary gets in the way somewhat by interleaving the multiple strands [of discussion]" (Kerr, C303, cc101 [Lee], March 29, 1983). The value of thematic organisation became clear in the SMSS as evidence of the multi-threadedness of discussion came to light and as the weaving function developed. Weaving – perhaps the key practice in interactive, dialogic online education – would benefit from a technical capacity to support and reflect the work of synthesis and interconnection in the structure of the conferences. By building in branching features, messages could be manipulated to reflect thematic considerations and the search and indexing functions of EIES employed so as to support WBSI's pedagogical model.[89]

[89] Branching was a feature of Participate, allowing for multiple threads of discussion to be created and represented in a single conference; Confer, for its part, contained a "footnote" function that allowed multiple threads to be represented, but not necessarily fleshed out (Cook, 1987).

Because of the intrinsic link between these problems and technical features, it was clear to WBSI that, while moderating functions helped to deal with the problems of participation and coherence they encountered, a full solution would also necessitate intervention and innovation in system design. It was on this basis that WBSI undertook to develop an original software application: a user-interface for educational conferencing called Passkey. Passkey was the product of ongoing research at WBSI into the social factors involved in computer-mediated communication – a research programme that grew directly out of their experience of online education (WBSI, 1986a &b, 1987). As such, it was designed specifically to answer to the kinds of problems outlined above – the complexity of conferencing systems and problems with certain design features.

Initially conceived in 1984, Passkey was motivated by one of the more troubling problems encountered in the SMSS: convincing busy executives to spend time learning a complex interface for online communication (WBSI, 1986b). Serving a function similar to contemporary Web browsers, Passkey was a terminal interface overlaying the deeper command structure of EIES and providing more intuitive controls for communication functions (WBSI, 1986b; Vallee, 1986). Its effect, like the browser's for the Web, was to make online communication more accessible, obviating the need to rely upon abstruse commands for simple operations. The main menu displayed four options corresponding to general functions – a main menu for account configuration, connection and help functions; a writing menu with a text editor and functions for posting messages and attachments; a reading menu for access to and navigation of conferences; and a data disk menu for accessing, searching and indexing messages stored in local memory (Vallee, 1986). The clear labelling of functions according to common actions and their association with numerical keys (from 0-9) as opposed to complex command strings helped to simplify the EIES interface, and thus contributed to rendering communication through it much more transparent for inexperienced users – placing more focus on interaction and less on the challenges and difficulties of the technical medium. This rationalisation of user interaction with technology, while limited by the absence of the kinds of graphical features available today, was nevertheless a great step forward in socialising computer networks and adapting them to social practices like education.

The creation of software that simplified the use of existing systems not only met the need for transparent communication in educational settings. It also aided processes of internetworking between various conferencing systems. In the early 1980s, a number of systems were available – EIES, Participate, Notepad, Caucus, Confer, and CoSy – in addition to a variety of emerging online services like The Source, The Well, Usenet and Bitnet (Cook, 1987; Rowland, 2006). While most of these derived from innovations made by Murray Turoff and Jacques Vallee (Hiltz & Turoff, 1978; Vallee, 1982), they were all distinct from one another and developed in relative independence both technically and socially (Meeks, 1985). Many, like The Source and EIES, had served as testing grounds for educational networking. Others, like CoSy, had been developed in academic settings for the purpose of educational communication (Meyer, 1999). Still others were used in a variety of educational initiatives – Participate in the ConnectEd programme, NYIT and OISE; Common Ground at the Harvard Graduate School of Education; Confer at the University of Michigan, etc.[90] But because the systems and the networks they supported were separate, the only way to access the resources and communities they contained was by subscribing to them all – something that increased both the complexity of networking (because of the new commands that would have to be learned) and its cost. Passkey circumvented these problems by providing a flexible interface that could be adapted to different conferencing systems (Vallee, 1986). One of Passkey's menu options let users switch between systems in a relatively seamless way, with only minor differences in the Passkey menus. Adaptations of Passkey were not made for every online service, but were available for the major ones – Participate, Confer, The Source, Notepad, EIES and VAX Notes (Vallee, 1986; WBSI, 1986b). Passkey thus resolved differences in interfaces and command codes in a single platform that could interpret them all, rendering the process of moving between conferencing environments much simpler, enhancing interactivity in the various educational settings in which conferencing was used, and opening a diverse set of educational resources to users on a variety of different systems.

Simplifying communication, however, was only half the battle. If educational conferencing was to succeed, the software had to reflect the needs of individuals and groups involved in education as a particular kind of interactive social process. This meant a critical discernment of the features that were of

[90] C.f., Davie (1989), Deutschmann *et al.* (1985), Hancock (1985), WBSI (1988a).

pedagogical value, and the specification of teaching and learning processes that such features would be designed to support. In their initial funding proposal for Passkey, WBSI recognised that “[t]he value of software […] for different groups may vary widely. For certain groups the addition of one more feature beyond those commonly available […] may have little importance, while for other groups there may be a specific […] feature that makes the difference between success and failure” (WBSI, 1987: 11-12). For example, the value of a feature allowing moderators to track the frequency and rate of user access, to show what messages had not yet been read, and so on differs in different contexts. In project management, this feature might not be valued, since emphasis may be less on the process than on the product of interactions. In education, by contrast, such features are key to allowing moderators to assess student progress, to judge when to formulate weaving comments, to ensure that all participants are progressing together, and to intervene where a participant may be falling behind the group (WBSI, 1987). Where participants are not visible to one another, where user-statistics are among the only ways of charting the group’s progress, and where the performance of tracking functions has an identifiable value pedagogically, such functions should be included in the design of educational software.

Passkey’s educational features grew more or less directly from the experience of the SMSS and the moderating functions developed to support dialogic online education. These features ranged from comment headers that included keywords as subjects and that thus facilitated thematic searching and collating of messages (making conference archives more available as active resources), to reply features that associated a reply-message with an original one, to a branching structure to facilitate multi-threadedness and weaving, to the extension of user privileges to allow participants to create branches or branch conferences around particular sub-themes or topics, to subject indexing features enabling participants and moderators to follow different threads and weave these threads together (Feenberg, 1993; Vallee, 1986; WBSI, 1987, 1986a). WBSI's experiments with this latter feature failed for lack of sufficient computing power, but subsequently inspired the TextWeaver project, which builds on many of the insights gained in the SMSS and other early conferencing experiments (Feenberg & Xin, 2002).

Beginning as an idea for a new kind of conferencing system, evolving into an application for educational conferencing, and ending as a flexible interface for networked education, Passkey was both an integral aspect of the development of online education at WBSI and a cogent example of the convergence of social and technical factors in the formation of online education. The negotiation of the limitations and challenges of conferencing systems led WBSI to identify communicative strategies for conducting online education, which they summarised in the role and functions of moderation. These then acted as a basis for developing technical features that could be mobilised in online education as it was defined pedagogically. Passkey was thus not just another tool applied to education, but a powerful example of how a pedagogical orientation and set of techniques, strategies and values could be embodied in a concrete technical form. The SMSS supplied a practical basis out of which a technical code of online education took shape, while Passkey became the concrete expression of that code in an educational technology. The WBSI case shows that online education need not be a technocratic imposition, but can embody the values, aims, interests, and interpretations of educators.

5.6 Conclusion: Technical Codes of Online Education

This chapter has tried to sketch the background against which, in the 1980s, a mode of online education developed – at the levels of pedagogical practice and technical form – that stood in dramatic contrast with CAI. The differences between these two kinds of educational computing are obvious. In place of CAI's focus on information delivery, conferencing foregrounded dynamic social interaction. In place of a product-oriented education capable of being broken down into functional moments, conferencing offered a process-oriented education in which technical functions were to be appropriated for pedagogical aims. In place of CAI's conformity to an institutional interest in cost-savings and economies of scale, conferencing relied upon professional instructors mediating critical dialogue in small groups. Instead of grasping the information processing capacity of computers to replicate teacher functions, conferencing grasped the communication capacities of computer networks to extend the seminar room as an interactive space.

These differences were not simply the product of formal distinctions between two technical systems. The dissimilarities between the systems expressed deeper divisions in the conception of education as a process, and of online education as a novel mode of technical mediation for that process. Just as CAI was a rational extension of the educational meaning and value of the computer within an interpretative framework derived from distance education, so educational conferencing at WBSI corresponded to a technical code that took shape out of contingent choices, values and goals in the realisation of online education. The idea that computer networks opened a new area for the development of the computer based on interpersonal communication led early educators both to examine the abstract potentials contained in its features, and to a realisation that CAI was not the only educational application of it, nor the most desirable one. The computer did not have to follow the path of earlier educational media such as film, radio, and television, since it introduced something unique – a capacity to host group interaction. This allowed early innovators to specify a field for online education's development that explicitly excluded CAI and its reliance on commodified information delivery and acquisition, deskilled mass production, and its tendencies towards the automation of teaching.

WBSI thus adopted a critical orientation to online education: one defined not by a rejection of technology, but by the definition of a space in which a sociotechnical practice could grow in relation to values, interests, priorities and goals that were, from the outset, in alignment with conventional conceptions of professional organisation and pedagogical practice. Within this space, the experience of online education could take on a particular meaning – aspects of the process were highlighted as effective or problematic, while certain technical features were seen to bear particular challenges. And within this space, the strategies developed to respond to these challenges could also be delimited. These strategies involved innovating social functions for the mediation of technical systems rather than the innovation of technical functions to displace human skills or prescribe human action and choice. WBSI's moderating functions were a cogent rejection not only of the form of online education decried by critics from Lyotard to Noble, but also of the kind of critical response they represented. The development of moderation showed that a form of online education was possible in which the professional skills of faculty were required, in which information was a means to the end of critical discussion rather than an end in itself, and in which technocratic values of efficiency, cost-effectiveness, mass production, economies of scale, division of labour and automation were displaced.

Of course, as with CAI, these features of educational conferencing were not intrinsic to the technology. They were a product of the formation, through experience, of a technical code for online education, the elements of which were:

- A recognition of the centrality of communication and interaction to education and a relegation of information to secondary status as a means of interaction;
- A blurring of the boundaries between distance and conventional learning in terms of pedagogical models and techniques;
- An ideal-learning situation based on dynamic small-group interaction and modelled on the face-to-face seminar;

- A rejection of information-delivery models of computer-mediated education;
- Pedagogical approaches focusing on social interaction and on technical structures as mediators of that interaction;
- Organisation of learning around key themes and the definition of an intellectual terrain to be explored;
- Emphasis on education as a process rather than as a product, and on enhancing access rather than increasing production;
- The development of communicative roles and strategies in response to technical challenges and the subordination of technology to pedagogical goals;
- An orientation to technology as an environment for human encounters rather than as a functional equivalent of the teacher as an information processor;
- A reliance on organisational models based on conventional education, with a professional instructor guiding the activities of learning groups.

These guidelines comprised a technical code on the basis of which online education took shape in early conferencing experiments. This code was not merely a set of ideas in the minds of those involved in these experiments, but defined a pattern of concrete realisation in online education – both in its day-to-day practice and in the designation of desirable features of educational software. The development of moderation shows how the active negotiation of technical forms through social values can result in a unique sociotechnical practice, while the development of Passkey shows that the historically emergent definition of a sociotechnical practice can shape a concrete development path.

In the last two chapters, I have tried to show that, at its inception, what came to be called “online education” was capable of two different realisations based on two distinct programmes for its design, development and practice. These realisations are expressed in CAI and educational computer conferencing. In the 1980s, these two iterations of online education were co-existent – as much as they may have appeared at the time as alternatives, or even as opposites, they were equally available as models for what online education could be. As co-existent possibilities, they constituted poles on a continuum between which the concrete practice of online education came at that time to be suspended: CAI, based on a pedagogy of commodified information delivery and computer conferencing grounded in an interactive dialogic pedagogy. In each case, a distinct arrangement of a similar set of technical and social elements were configured to achieve a desired “fit” between a technical practice and an interpretation of the conduct and context of that practice. And in each case, it was ultimately not technology, but the contingently developed and heterogeneously deployed technical codes guiding the determination of this fit that comprised a politics of online education’s development.

The political implications of these codes should by now be clear. One supplies a basis for the kind of restructuring envisaged in the evangelical discourse – separating process and content and intensifying the hierarchical division of labour in higher education; focusing on the production of pre-packaged educational commodities, on the realisation of efficiencies in their production and economies of scale in their marketing and consumption; predicating pedagogy on the structural and technical requirement of cost-savings; pushing the innovation of technical functions that replicate the role of professional instructors; transforming social interaction between students and teachers into pre-programmed interactivity embodied in machines; applying a logic of industrial production to education and consolidating “operational autonomy” in an independent managerial post. The other presents a different possibility: a fusion of process and content in the realisation of a dialogic pedagogy; the mobilisation of familiar professional roles and functions in the conduct of critical humanistic education; the involvement of an array of actors, including students, in the determination of a viable online pedagogy and a technology designed to support it; the identification of technical functions modelled on the seminar room as a space for social interaction; and the promotion of transparency and usability in the medium to facilitate communication and community formation. While each of these codes bears political implications that can be interpreted out of their actual forms and implementations, it is ultimately in the conflicts, struggles and negotiations through which realisations of online education favour one or the other that a politics of online education rests. Not the adoption of computer networks as educational media, but the explicit rejection of CAI for their appropriation and development is what constitutes the political statement made at WBSI. No technical prescription mitigates this move, but rather a contingent choice between one model of education and another that changes the terrain on which the computer gains meaning as an educational technology. The primary level of a politics of online education, then, is not at the level of technology itself, but at the level at which historical encounters between technical forms and contingent sets of social values give shape to the realisation of a sociotechnical practice. It is from this level that the political meanings and consequences of online education arise.

The politics of online education is thus a politics of ongoing conflicts, struggles and negotiations between two co-existent, co-emergent codes for its realisation. The analysis of CAI and the WBSI case demonstrates how contingent logics underlie the actualisation (and therefore the “nature” and “consequences”) of online education. This shows that online education is capable of multiple iterations, and that an alternative set of values, definitions, roles, and technical functions can guide realisations of online education that might be palatable to critics and that might operate against the trends in university reform that they identify with technology as such. But the flexibility of the codes underlying online education also means that they bear a great deal of fluidity – elements supporting one realisation can be translated into terms suitable to the other. Indeed, as online education developed through the 1990s, as computer networking grew from a small community of users to a global phenomenon, as the Internet came to symbolise waves of transformation in all areas of society, and as technology collided with a series of crises in higher education, the lines between these two technical codes increasingly became blurred. It was out of this convergence of the two codes that the seeds of the evangelical discourse were sown at the end of the 1990s.

CHAPTER 6: THE AGE OF EVANGELISM: FROM ONLINE EDUCATION TO THE VIRTUAL UNIVERSITY

To be sure, he carries with him balms and ointments, but in order to cure he must first create patients.

\- Friedrich Nietzsche

Making history has never been so easy.

\- Daniel Bejar

6.1 Introduction: The Rise of the Evangelical Discourse

In the 1980s, online education was the purview of diverse, academically-based experimental initiatives. These initiatives were largely peripheral to mainstream teaching and learning, freeing them from the managerial agendas that often guide innovation in large institutions. They were exploratory, involving the negotiation of technical means in the creation of an original pedagogical model *and* the development of technical systems to support it. They were innovative in the *use* of telecommunication and computers, and in the realisation that a fusion of the two allowed online education to transcend CAI and supported interactive learning. They defied common wisdom in educational technology in that, instead of portending revolutionary change, they appropriated technology on the basis of traditional instructional values. And as they wrestled with the challenges of conferencing, they networked with each other to collaboratively define online education as a sociotechnical practice. By the decade's end, a consensus had emerged on what online education would be – an innovative mode of dialogic interpersonal interaction managed via moderating functions employed in many-to-many communication systems.

This consensus is reflected in the early literature of online education, which was produced, in part, by those involved in the early experiments, and which bears the imprint of their model, focusing on issues of text-based communication, the possibility of learning communities online, collaborative learning, the instructor's role, etc.[91] This literature, by and large, restricted itself to extending the model developed in 1980s, refining elements of it, and adapting it to emerging technologies. Little of the sense of urgent change typical of later discussions, and none of their futuristic jingoism was yet in evidence. Indeed, even as new technologies were transforming other spheres of social life, online education remained a cottage industry – designed for small groups and tailored to building educational experiences around seminar-style dialogue. While some connected with the early experiments had promoted the *technical possibility* of mass virtual universities (Paulsen, 1991), the question of their *pedagogical desirability* was a contentious one. The revolutionary impact of online education, if it would have one, would be in *distance* education, not conventional classrooms (Kaye, 1989, 1987).

Ironically, it was in the testing of the potentials of conferencing to transform mass distance learning that the slow process began whereby the model of online education developed in early conferencing was transposed into a programme for the technocratic reform of the university through its embedding in

[91] C.f., e.g., Berge & Collins (1995), Feenberg (1993, 1989), Harasim (1993, 1990), Harasim *et al.* (1995), Hiltz (1994); Kaye, (1989, 1988, 1987), Mason & Kaye (1990, 1989), Paulsen (1992).

the evangelical discourse. The test-bed was the Open University UK's DT-200, "Introduction to Information Technology", which ran from March to October, 1988, using CoSy in a class of almost 1400 students and 65 tutors.[92] While some of the course's designers saw computer conferencing as a way of "humanising" distance education and empowering tutors by enhancing communicative interaction, in the end the OU experiment achieved the opposite effect – that is, to apply values and goals from industrial distance institutions to dialogic online education.

The reason for this was the integration of conferencing within the OU's existing model of course design and delivery, a circumstance that framed the technology in a structural contradiction between the economic requirements of mass distance institutions – standardised production methods, low-cost inputs, commodified materials, economies of scale, deskilled delivery, hierarchical organisation[93] – and the pedagogical potentials of conferencing – its capacity to facilitate social interaction and enhance dialogue. This contradiction had several expressions. The course designers did not want students to treat conferencing "as an added extra, which could be ignored" (Mason, 1989: 115), but they made its use optional (Thomas, 1989). They began by asking if conferencing could humanise distance education, but marginalised it to "no more than 5% of the course" (Mason, 1989: 136), with the rest consisting of pre-packaged material. Tutors were to "organise a regular tutorial computer conference and […]

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[92] C.f., Mason (1989, 1988), Mason & Kaye (1990), OU (1988), Rumble (1989), Thomas (1989, 1988).

[93] C.f., Gunawardena & McIsaac (2004), Kaye & Rumble (1981), Peters (1994).

participate in a tutors conference" (OU, 1988), but they were only reimbursed for twenty hours of connection time and eight hours of tutorial contact over the eight months the course ran (Thomas, 1989).[94] Conferencing was meant to promote lively discussion of course issues, but tutors had only one half-day training session on moderation (Mason, 1988). In the end, conferencing was relegated to a small corner, contractual limits pressed out a potential for interaction, emphasis on course material militated against dialogue, and the potential for enhancing distance education had succumbed to the pressure of the mass institution.

For many, then, mass conferencing looked like a dismal failure – at least in comparison with the other conferencing experiments. But despite this, it was suggested that, even in failure, the course pointed to other possibilities – but from within a different frame of comparison. In the evaluation of the OU experiment, the formative question shifted from how to realise dialogic distance learning to how to maintain low costs and economies of scale while benefiting from the improved quality and obvious appeal of interactive technology. The result was that conferencing became subjected to a raft of values familiar from industrialised distance systems. Thomas, for example, suggests that "CMC could contribute to reductions in […] cost […] through greater use of existing printed material" (Thomas, 1988: 1), in essence rendering conferencing adjunct to commodified information delivery. He elsewhere recommends using standardised, reusable materials, "with corresponding reductions in […] academic resources [tutors]"

[94] This translates into just over 1 minute of online contact time per student per month. Any other costs incurred would have to be paid out of the tutors' pockets. Mason (1988) states that the workload for tutors was well above their contractual compensation, and that "more tutors than usual have declined the option to continue tutoring next year" (26).

(Thomas, 1989: 174). Mason & Kaye (1990) suggest that low-cost online learning could result from reducing contact hours, further rationalising the labour process in the management of online communication. But this was not as far as this argument went:

> […] what is it exactly that tutors provide in the OU system that could not be done by an intelligent machine? Let's suppose for instance that you had a large mainframe, with a huge database, that stored responses to all known points raised by students, with a small team of staff to pick up new points raised. Would that do the job? And how do you know that I'm not a machine? (Bates, qtd in Mason, 1989: 127).

While it is hard to gauge the tone of these comments, the vision they express is familiar – a model of automated online education that extends from its informational functions to its communicative ones. Evaluative responses to the OU course thus re-introduce themes that early conferencing had explicitly operated against – a substitution of automated information delivery for communication; the off-setting of costs by the mass production of educational commodities; a displacement of labour-intensive interaction in favour of cost-effective access to information.

While such suggestions would have been anathema to other early innovators, they were soon to become generalised as ideas about the meaning and nature of online education. Indeed, by the end of the 1990s, it seemed clear that it was not in distance learning that online education was going to have its revolutionary impact, but rather that it would provide a basis for importing models of mass distance education to conventional universities. In eight short years[95] online education changed from a cottage industry into a rallying point for higher education reform; from an extension of professional subjectivity into an agent of deskilling and automation; from a set of pedagogically interesting tools into a system defined by economic and managerial concerns; from a localised (but globally networked) academic practice into a *cause célèbre* of administrators, venture capitalists, bureaucrats, media gurus, and CEOs. In part, this shift can be understood in relation to online education's increasing definition as a special case in general processes of social and economic change associated with the development of ICTs (c.f., e.g., Castells, 2000). But while public discussion focused on technology as a driver of such change, the concrete currents of development in online education tell a different story.

This chapter explores the emergence and impacts of the evangelical discourse of online education by tracing the latter's codification within an agenda of commodification, commercialisation and deskilling/automation. It does so by focusing on several moments or stages through which a logic supportive of the latter tendencies were installed at the foundations of development in the field. First, I outline the historical contexts in which higher education reform emerged as a pressing issue, focusing on several "crises" in the university that led many to see technology as a solution. I then look at how faculty were displaced as the primary shapers of online education through its appropriation by university

[95] That is, between the publication of Harasim's (1990) collection of essays by early innovators that announced online education as a "new environment", and the publication of Noble's first "Digital Diploma Mills" essay (Noble, 1998a).

management and administration, tracing how this resulted in a transformation of the values networked education was meant to express, and how it operated through the mobilisation of a discursive opposition between tradition and technology. The next part of the chapter examines how the denigration of traditional instruction found support in pedagogical theory, outlining the ambivalence of concepts developed in cognitivist, constructivist, and socio-cognitivist schools of thought.[96] I then turn to the matter of the evangelical discourse itself, outlining how, in the context of crises in the university and under the horizon of a new structure of determining values and goals, the abstract potentials of networked digital ICTs were connected with "necessary" changes in the university and higher education at the levels of both organisation and pedagogy, and how material support was found for these changes in specific networked educational technologies and systems. Following this, I outline what was seen as a logical and desirable – if relatively extreme – end point for the development of online education towards the realisation of a fully virtualised market in learning goods and services. In the conclusion, I summarise the terms of the evangelical discourse and consider how the analysis here contributes to critical understandings of online education.

[96] Though as I hope to demonstrate, what is at issue is an *articulation* of these concepts which often reduces their pedagogical complexity and allows them to be mobilised as pedagogical elements in modes of operational reform.

6.2 The Context of Evangelical Reform: Crises in Higher Education

Neither the mere suggestion of automated online education along the lines posited by Bates, nor its fledgling technical possibility were enough to transform this idea into a fully-articulated programme of technology-based university reform. This required a set of catalysts in the environment of higher education that could direct attention towards the need for the kind of technical solution Bates described. The description, then, first needed a problem for which it could act as a logical and desirable response. And indeed, while the conferencing experiments were crafting a dialogic model of online education through the 1980s and 1990s, that problem was gradually taking shape in the environment of higher education. This period was a difficult one for the modern university, one that Clark Kerr has called the “Great Academic Depression” (Kerr, 2001), and that Jürgen Habermas has referred to as a “recession in academic planning” (Habermas, 1989). It was a period in which a number of crises – in funding, in access, in enrolment, in legitimacy, in identity – accumulated and overlapped to create conditions in which technology could appear as more than a novel pedagogical experiment, but as a saviour of the university from itself.

Throughout the 1980s and 1990s, funding to core operating budgets for public higher education institutions dropped significantly.[97] In Canada, for example, between 1980 and 2000, core operating funds per student fell by 30 per cent, while this country’s largest province, Ontario, saw a CDN$800-million

[97] While this may be less apparent in the US, where a diversified higher education system admits of a wider array of funding models, in Canada and the UK it has had dramatic impacts. C.f., e.g., Davenport (2002), Delanty (2003), Moll (1997), Selwyn (2004), Turk (2000).

decrease in operating grants to public universities from 1993 to 1997 (Davenport, 2002). Universities responded by raising fees (with governments lifting caps to allow them to do so), instituting hiring freezes, and employing more part-time teaching staff.[98] Decreases in funding were underscored by a growing "enrolment crisis" in higher education. One aspect of this was higher student-instructor ratios as funding cuts stymied universities' capacity to expand their faculty complements in tandem with growing demand. The other aspect was a mounting call – from government, industry and the public – to increase access to higher education as a basis for supplying the highly educated workforce that was necessary to sustain growth and competitiveness in the knowledge economy. While policy makers and corporate pundits were insisting that "in the global economy of the 21st century it will be the skills, inventiveness and creativity of the workforce that will give companies – and nations – their competitive edge" (qtd., Robbins & Webster, 1999: 168), and while it was generally agreed that this would require "better access to post-secondary education and training" (Harasim, 1999: n.p.), the mantra in and for universities during the 1990s was "do more with less" (Massy & Zemsky, 1995). The climate of higher education at this time, then, was one in which economic constraints increasingly shaped the strategic programmes and activities of the institution at all levels.

The climate of crisis did not stop at the nuts and bolts of institutional operation. The demands of the new economy, the pressures of enrolment and

[98] From 1990 to 1998, the key period in the formation of the evangelical discourse, fees at Canadian universities rose an average of 10% per year, well above the Consumer Price Index (Statistics Canada, 2006). And while full-time faculty in Canadian universities declined by 9.6% from 1992 to 1998, the number of part-time faculty rose (Statistics Canada, 2000).

high student-faculty ratios led many to question the content and the quality of the education students were receiving, insinuating that a crisis in numbers translated into a qualitative crisis in the curriculum and in instructional practice. Labour market shifts were putting the relevance of much of the curriculum in question, with greater emphasis being placed on fields with applicability to emerging industries (Harasim, 1999).[99] At the same time, changes in the economic role of knowledge and information had thrown into doubt the relevance of the predominant teaching methods. Where an aptitude for the competent application and manipulation of knowledge in a variety of contexts was considered more valuable in the new labour markets than the possession of knowledge specific to a particular university discipline, strategies of instruction based on the transfer and inculcation of discrete disciplinary knowledges were seen to be largely outmoded. For some, the disjuncture between university education and the "real world" contexts where knowledge is applied meant that higher education was actually *inhibiting* students from being able to function in the world of work after graduation (Brown *et al.*, 1996). While the suggestion seemed to be that university instructors might only have to change how they teach, encouraging more active and applied approaches to learning and focusing less on the strictures of the disciplines, the intimate relationship between disciplinary knowledge and professional status indicated that a much more fundamental

[99] An echo of Lyotard's earlier claim about transformations in knowledge in the development of postmodern society (Lyotard, 1984).

change would have to occur – one which cut to the very core of the academic profession.[100]

The doubt being thrown onto instructional practice and the organisation of teaching and learning was exacerbated by fragmenting trends that had characterised the university beginning in the 1980s. At this time, the so-called "culture wars" had ravaged humanities and social science disciplines, with conservatives reasserting a "Great Tradition" against a "McCarthyism of the left" (Radosh, 1994), "postmodernists" rending the flesh of the disciplines with assertions of epistemological relativism, and internalised representatives of the new social movements drawing attention to the politics of knowledge in its institutionalised forms.[101] Between reactionary retreats into canonical disciplinarity in the name of humanistic *Bildung*, relativist *jouissance* in a knowledge free of disciplinary constraints and open to new recombinant articulations, and critical attacks on the foundations of knowledge in favour of "tactical, mobile, oppositional knowledges", a vacuum had appeared where once there had been a unified identity defining the work, status, and mission of the university as a special kind of social institution. While social changes in the past (the rise of Enlightenment, the emergence of the nation-state, the expansion of democratic movements) had been internalised by the university in terms defined by academics (Delanty, 2002), the only consistent vision that emerged during the

[100] A point to which I will return in a later section.
[101] C.f., Bloom (1987), D'Souza (1991), Eagleton (2000), Emberley (1996), Giroux (1992), Good (2001), Kurzweil & Phillips (1994), Peters (1996) & Readings (1996).

1990s was derived from industry and the market and internalised by university administrators in an empty discourse of "excellence" (Readings, 1996).

While this discourse was amenable to expression in academic activity, it did not take academic values as its base. Rather it provided an opening for the establishment of new values – efficiency, productivity, cost-effectiveness, accountability, applicability – in the conduct and organisation of academic work and in institutional operation. This revaluation of university values tied academic practices more closely to management and facilitated an increasing hierarchisation of the university with a more autonomous administrative structure and an institutional culture defined less and less by faculty (Readings, 1996).The new form of hierarchical control, and the operational values it purveyed to all levels of university organisation and practice, were articulated in various institutional mechanisms (performance indicators, quality assurance tests, productivity evaluations), and diffused socially through popular instruments like the league tables published by *McLean's Magazine* and *US News and World Report* (Bruneau & Savage, 2002).

By the middle of the 1990s, then, two key conditions for the realisation of the vision of online education vocalised by Bates had come into formation – the general problem and a new institutional culture for addressing and defining solutions for it. Crises in funding and enrolment, as well as expectations of increased access put universities in search of concrete ways of doing more with less – finding ways of expanding access and managing current enrolments while controlling costs as much as possible. Increasing efficiency and productivity were thus the two key values that solutions to these problems would have to embody. But the problem of management was accompanied by a problem of re-integrating higher education into a changing social and economic context. And so the strategic mission of the university at all levels had also to involve innovations that could prepare students for work in the emerging economy. Innovation in instructional methods and organisation was thus another priority as the traditional modes of teaching and learning were seen to be increasingly outmoded. And the emergence of a culture of management in the vacuum left by the erosion of institutional identities of the past supplied a new set of values through which strategic initiatives in the university, including online education, could be framed. However, though technology is frequently understood by managerial control structures in other organisations as a solution to problems of productivity, efficiency, cost-effectiveness and other operational values, the deployment of educational technology for such purposes could not simply happen in the university. This was because, as in other areas where technology is appropriated to rationalise work, there were already people with other definitions occupying the field.

6.3 The Enclosure Movement in Online Education: Expelling the Faculty

Early conferencing experiments shared three features – they were faculty-driven, small-scale, and detached from the mainstream organisational concerns of universities. They were organised as extensions of professional practice, tailored to the pedagogical model they developed, and insulated enough from changes in higher education that they did not have to respond to more than pedagogical concerns. All of this changed in the 1990s. During this decade, faculty became *objects* rather than subjects of technological innovation; online education became a co-ordinated institutional project; and educational technologies became means of answering key organisational problems. Critics of online education begin from these outcomes and generalise them across the field as a whole. From this point of view, online education signifies a two-fold form of domination – the domination of faculty and instruction by university administration and the domination of the university by external interests who gain a new ingress through the ascendancy in it of managerial values (Noble, 2002). Both forms of domination are said to involve deploying technology in the assertion of hierarchical control in order to realise the economic value of knowledge, instrumentalise instruction to the needs of industry, and transform education into a revenue-generating process. Online education is a thus interpreted as a strictly top-down, control-oriented phenomenon, opposed to faculty interests and values and thus to be resisted by them.

But the *claim* that online education forces change from on high is not equivalent to the actual occurrence of such changes. This depends on the creation of conditions conducive to the kinds of change imagined as desirable. If the reforms critics associate with online education were to occur, then the field of its development had to be enclosed in conceptual frames and control structures that could guide its realisation towards the dominative forms critics see as its essence. The politics of online education must be understood, then, not as an *imposition* of technology along with prescriptions for change, but as a result of *appropriations* of elements in the institutional environment and of active interventions into that environment's operational conditions in order to foster a climate supportive of the top-down programme of educational reform opposed by critics. The question is not how external agencies and institutional managers impose a vision of educational reform through online education, but how the field of its development is restructured so as to facilitate its realisation as the kind of control-oriented phenomenon critics see it as being – this is a question not of imposition, but of enclosure.

As in any enclosure movement, the realisation of the evangelical programme of online education necessitated a reorganisation of the field to support new developmental arrangements and productive relations. Likewise, as in any enclosure movement, such a re-organisation had to take hold against existing arrangements and relations in the field. These latter had developed towards forms that embodied the professional values of faculty and supported an extension of familiar classroom practices. Such an encoding was not compatible with, and indeed acted as a barrier to, the commodified, automated online education envisaged by reformers and critics alike. Realising this vision would require a displacement of those groups occupying the field already – i.e., faculty. This displacement took the form of interventions into the organisation and discourse of online education that removed control over its development to senior administration, that introduced new values at the core of its development, and that placed traditional values, practices, structures – and faculty – in opposition to those ushered in by new technology. Through interventions to effectively remove a potential source of alternative models, online education could take shape along a new development path by asserting faculty and “tradition” not as potential sources of innovation, but as barriers to it and to the benefits that would accrue to institutions, students, industry and society from it.

The exclusion of faculty from a shaping role in online education was conditioned, first, by a call for greater co-ordination and centralisation in its organisation as an area of strategic development in universities. In the 1980s, online education was seen by faculty and administrators alike as something to be organised through individual initiative and experimentation (Bates, 2000). This arrangement supported an extension of faculty interests to new technical practices. In the 1990s, however, as universities faced a complex set of operational pressures, the need to find workable solutions drew attention to educational technology and led to a reassessment of this disaggregated mode of development. At this time, it became part of the “common sense” of the field that, in order for the benefits of new educational technologies to be realised, they could no longer be organised as “personal productivity aids” (Massy & Wilger, 1998). “Lone Ranger” appropriations (Bates, 2000) and the “inadequate piecemeal solutions” that went with them (Heterick *et al.*, 1998) had to be abandoned. The sense was that online education was “uncoordinated”, subject to “decision by trial and error” (Trow, 2002: 303), and begged for “top-down management” as a pre-requisite to establishing “institutional readiness” for a move to online learning (Foster *et al.*, 2002).

This call for co-ordination led many to insist on greater hierarchisation, whereby innovation would be harnessed to higher levels of administrative control, and where agendas for development would be established above the level of pedagogical practice:

> […] there has to be a meta-level function that reflects upon the process at the next level down in order to set up improvements to it. Therefore, in thinking about how development and implementation should be organised, we must be aware that every level of operation presupposes a higher level that is monitoring and reflecting on the way the lower level carries out its tasks (Laurillard, 1993: 225-6)

What was being called for was more vertical integration in online education, whereby it would be the role of senior management – not faculty – to "define a vision for teaching and learning and define where technology fits" (Bates, 2000: 43). This mode of organisation is familiar – as a hierarchically ordered, centrally controlled process, online education can take shape as "an extension of the traditional form of distance education" (Elloumi, 2004: 61), insinuating that once online education had ceased to be a toy in the hands of faculty, it would "mature" as a co-ordinated endeavour whose management would require the kinds of institutional arrangements characteristic of mass distance institutions. In such a structural environment, faculty become the objects of technological change, and managerial assumptions, requirements and values can more easily filter into the definition of development paths, implementation models, and institutional goals for online education.

The processes whereby faculty were excluded from a determining role in online education thus also had an *axiological* expression, both as a consequence of and a support for its institutional centralisation. As online education was appropriated by administration, it gradually shifted from being a forum for instructional experimentation to being a key element in “overall [institutional] strategy” (Porter, 2001: 78). And as this repositioning occurred, assessments of its potential began to filter through concerns related to the operating climate of the university – specifically the financial and enrolment crises mentioned above. The result was a thoroughgoing transformation of the value frameworks within which online education took shape. This transformation was most clearly directed through the key question that now guided understandings of its potential and assessments of how it would be developed and integrated as a feature of university organisation and practice – that is, how to leverage technology to manage enrolments and instructional processes while controlling the operating costs of mass education systems (Elloumi, 2004; Massy & Wilger, 1998; Massy & Zemsky, 1995). The clearest indication of the shift in the framing values under which online education now took shape is the array of strategies suggested for the manner of its integration into educational processes and its role in transforming that process.

One strategy, tried and true in the field of distance education, was to use online education to reorganise academic labour in favour of part-time workers and outsourced services by drawing on ICTs ability to distribute the various “moments” of the educational process across a set of network relations. Thus “instruction [can be separated from] assessment, teaching from degree granting, content development from content delivery” (Heterick *et al.,* 1998: 3), and “highly expensive faculty time formerly used to deliver material through lecture [can be] replaced by technological means of delivering content" (Walvoord & Pool, 1998: 36). Another strategy was to devise capital intensive solutions for the labour process based on a breakdown and functional analysis of instruction, its reduction to simple routines and the creation of interactive media products or the programming of automated systems to perform such routines (Massy & Zemsky, 1995). This would allow universities to create new revenue streams through the production of "self-standing, self-teaching, and even self-examining" courseware commodities (Lanham, 2002: 166), enabling the organisation of higher education as a process where "[c]onsumers will be able to purchase learning products independently and learn at their convenience, spending millions of dollars on education each year." (Heterick *et al.*, 1998: 4). These visions of online education support what many identified as a key direction in strategic development based on the production, marketing and delivery of educational commodities. The multi-media functions and inexpensive distribution enabled by ICTs could thus allow expansion combined with not only cost-savings but what appeared as vast profit potential as universities "[tapped] into the burgeoning market for online courses" (Epper, 2001: 5), enabling conventional universities to take advantage of the economies of scale that to this point had been the preserve of mass distance institutions. This would enable universities to enhance productivity, too, since "after a (sometimes large) front-end investment, the cost of usage per incremental student is apt to be low" (Massy & Wilger, 1998: 49). And so, as online education moved from being a faculty-driven experiment to a co-ordinated managerial initiative, it was increasingly heard that “[o]nly by integrating the Internet into overall strategy will this powerful new technology become an equally powerful force for competitive advantage” (Porter, 2001: 78) – a testament to how a need for hierarchical co-ordination acted as a basis for inserting a value derived from the market into the foundations of online education, and for inserting a new set of managerial values and concepts – cost-effectiveness, economies of scale, efficiency, productivity, commodification, marketisation – into assessments of the educational potential of ICTs and strategies for its educational articulation.

For present purposes, it is less important to demonstrate the degree to which these strategies were carried out in practice than it is to note that their very formulation in relation to online education suggests a dramatic shift in the conditions and directions of its development.[102] While for academics, the concern was how to integrate technology to support pedagogical practice, for administration there were other considerations – the need to respond to demands for increased access, to manage operations on shrinking budgets, to be relevant to emerging industries, to manage costs. As online education came to be invested as an *institutional mission*, it became clear that it would have to respond equally to these concerns and reflect values of cost-effectiveness, productivity and competitiveness as it did to faculty concerns and pedagogical values.

[102] Ample illustrations exist in the literature both promoting and critiquing such strategies. Noble’s work (2002) is, of course, the most well-known critical source. For a supportive treatment that discusses pedagogical issues in conjunction with managerial ones, c.f., Bates (2000).

In this sense, the axiological shifts in the organisation of online education that occurred as a result of its managerial appropriation also prompted a re-examination of teaching and learning, through which “traditional” education was brought into increasing contrast with *online* education as the latter was seen through the lens of the new managerial values. Subject to assessments on the basis of efficiency, cost-effectiveness and productivity, online education could be imagined along a continuum with existing instructional practices and imagined as an instrument for transforming the latter to realise the new goals it was understood to serve. In this contrast and comparison, it was faculty who, far from being the sources of innovation, came to be symbolic of a hide-bound conservatism that was inhibiting it. The final element in the expulsion of the faculty from the sphere of determination in online education, then, was the mobilisation of a discursive opposition between tradition and technology in which the former became the mark of faculty values, interests and practices, while the latter was understood as both a symbol and material manifestation of the need “to challenge many deeply held beliefs”, to leverage “changes in long established practices” and to encourage “new ways of thinking in an institution” (Bates, 2000: 42-3).

The opposition of tradition and technology is framed by a fundamental, and oft-repeated truism regarding ICTs – namely, that as a result of their rapid innovation and diffusion “[t]he circumstances, conditions and the very *status* of knowledge, learning, teaching and research are […] in a profound state of upheaval” (Lankshear *et al.*: 2000: 20. Emphasis in original). This statement appears odd against the experience of early conferencing, in which technology was seen as a problem in relation to a pedagogical model derived from the traditional classroom. Under the ascendancy of the new managerial values, the opposite appeared to be the case – traditional pedagogy was the problem for which technology was the solution. This reversal was a direct result of the revaluation of online education as a strategic project, and the need to address technology to a retooling of the university as a means of addressing its endemic problems. The new managerial values and goals online education was expected to realise created concern among university managers that, left to their own devices, faculty would do little but "replicate 'real' campuses without really exploring what a virtual campus could be" (Holmes & Gardner, 2006: 29).[103] While the extension of traditional instruction was considered imperative in early conferencing, here it is seen as "a restriction that universities must break out of if major advances are to be made" (Holmes & Gardner, 2006: 29). While the focus of these statements is on substantive pedagogy, the "major advances" referred to quite clearly relate to the managerial values now standing at the core of online education's development:

> There is a risk that technology continues to be incorporated by individual faculty, mainly as 'add-ons' to conventional teaching and curricula, without the accompanying changes in the instructional production function that are required to realise useful productivity gains. (Johnston, qtd. in Turk, 2000: 9)

[103] Analysis of instructors' use of new technology tended to support this notion: "the overwhelming majority of teachers employed the technology to sustain existing patterns of teaching rather than to innovate" (Cuban, 2001: 134). The assumption here is that this is precisely *not* what technology should be doing.

Of course, realising these gains meant instituting a vision of pedagogical reform against “professionally conservative” faculty (Massy & Wilger, 1998: 54), whose hold on the organisation and definition of classroom practice ensured that the pedagogies they adopted “[remained] hermetically sealed within the self-confirming culture of the school” (Brown *et al.*, 1996: 36). This culture is one in which faculty valorise knowledge in the same form as do the disciplines that grant them their professional status and authority. This is reflected in “the predominant form of learning in undergraduate education, […] the passive lecture-discussion format” (Epper, 2001: 6). The fact that this format is now seen, not as one that faculty strove to escape (as the innovators of early conferencing admonished), but as one that they actively encouraged as a means of reproducing their institutional status shows the degree to which faculty had become alienated from the centre of development initiative in online education.

Problems in classroom practice were paralleled by a felt need to transform the traditional structure of education – its organisation into four-year courses of study at locations segregated from the “real world”, ordered into semester-long programmes reflecting the segmentation of knowledge into discrete disciplines and built on assessments that tested how well students were acquainted with a body of knowledge defined not with respect to its utility but its canonicity. This mode of organisation was seen to be totally at odds with the organisational tendencies of online education, whose potential is for intermittent but lifelong engagement in modular courses of study, integrated into real world contexts, selected according to immediate need and applicability, and assessed according to the competent performances of learners in fields of application.[104] The contrast between these two modes of education is clear and the necessity of transforming traditional structures seems logical – if, that is, we define online education not only with respect to pedagogical goals and values but also the operational ones designated by university managers. These values frame traditional instruction as a “wasteful […] [piling] up of useless inventories of knowledge” and as a process in which “quality [varies] *inversely* with efficiency” (Lanham, 2002: 162-3; 161); where structures like academic freedom, professional autonomy and tenure do little more than segregate faculty in an “eternal childhood” and foster in them an infantile need to “protect the play space” (Lanham, 2002: 169; 170); where detachment from “authentic” contexts of “real world” practice produces “ersatz knowledge” (Brown *et al.*, 1996: 35); and which, in all respects, “is contrary to almost every optimal setting for student learning” (Epper, 2001: 6).

An equally pernicious barrier to managerial realisations of online education is the traditional structure of the academic profession and the privileges it accords faculty. The key issues here are described by Massy & Wilger, whom it is worth quoting at length:

> Foremost among the barriers to the full adoption of information technology [in universities] is a set of established institutional norms relating to teaching methods, faculty autonomy, and notions of productivity. The set of teaching-method norms include such considerations as teaching load, student-teacher ratios, and class size. Optimizing the use of information technology requires faculty to change what they clearly prefer to leave untouched. The very interconnectivity of the new information technologies similarly

[104] My characterisations of traditional and technologically-mediated education are paraphrased from several claims made repeatedly in the literature of online education. C.f., e.g., Brown *et al.* (1996), Katz & Oblinger (2000), Lanham (2002), Trow (2002), Walvoord & Pool (1998).

> challenges the faculty's definitions of autonomy, which dictate that a professor can individually decide what, when, and where he or she teaches […] Faculty are also deterred from adopting technology because of one other factor: given the choice of additional money for information technology or another faculty member, most would choose the additional faculty member […] Like a brotherhood of monks, faculty intrinsically value other faculty members. (Massy and Wilger, 1998: 52-3)

If the educational use of information technology is to be "optimized" as an instrument of productivity, cost-improvements and efficiency-gains, faculty must accept the increased teaching loads, higher student-teacher ratios, and large class sizes that go along with it. They must accept the loss of autonomy that accompanies increased student choice in the virtual education "marketspace" (Katz & Oblinger, 2000). And they must accept the fact that, just as the academic revolution that ushered in the humanistic renaissance of the fifteenth century required the expulsion of the monastic orders from the university (Pederson, 1997), so too will their parochial monkish brotherhood soon be disbanded.

The shaping force of the discursive intervention whereby tradition was opposed to technology increased as this opposition was elevated to ritual status in discussions of online education – whether these were conducted by/for pedagogues, administrators, policy makers, investors or the general public. The effect was a translation of online education whereby its nature and aims were diametrically reversed from those established in early conferencing, and whereby the subjects who had initially engaged in its development and defined its practice and technologies were increasingly positioned outside of it and as targets of the mode of managerial restructuring it was now expected to support. Once a "new environment" for education (Harasim, 1990), online education had become a “pressure point for challenging the dominant assumptions and characteristics of […] traditionally organised universities” (Hanna, 1998), the spark of an “impending revolution in higher education” (Collis, 2002), part of a “new compact” between the university, economy and society (Foster *et al.*, 2002), a “paradigm shift” (Massy & Wilger, 1998), or even a “new reality” for the university (Advisory Committee for Online Learning, 2001). In this climate, “traditional” is shorthand for “obsolete” in the scales of technological change, while those subjects, structures and practices so designated can be figured as barriers to innovation and the benefits flowing from it. Combined with the hierarchical control of online education and its investment with managerial values, the opposition of technology and tradition seals the removal of faculty from determination of the modes of technological innovation in the university and thus stands as a key element in the appropriation of online education under the horizon of the evangelical discourse. Before turning to an explicit consideration of that discourse and its impacts on networked educational technologies, it is first necessary to examine the ways in which the opposition of tradition and technology was expressed at the level of pedagogical theory and practice.

6.4 The Pedagogical Foundations of Evangelical Reform

So far, the discussion has focused on the formal organisation of online education as a field of development. If, however, a discourse of technology-based change in the university had only operated at this level, its grasp on online education would have been tentative at best. Only by finding resources in pedagogical theory and practice could it gain legitimate expression as a prescription for educational reform. Ingress to these resources was supplied by a parallelism between managerial discourses of institutional reform and currents in pedagogical theory, each of which held a similarly negative orientation to traditional instruction. The attack on traditional modes of instruction by managerial reformers was, as we have seen, carried out in the name of the *institution* and a set of *operational values* – improving efficiency, productivity and cost-effectiveness. The attack from pedagogical theory was carried out in the name of the *student* and familiar concerns around the *teaching and learning process* – improving and enhancing the quality of the learning experience. Worlds apart as these may seem, the terms in which the pedagogical critique was carried out brought it into a position from which elements of it could be appropriated in support of managerial reform. In what follows, I will first outline aspects of traditional instruction that were seen to be in need of change, and introduce the paradigms from within which alternative pedagogies were formulated. I will then focus on elements developed individually in or shared by these paradigms and show how their articulation opened pedagogical practice to appropriation in and investment through a programme of evangelical university reform.

For most advocates of pedagogical reform, the characteristic space of mass higher education – the lecture hall – reifies both a model of education based on "lecturer-centred knowledge transmission" (Maor & Zariski, 2003: n.p.), and a power relationship in which "the instructor contextualises and personalises […] information to meet their own needs" (Ally, 2004: 19), and "[imposes] their own ideas on students”, who are more often than not positioned as “unwilling apprentices” (Robbins & Webster, 1999: 196). In the “lecturer-centred” approach, students are merely “listening to teachers talk about” a subject area rather than engaging in practical activities associated with it or participating in discussion of its key issues and problems (Epper, 2001: 6). The student is positioned as a “passive recipient of knowledge” and the reigning logic is one of “teacher-control and learner-compliance” (Gulati, 2004: n.p.).[105] The spaces of traditional education are, for many of its critics, a function of the *culture* of the traditional university – one which emphasises abstract knowledge segregated from the contexts in which knowledgeable practitioners act. The organisation of knowledge according to disciplinary canonicity as opposed to the expert practices such knowledge informs is a key feature both of the culture of the school and the authority of scholars – as such, there is an interest in perpetuating this mode of organisation amongst faculty (Lanham, 2002). The result is to keep knowledge “hermetically sealed within the self-confirming culture of the school”, to engage students in “ersatz activities” unrelated to professional practice, and encourage in them an “ersatz knowledge” that ill equips them for the world of work (Brown *et al.*, 1996: 36). The impact is to pacify students, aggrandise instructors, perpetuate a self-serving system, and ultimately fail in the mission of training young people for the world.

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[105] Interestingly enough, these critiques of traditional instruction share much with the critiques mounted against CAI in early conferencing experiments. Indeed, the continuity between the critique of traditional distance learning in the 1980s and that of traditional classroom instruction in the 1990s suggest ways in which the earlier model of online education retained sway. Be that as it may, the pedagogical terms emergent from this critique were ambivalent enough to admit of appropriation in the evangelical discourse – it is this feature, rather than the points of continuity with the earlier model, that will interest us here.

Like university managers, then, pedagogues advocating for instructional reform targeted the traditional structure and practice of education. And like university managers, they largely attributed the sad state of affairs in instruction not to its structural conditions, but to the preferences, values and interests of professional instructors, who “cling […] to their tested and trusted pedagogies” (Epper, 2001). And so, while the terms on which pedagogical reformers offered their solutions derived from instructional practice, and while their impetus was endogenous to the professed aims of education as espoused by faculty – bettering students, improving the craft of teaching, creating better conditions for learning – the parallelism in discourses of pedagogical and managerial reform bring the former within the gravitational pull of the latter insofar as the pedagogical solutions on offer were ambivalent enough to be appropriated within frameworks of managerial reform in opposition to both traditional educational structures and faculty.

These solutions – and the critiques of traditional instruction discussed above – largely derived from two paradigms in pedagogical theory and practice: cognitivism and constructivism. Briefly, cognitivism sees learning as a result not of a passive ingestion of information, but of the active processes of the mind, which takes in information, processes it in a layered “memory system” (Royer, 2005a), and so builds up “schemata” – cognitive structures embodying an individual’s understanding and supplying frameworks for thought, expert performance, and the integration of new information.[106] Here, learning is a process of integrating information pertaining to real world situations and building up "mental models" of practical activities within those situations that increasingly reflect those possessed by expert practitioners (Polson, 1993). Constructivism similarly sees learning as an active process whereby learners construct a meaning for the world out of their experiences, but focuses more on the role of culture and community in the formation of understandings and competencies.[107] For constructivists, the communities of which the learner is a part supply terms of action and understanding within which individuals work. This is also true of professional cultures, entry into which is not only about acquiring knowledge, but also about acquiring the techniques, tools and languages used within the culture of practitioners. Education is thus a process of "enculturation" whereby learners orient themselves within "communities of practice" through "legitimate peripheral participation" in those communities (Brown *et al.*, 1996; Lave, 1988).

While these traditions originated separately, and while in many ways they diverge to the point of incompatibility,[108] they share some key points of contact out of which several common pedagogical precepts emerge. They both see learning as an *active* process of *individual* meaning construction grounded in

[106] C.f., Ally (2004), Brown *et al.* (1996), Driscoll & Burner (2005), Gardner (1985), Kintsch (1993), Polson (1993), Royer (2005a & b)

[107] C.f., Anderson (2004), Bonk & King (1998), Doolittle (1999), Fosnot (2005), Garrison (1998), von Glasersfeld (1998), Jonassen (1996), Larochelle & Bednarz (1998), Lauzon (1999).

[108] For example, the information processing theory of mind seems at odds with a pedagogy that focuses on the cultural and social situatedness of learners (c.f., Royer, 2005a; Suchman, 1987); similarly, the rationalist roots of cognitivism (c.f., Woolgar, 1989) seem to put it in conflict with the epistemological relativism that ties constructivism more closely to critical pedagogy, post-structuralism and the new social movements (von Glasersfeld, 1998; Lauzon, 1999).

prior knowledge. Both situate the *learner* and the *learner's knowledge* at the centre of the learning process – all learning begins from prior knowledge, and thus activating that knowledge to enable learning is key, as is introducing learning activities that are *relevant* to the learner. They both see knowledge as contained in a "*structure*" of some kind – a mental model derived from previous processing activity. Both situate learning with respect to *real world activity* and reference it to knowledge as a kind of *tool* utilised in the more or less *competent performance* of expert practices – this latter being the goal and measure of success in the learning process in each approach. And both see teaching not as a process enacted solely with respect to knowledge, but as one of *facilitating* the acquisition of accurate "situation models" (Kintsch, 2005) for engaging in "authentic activity" (Brown *et al.*, 1996). On the basis of these similarities, these two paradigms tended, through the 1990s, to merge into a third orientation, known variously as "cognitive constructivism" (Doolittle, 1999) or "socio-cognitivism" (Freebody, 2005).

On one hand, the notions of active, situated learning, learner-centred instruction, and teaching as facilitation appear to offer progressive alternatives to the pedagogies of mass education – in both its conventional and distance articulations – and even to reflect the model developed in early conferencing. They thus seem to bear a potential to shore up a dialogic alternative to the kinds of commodified and automated pedagogies (and the technical systems supporting them) that tend to emerge when managerial values undergird the strategic planning of educational reform. But these pedagogical notions are themselves ambivalent, and even though they largely emerge on the basis of a critique of massified instructional practice, they also tend to suggest at least two modes of appropriation and practical realisation – one which suggests a progressive pedagogy that confirms the interactive social relationship and professional organisation at the heart of education, and another which interprets these pedagogical concepts through the filter of operational values and mobilises them in a reduced form as supports in a reformist discourse and in the formulation of online education as a concretisation of the claims of that discourse.

For example, a focus on the learner suggests two possible trajectories for a shift in the focus and organisation of instruction and in the role of the instructor. Along one trajectory, this shift is articulated as "*learning*-centred teaching", an inflection of the basic pedagogical tenet that discursively and conceptually reaffirms the key social relationship of education, and that contrasts with "*knowledge*-centred teaching", displacing a focus on knowledge as a well-defined, extant *quantity* in preference to one on the interactive *processes* whereby learners orient themselves to critical activity in a field of inquiry guided by a scholarly professional (Anderson, 2004: 35). In this articulation, instructors still have a position as professional practitioners whose expertise and status in relation to knowledge remains unquestioned. Along the other trajectory, the shift to a focus on the learner is articulated as "*student*-centred learning", where it is the individual needs, knowledge, goals, and propensities of students that define their interactions with educational content. The focus here is on convenient access to knowledge and resources of immediate relevance to the learner, and education becomes a process “in which the whims and peculiarities of each individual learner are uniquely catered to” (Anderson, 2004: 35). Here the pressure to change pedagogical practice is shaped less by specifically pedagogical considerations and more by “intense competitive pressures defined largely by consumer needs and desires” (Epper, 2001: 3). Education becomes a “just-in-time” affair where “much of the burden of instruction […] [moves] back onto the student”, where students shop around the education marketplace to “find the education [they] need for [a particular] problem and get on with life” (Lanham, 2002: 163), and where the overriding question of quality can be reduced to one of “value for money” (Graves, 2002). In this way, the idea of student-centred learning as a way of realising a real pedagogical value in the rebalancing of the power relation and relation to knowledge that characterises mass education is displaced in favour of one in which instructional functions with respect to information access and acquisition are displaced onto the student, in which individual consumer needs come to define the education process, and in which the instructor can be repositioned as a broker of knowledge commodities. This marks a turn towards pedagogical frameworks familiar from distance education, and the language of “autonomy”, “independence” and “control”, which presume a separation of instructor and student and which foster the development of a model of educational technology predicated upon isolated learners (Moore & Kearsely, 1996).

By extension, there are two roads from a focus on the student to understandings of the ideal learning situation – one that extends from “learning-centred teaching” to arrive at a conception of this ideal as the collaborative learning group (Berge & Collins, 1995; Harasim *et al.*, 1995; Maor & Zariski, 2003) and another that insists upon an individualisation of instruction based on a shift to increased “learner-control” in reaction against the “teacher-centred” models reified in conventional mass education (Bates, 1995; Kintsch, 1993; Laurillard, 1993). Both of these trajectories stand in contrast with the one-to-many model of mass distance education and the conventional lecture format. However, while the first guides pedagogical practice towards the kind of interactive small group settings familiar from the conventional seminar and early conferencing, the other pushes the individuation of learning towards a model familiar from traditional distance education and its computer-mediated extension in CAI. Individualisation and student-centred learning combine in a paradigm of a “mass customisation” of anytime, anywhere educational goods and services (Heterick *et al.*, 1998). While such a formulation can retain the veneer of a progressive pedagogical approach, it also corresponds well with pressure to reform educational organisation and practice on the basis of the values of cost-effectiveness and efficiency, while also guiding reforms more clearly towards the implementation of technical solutions designed to suit this narrow understanding. As Werry points out, this may be “student-centred learning”, but “it isn’t clear that [it] […] is really in line with constructivist principles” (Werry, 2001: 13).

A similar ambivalence characterises the notion of active learning. Constructivism perceives active learning as participation in meaning-making activities mediated by the languages and norms of social groups (Garrison, 1998). This definition of active learning has parallels with the notion of collaborative dialogue developed in early conferencing and that grounded the technical code of online education emergent from the conferencing experiments. The conception of learner activity in cognitivism, by contrast, is grounded in a metaphor of information processing, where mind and memory operate analogously to the computer (Card *et al.*, 1983; Friesen & Feenberg, 2007; Polson, 1993). The two levels that make up the "human memory system" (Royer, 2005a) are working memory, which operates in the immediate situation through the active processing of information in the "memory store" (Ally, 2004), and long term memory, which is conceived as a complex set of structures – called "schemata" (Royer, 2005b) – in and through which deep cognitive processes are organised. The interaction between these two systems is key to the learning process, which involves the cumulative building up of schemata (or "mental models") out of information processed in working memory (Kintsch, 1993). Improving the learning process thus involves rendering the processing and schematising functions of individual minds more accurate and more efficient – something which can be achieved through the correct design of informational representations (Ally, 2004), by "reifying" the cognitive structures of both novices and experts in "cognitive visualisations" to encourage learners to reflect on their own models in relation to those of experts (Jacobson, 2004), and by creating simulations of real world situations that guide the learner on the basis of expert schemata and so encourage them to acquire those schemata (Ong & Ramachandran, 2000).[109] Such conceptions of active learning separate learner activity from group interaction and instead focus on the informational and representational aspects of knowledge and the internal structures of the mind, again, pulling "learner activity" away from its foundations in progressive pedagogy and towards forms the support a different kind of instructional reform.

One critique mounted against cognitivism is its circumscription of learning to the individual as a kind of isolated information processor (Suchman, 1987; Woolgar, 1989). This critique is, in many ways, the instigation for a *rapprochement* between cognitivism and constructivism (Freebody, 2005), a key concept in which is "situated cognition" (Brown *et al.*, 1996). This notion unites the formal understanding of internal information processing with the constructivist idea that learning involves participation in a community and internalisation or negotiation of the models for understanding the world held by that community. Membership in a community is thus defined in terms of the acquisition of "situation models" (Kintsch, 1993) that allow individuals to see the world and perform within the cognitive frameworks supplied by the group. Learning is interpreted to involve "enculturation" into "communities of practice", a process whereby learners engage in "legitimate peripheral participation" in the "authentic" activities of the group, rather than merely learning about those activities in the

[109] A clear expression of this is "cognitive load theory" which states that "the capacity of working memory, as well as the nature of the material to be learned, can restrict the ease with which information is processed […] Possessing a large number of relevant schemas reduces the load on working memory and allows for precious resources to be more efficiently allocated" (Driscoll & Burner, 2005: 220-21).

alienated context of the classroom (Brown *et al.,* 1996). Knowledge – the fundament of learning – is here defined less as an inert quantity defined by disciplinary boundaries and positioned as an object of reflection, and more as a tool used in professional practices under norms defined by the community of practitioners (Brown *et al.*, 1996). The contexts of traditional schooling, and the form of traditional instruction are such that this intimate connection between knowledge and application are sundered, with the result that students learn more about the knowledge-tools specific to the culture of academics than they do about the tools and uses of practitioners. If learners are, indeed, to build up accurate models of expert knowledge, either the school must be transformed to marginalise the disciplinary cultures it serves to perpetuate or the professional subjects defined as instructors must lose their specificity in the organisation of education as a “cognitive apprenticeship” undertaken within the cultures of practitioners (Brown *et al.*, 1996). While there is much to recommend the notions of enculturation, authentic situated learning, and legitimate peripheral participation, there is also a danger that they reify an opposition between “theory” and “practice”, “reflexive” and “applied” knowledge, and “school” and the “real world” and, in favouring the latter terms, undercut both an independent space for critical dialogue and learning, and the professional and institutional structures on which these are based.

The concepts developed to understand, explain and intervene in pedagogical processes, then, also bear an ambivalence which can be resolved in different ways to support different ideas about change in the organisation and practice of teaching and learning. Student-centred learning, active learning, and situated cognition do not neatly describe unified and unambiguous contents, nor do they make reference to unified and unambiguous activities. Rather, they can be appropriated within differing frameworks, and inflected to act as supports for very different kinds of reform in education. On the one hand, their emergence out of and functionality within movements to reform pedagogical practice in line with progressive trends against institutional and disciplinary authority can result in a positive redefinition of the role of the instructor and the re-organisation of the learning process – indeed, this is where such concepts align with the model of online education and the technical code for its realisation that developed in early conferencing. On the other hand, they can be interpreted and appropriated within reform movements guided by concerns for efficiency, cost-effectiveness, economies of scale and deskilling and can result in a displacement of instructors, an individualisation of learning, a marketisation of education and a dissolution of the contexts and culture of reflexive critical knowledge that mark academics as professional subjects.

It should be emphasised that pedagogical concepts like student-centred learning, active learning and situated cognition, do not, in and of themselves, bear an unequivocal relation to an evangelical reform programme in higher education, nor (insofar as they relate to understandings of online pedagogy) are they simply available for integration in an evangelical encoding of online education. It is certainly not my intention here to brand these concepts *as such* with the mark of the evangelical discourse. Rather, it is to show how their articulation opens the possibility of their appropriation as potential supports for and legitimations of evangelical reform at the level of pedagogical practice. The concepts themselves bear an ambivalence that is evident in the array of approaches to teaching and learning in which they appear.[110] However, in conjunction with the trends described in previous sections, this ambivalence was, through the 1990s, increasingly resolved in favour of interpretations that allowed these concepts to be mobilised in a programme of commodification, commercialisation and deskilling/automation and thus configured as elements of the evangelical discourse. It is to a substantive consideration of this discourse that I now turn.

6.5 Closing the Black Box: Online Education and University Reform

The discussion above has endeavoured to sketch the contexts as well as the organisational and pedagogical foundations for certain appropriations of online education that bring it into line with the evangelical programme of university reform. We have seen how cumulative and overlapping crises created a climate within which online education could emerge not just as a pedagogical novelty but as a solution to the problems besetting the university. We have seen how, in the centralisation of online education as a strategic institutional initiative, faculty were displaced as key participants in its determination. We have seen

[110] For example, “situated cognition” is used by Brown *et al.* (1996) to attack the abstract nature of traditional education and to encourage tying it more closely to the world of work – sublimating it to the requirements and culture of industrial application. The same concept is used by Lauzon (1999) as a basis for a radical pedagogy grounded solidly in a necessary distinction between education as a space of critique and the world of work as a potentially dominating force in contemporary education, illustrating Nietzsche’s point about words referenced in chapter 2.

how, as a result of this, the goals guiding online education came to derive less directly from the sphere of instructional practice and pedagogical theory, and more to be filtered through operational requirements of efficiency, cost-effectiveness, and productivity. We have seen how a discursive opposition of technology and tradition targeted faculty and instruction as key objects of reform, rather than as potential starting points for innovation in online education. And we have seen how conceptual elements deriving from the theory and practice of teaching and learning offered a toe-hold for the transformation of online pedagogies back towards the kind of individuated, information-based ones familiar from traditional distance education and concretised in CAI. Each of these developments aided in the creation of conditions within which a particular vision of and development path for online education could be identified.

Of course preferred values, articulated goals, discursive transformations and pedagogical concepts are only part of the story. They supply a framework for interpretation and development, and a foundation for a vision of online education as a sociotechnical practice and as a new mode of teaching and learning, but they do not provide a material basis on which this vision can be transformed into a concrete development path. In order to be so transformed, this interpretative framework needed to find affordances for its concrete realisation at the technical foundations of online education. In the following discussion, I will first outline several points along which online education's basic technological foundations – networked computers, the Internet and the World Wide Web – were granted particular potentials and meanings as they came to be embedded within the interpretive framework supplied by the transformations in operating conditions, organisation, values, participant interests and pedagogy sketched above, linking these, where applicable, with particular trajectories of technological development in online education. I will then sketch how the interpretation of these features, in conjunction with the continued development of technical foundations for concretising these interpretations, was translated into an overarching vision for online education by outlining an iteration of it that clearly – if in extreme terms – reflects the trends towards commodification, commercialisation and deskilling/ automation that drive the evangelical discourse, and through which "online education" as a field of pedagogical experiment was reiterated as a wholly new mode of virtualised educational practice.

At a general level, the evangelical discourse is organised around three claims: the *obsolescence* of the traditional university; the association of the traditional university with *faculty* who are thus the main objects of reform; and the identification of the *abstract properties* of online education's basic underlying technologies – networked computers, the Internet and the World Wide Web – with general requirements for educational change. These claims have a processional order in the evangelical discourse which is key to understanding its functioning and its politics. The features of new technologies are linked to affordances for operational changes; these affordances are contrasted with aspects of traditional organisation and practice which they are said to improve along measures of efficiency, cost-effectiveness, productivity, scalability and other operational values, and which they reform according to pedagogical principles that are appropriated to seem coincident with these values. We can follow this processional order along several lines of argument to gain a sense of the changes the evangelical discourse imagines for the university and ascribes to technology, as well as to see how these changes were reflected in concrete technical innovations and development initiatives.

First, *ICTs translate knowledge into rich, interactive, multi-media information* in contrast with the static mode of information representation in print text and the passive mode of information ingestion typical of the lecture. This feature allows the creation of high-quality modular content that can be infinitely reproduced at low cost and easily reused by large numbers of independent learners (van Merrienboer & Boot, 2005). From a pedagogical perspective, this quality of ICTs supports "student-centred learning" (in the narrower sense outlined above) in that networked digital resources can be accessed conveniently, and "combined and used in different ways […] to meet different needs" (Heterick *et al.*, 1998: 3). From an operational perspective, it shifts education from labour-intensive to capital-intensive modes of delivery, enabling universities to "tap into the burgeoning market for online *courses*" (Epper, 2001: 5. Emphasis in original), and transforming instruction from a cost-centre into a revenue generating mechanism. From the critical perspective, this underscores online education as a field of the production and delivery of digital commodities alienated from the faculty who produce them (Noble, 2002), and links the possibility of progressive pedagogical reform to a new mode of domination (Robbins & Webster, 1999). This interpretation of the educational potential of

ICTs is conditioned by the fusion of an individualised pedagogy and a need for "scalable" technical solutions to the conundrum of increasing access and controlling costs. This brings the informational and representational potential of networked ICTs to the fore and pulls online education towards commodified forms.

At the material level of technological developments in online education, the trend towards rich, information-based virtual educational experiences has been supported by the development of "learning objects" as a general category of reusable Web-based educational materials (Wiley, 2005), and by the development of metadata standards such as the Sharable Content Object Reference Model (SCORM) that allow such objects to flow easily between a variety of different systems (Dodds, 2007). While most teachers understand the value – in terms of labour and pedagogy – of the reuse of instructional materials, the possibility of reusable digital content transforms this idea in significant ways. Defined at the most basic level as "self-contained chunks of content" (Wiley, 2005: 2), learning objects are the key commodity of evangelical online education: "Once a collection of such […] objects exists and has been stored and catalogued in a digital library or other storage and indexing facility, instructional designers may select and aggregate learning objects from within the collection" (Wiley, 2005: 2). This organisation of material in replicable, commodified form allows another possibility to be entertained, as well:

> Intelligent or automated systems may also be designed that select and aggregate learning objects according to given criteria for individual use […] [such] systems may utilize assessments from the learning object structure to create pre-tests. For all individual

> assessments that learners pass, […] systems may then remove associated instructional materials […] When intelligent systems are used to select and organize media, as well as provide feedback and grading, enrollment bottlenecks due to the perpetuation of conventional teacher-to-student ratios […] may be overcome. (Wiley, 2005: 2)

Commodification of course materials and their aggregation in online repositories provides a new basis for organising education as a kind of information brokerage. With the moments of research and preparation, presentation, and delivery thus separated, the instructional process can be divided into phases, with a small number of professionals designing learning goals and assembling materials, Web-developers designing the interfaces for such materials, tutors or machines handling the interactive aspects of course delivery and students shopping around the virtual marketplace for relevant "chunks" of learning content. The potential consequences of this for universities are clearly illustrated by Klass (2000) and Lanhham (2002), each of whom sketch situations in which standard disciplinary curricula could easily be reduced to a small handful of course modules offered online.

The adoption of enterprise learning management systems (LMS) such as WebCT and Blackboard seemed to further entrench this developmental direction. These systems combine a number of content creation and representation tools, as well as automated systems for testing and assessment that draw upon dynamic databases (Lee, 2004). And while they contain tools for synchronous and asynchronous communication, content representation is clearly the core around which they are built, with their basic building block being the "content module" (Friesen, 2001).[111] While early LMS were designed as content tools for classroom enhancement to be used by faculty to aid their activities, the later inclusion of protocols for content sharing across applications suggested that they could potentially stand at the heart of a commodified system of content delivery that could operate through the aggregation and distribution of digital learning objects. The commodification of courseware was thus linked to a concrete development path which also fosters both the commercialisation of education and a deskilling or even automation of instruction in new technical forms.

The second abstract feature of ICTs that the evangelical discourse fixes on is *their capacity to render knowledge accessible at any time from anywhere and put control over the selection, acquisition, and use of knowledge in the hands of individuals*. This contrasts with the "sequestration model" on which the traditional university is based (Lanham, 2002), in which education is constrained by fixed location and rigid scheduling and segregated from the real world contexts for which it is ostensibly preparing students. It also contrasts with a model of educational provision that privileges the authoritative knowledge of the scholar, who is in complete control of selecting, representing, and assessing what is to count as legitimate knowledge (Ally, 2004). In distributing access to information more widely, ICTs support its disconnection from the university and thus symbolise an end of the university's (and the faculty's) monopoly of knowledge. For some, this signals a "democratisation" of knowledge (Lankshear

[111] This author took part in a 5-day WebCT training session for faculty at Simon Fraser University in 2004. Though the sessions were held daily in 3-4 hour periods, only one-half session was dedicated to discussion features and the focus was on the operational aspects of the discussion tools rather than on the problems, challenges, or modes of online educational communication.

et al., 2000; Trow, 2002), and a correction of power imbalances in the classroom to allow multiple perspectives and support critical pedagogies (Lauzon, 1999). For others, it marks an end to the artificial scarcity of knowledge perpetuated by a professional elite in order to reproduce their institutional status (Lanham, 2002), and the potential for new providers to enter the field, fostering a more competitive environment (Collis, 2002). In an odd formal parallelism, progressive pedagogy dovetails with marketisation as the university's grip on knowledge loosens.

From a pedagogical perspective, these features of ICTs support the creation of tailored educational experiences that can be linked directly to the real world contexts of learners, and extend control and determination over the educational experience to the student. They thus supporting both situated and student-centred learning (Lauzon, 1999).[112] From a managerial perspective, they create the possibility of economies of scale in provision, which can be taken advantage of through online course production and distribution, leveraging the university's "brand" to carve out a space in new distributed markets for learning. From a critical perspective, they pose the risk of transforming professional instructors into deskilled knowledge brokers whose principal task is to connect learners with educational commodities (Klass, 2000), and turning universities into "retailers" of virtual courseware (Lanham, 2002) or maintenance organisations brokering services to consumers on the open market for learning services (Werry, 2001). Combined with their enhanced representational and informational

[112] Ally (2004) goes so far as to say that "In the online environment, students experience […] information at first-hand, rather than receiving filtered information from an instructor" (19) – an indication of the degree to which the dangerous illusion of disembodied digital information has taken hold in some circles.

capacities, the expansive distribution networks of which ICTs consist underscore the inefficiency of “bricks-and-mortar” institutions, pitting them against capital-intensive virtual provision. Under this logic, “democratisation” might be better understood as “liberalisation” – a shift in inflection that emphasises a loosening of institutional controls to allow for increased commodification and commercialisation, and shifting the locus of the determination of knowledge to the market rather than instituting a real “democratisation” in its production or transmission.

Of course, realising the “value” of education in liberalised operating conditions also meant adapting it to an environment that was becoming much more “demand-driven” than that of the traditional monopolistic university (Graves, 2002), and where a variety of new providers would be able to enter the market as a result of the lower costs of production and distribution of educational materials in digital media (Heterick *et al.*, 1998). As ICTs made access to knowledge a matter of individual choice, universities would have to become more concerned about students’ needs than about disciplinary canons; they would also have to become more concerned about delivering a “return on investment” in an environment of expanded consumer choice (Graves, 2002). The expectation was one of intensified competition between a diverse range of providers for dominance in providing high quality virtual education to distributed consumers. For university managers, this meant turning to new business models for the production, delivery, and consumption of commodified online courses (Collis, 2002), occasioning a deeper integration not only of universities into the market, but of market principles into the culture and organisation of higher education (Aronowitz, 1999; Levidow, 2002).

In the mid- to late-1990s, clear indications of this were given by a range of new business strategies adopted by universities for developing online education – the selling of advertising space on online course offerings (York University), the creation of for-profit subsidiaries for developing and hosting online programmes (Columbia, UCLA, Carnegie Mellon, York), and the formation of consortia to carve out regional or larger monopolies and to realise efficiencies through the sharing of resources (UNext, Western Governors University, California Virtual University) (Werry, 2001). While most immediate competition for universities was expected to come from other universities, with private providers concerning themselves with the more immediately accessible and lucrative market for corporate training, some observers warned universities not to sit too long on their laurels:

> […] the technologies [universities] are now adopting remove the constraints under which they traditionally operated. Freed from the classroom and with a marginal cost of serving another customer of essentially zero, in the near future entrants will be looking to leverage their courses into more than just the corporate market […] successful competitors in this space will be building valuable resources – financial, brand, and expertise with the new pedagogies – that they can then translate to the more traditional higher education market. (Collis, 2002: 186-7).

While the informational and representational capacities of ICTs gesture towards the rise of commodified digital courseware as the key object of value in educational markets, their decentralising tendencies and interactivity were interpreted to create necessary conditions for a thorough marketisation of higher education – an increasing merger between public sector universities and private sector training where the latter was seen to provide the leading models for developing online education.

Intensified competition also pressures labour-intensive processes like education to consider strategies for lowering costs and streamlining operations in order to remain economically viable. Under this horizon, two other features of digital ICTs became focal points in programmes of evangelical reform – that is, *their capacity for instantaneous connectivity* and their role as a centrifugal force for *media convergence*. Within the evangelical discourse, these features were translated into supports for a disaggregation of the various activities performed by institutions of higher education, and a deskilling or even automation of some of their labour-intensive functions – specifically the teaching function. The distributed connectivity enabled by ICTs enables an *unbundling* of education to support more flexible networked services. Peripheral services can be outsourced to private providers, and educational services can be broken down into discrete moments – course design and production, information delivery, gathering materials, tutoring, question and answer, testing and assessment, credentialing – carried out at different levels of an organisation, or (again) outsourced to other organisations. As markets for virtual service provision become more diversified, institutions will have to decide which area(s) to specialise in, which to contract out (to individuals or other corporate entities), and which can be rationalised in the application of automated systems (Taylor, 2002; Wallhaus, 1998;). The unbundling of services provided by large campus-based universities is yet another line along which commercial interests and market forces are said to exert a stronger influence over the organisation of education.

From a managerial perspective, the networking capacities of ICTs enable the realisation of much more streamlined operations, freeing up resources to be placed back into strategic organisational functions and initiatives. For critics, however, outsourcing peripheral services imagines the university as yet one more commercial space for private corporations to exploit (Turk, 2000), while the potential for exploiting networking functions as a means of adopting course development and delivery models similar to the hierarchically ordered and deskilled ones of industrial distance education and private online education casts network technologies as levers for restructuring the academic labour process, reducing the professional status of faculty and shoring up the autonomous power of administration (Collis, 2002; Noble, 2002). The networking features of ICTs thus figure prominently in efforts to realise online education within a framework of increased convergence between the university and the market, and presage a replication in the university of the same kinds of hierarchical organisation and control of labour as characterise commercial organisations.

If the networking capabilities of new ICTs enabled an analytic breakdown of the various functions of university organisations and highlighted a potential for the unbundling, outsourcing and serial organisation of university operations, their development as *multimedia* fostered an attention to how their representational and interactive features related to the various elements or stages in the instructional labour process. At a time of fiscal restraint in public spending and thus in university budgets, the clearest route to the realisation of online education had less to do with the use of multimedia as enhancements to traditional classroom practice and more to do with "replacing costly faculty labor with technological capital" (Massy & Wilger, 1998: 58). The value of ICTs was seen to lie not in any direct pedagogical potentials they may have borne, but in the structural affordances they lent to the re-organisation of education from an operational perspective. Thus we hear that "applying new technologies may well be more effective and less costly than producing traditional materials […] Using the technology can make the learning process faster and more efficient, therefore cutting costs" (IHAC, 1995: 60-1), or that "[u]sing IT for more-with-less productivity enhancement requires that technology replace some activities now being performed by faculty" (Massy & Zemsky, 1995: n.p.).

Where instruction has traditionally been ordered as a professional activity grounded in an expert relation to knowledge, it can now be described as a set of discrete performances based on different ways of handling or transmitting information. These performances can be described as routines – of information presentation, delivery, testing, assessment, discussion, etc. – that can be programmed into intelligent systems. While theorists in distance education had long since developed schemes for describing instructional "events" (Gagne, 1970), before the 1990s there was no way of automating them without a dramatic reduction in the quality of education given the limitations of existing technical systems. Computer-based, networked multimedia, however, would allow for a greater range of information presentation and retrieval functions to be embedded in automated systems, thus hiving off such functions to machines and reducing communicative events to “just-in-time” assistance managed by low-cost tutors (Klass, 2000). As the sophistication of the natural language capacities of networked media increases along with the sheer volume of information, the potential for an automation of the full range of instructional functions becomes clear.

The technological foundations for the realisation of automated online education lie in the development of what James C. Taylor has called “fifth generation distance education” and take the form of sophisticated, Internet-based intelligent tutoring systems (ITS) (Taylor, 2002, 2001). ITS are “dynamic, interactive systems that can support learning by structuring [material] or responding to students as they work” (Wiley *et al.*, 2005). They are based on the functional analysis of various performances or events that make up the instructional process from the perspective of the teacher, as well as on programmes that exploit the information gathering and analysis capacities of distributed computer networks to compile detailed portraits of learners through pre-tests, portfolios, and other tools for acquiring user information (Merrill, 1993). The compilation of detailed “domain knowledge representation[s]” supplies such systems with a core database of knowledge against which it can mete out interactive content, evaluation mechanisms and exercises geared to individual student needs, while automated “advisors” search through millions of pages of pre-authored content to deliver modular learning materials at the click of a button (Merril, 1993). And if this be thought to reduce education to information in a similar fashion as the primitive programmable systems of the past, the interactive capacities of networked ICTs promise "to automate certain aspects of interaction with students, ultimately improving their cost-effectiveness" (Taylor, 2001: 6). This is imagined to work as follows:

> CMC provides a rich source of thoughtful interactions, which can be structured, tagged, and stored in a database and subsequently exploited for tuition purposes on a recurring basis through the application of automated response systems […] [These] intelligent object databases […] can be searched by pre-specified key words. Upon receipt of an electronic query from a student, the search engine seeks an appropriate match with a previously asked question, which if successful triggers a personalized response to the current question without concurrent human intervention. At this stage of development, a tutor must check the validity of the match between the current question and the answers generated automatically from the database before forwarding to the students following a quick scan and with a single 'click'. Such a quality control mechanism may become redundant in the future. If no appropriate match is found in the database of previously answered questions, the query is automatically routed to the relevant tutor for an appropriate response, which is then added to the database with a single point and click […] a significant increase in institutional responsiveness, at minimal variable cost. (Taylor, 2001: 7)

Here is the apotheosis of Bates' earlier vision of a mass computer-mediated education, whose informational and interactive functions have been fully automated, in which the erstwhile city of intellect has disappeared into the circuits of the global information highway, and in which the musty corridors and book-lined offices of academic departments have been replaced by endless rows of cubicles in anonymous call centres.

The patterns of transformation in the contexts of higher education, in the position of academics with respect to innovations in educational technology, in the values against which "progress" and "development" in educational technology are measured, in the relation of traditional and technologically mediated practices and modes of organisation, in the pedagogical foundations for understanding changes in higher education practice – patterns of transformation in these areas converge through the 1990s to create a climate in which the affordances of networked ICTs can be interpreted in particular ways and articulated into a concrete development path for online education. This path leads to increasing commodification of knowledge, commercialisation of education, and deskilling or automation in the instructional process. And it is grounded by concrete developments in educational technologies, initiatives and systems – learning objects, learning management systems, new business models for organising online education, and intelligent tutoring systems. Out of the nexus of these developments emerges a general vision of the teleology of online education that crystalises the evangelical programme of university reform – one which coalesces out of a number of national or global projects for the development of networked learning infrastructures.

In general, these infrastructures were imagined as vast databases of learning resources and tools, educational modules, and "digital curriculum" – a kind of post-institutional landscape for higher education in which a multiplicity of different providers compete to deliver their services to individuated customers. In the UK, for example, this vision was captured in the National Grid for Learning (NGfL) launched under the New Labour government in 1997 (Selwyn, 2002). In Canada, a similar integrated, national learning network was suggested based on CANARIE's CA*net 3, and built upon the foundations supplied by existing networked educational programmes such as SchoolNet, an initiative of Industry Canada to network Canada's public schools (Advisory Committee for Online Learning, 2001; Gutstein, 1999; Moll, 1997).[113] The US equivalent was the National Learning Infrastructure Initiative (NLII) founded in 1994 by Educom, and whose name belies the ultimate scope of its vision, which ultimately comprised a "Global Learning Infrastructure" (Graves, 2002; Heterick *et al.,* 1998). The ultimate goal of this infrastructure is described as follows:

> We envisage a global learning infrastructure – a student-centric, virtual, global web of educational services – as the foundation for achieving society's learning goals. This [...] goes beyond the paradigm of the virtual university, which remains modeled on individual institutions. The global learning infrastructure will encompass a flourishing marketplace of educational services where millions of students interact with a vast array of individual and institutional suppliers. It will be delivered through multiple technologies, including the Internet, broadband cable and satellite [...] It could not have existed five years ago – but it will be pervasive five years from now. At the technology core of the global learning infrastructure are fully interoperable modules and an enabling infrastructure which will: extend access to virtually anyone [...] provide convenient anytime/anywhere/anyhow access [...] deliver high quality, self-paced, customised, world-class content and pedagogy [...] be cost-effective, dramatically reducing the two biggest costs of the current system: faculty and physical plant. [And it will] [c]apitalize on market forces to achieve these goals. (Heterick *et al.*, 1998: 4-5).

The vision is one of "a single, integrated entertainment-communications-learning 'box' in each home" (Bates, 1995: 229), a "one-stop, Web-based service environment that integrates a range of academic and administrative services"

[113] The link, in Canada, between national networked educational initiatives and the federal Industry ministry is important to note. Where jurisdiction over education is divested to the provinces, the creation of networked educational initiatives through Industry Canada has served as an effective means of linking the national articulation of online education with the priorities of economic development and the interests of Canadian business. C.f., Gutstein (1999), Lewis *et al.* (2001), Moll (1997).

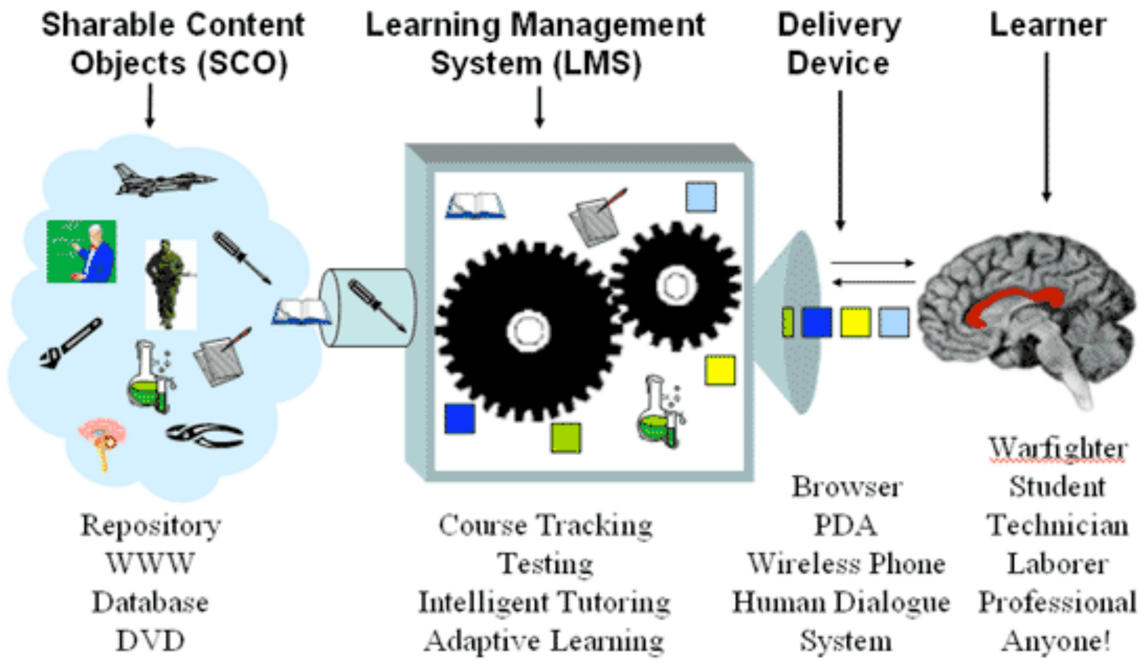
(Graves, 2002: n.p.). In the evangelical vision of online education, the institution has been replaced by a virtual network of commercial education products and services, knowledge has been replaced by modular informational commodities, and instructors have been replaced by automated instructional systems, information aggregators and vast online databases.

* * *

In the 1950s, higher education systems underwent a concerted programme of reform in response to the needs for a more educated workforce and the pressures of a coming enrolment crisis. At that time, the general consensus in the West was to create or enhance national public systems – that is, to realise education as a social good that ultimately should be supported by society as a whole. While some feared that these reforms involved a massification of education as a result of which modes of technical rationalisation could be introduced into the instructional process as part of the gradual development towards a technocratic dystopia, most laughed off this idea as idle fancy (Smith, 1958). In the 1990s, under a similar aegis of reform, and in a much altered set of circumstances, the vision of a fully virtual education came to underpin both the discursive and material development of online education. The idea of education as a social good had been replaced with one of education as a private good (Graves, 2002), while a humanistic understanding of higher learning had been supplanted by one in which education was wholly instrumentalised to economic requirements – both in terms of its internal organisation and its social function. In this climate, online education could not simply be a tool in the hands of instructors to enhance their practices as they understood them. Rather it would, much as those in the 1950s feared, become the precise means of realising the dream of the automatic student and the robot professor.

6.6 Conclusion: The Evangelical Discourse as Technical Code

Figure 6.1: A concretisation of the evangelical discourse.[114]



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This diagram depicts online education as a sociotechnical system under the terms of the evangelical discourse. A body of commodified learning objects is stored in some repository or other – the Web, an online database, a CD-ROM or whatever. Presumably, these objects have been produced by a content expert (now no longer in the picture, nor necessary to it), employed for the purpose by one or another eLearning broker – perhaps a private corporation, an

[114] It should be noted that this diagram reflects a particular perspective on distributed learning, and should not be read as typical of the work of ADLNet. I use it here to illustrate the kind of design elements and assumptions emergent within the evangelical discourse. For a view of the more recent work of ADLNet, c.f., http://www.adlnet.gov/.

entertainment company, or even a university. The products are processed, arranged and stored on a learning management system which contains an array of automated tools for facilitating education – monitoring student progress and activity, testing and evaluation, question and answer, and even adapting the learning process in response to the activities of individual students. These systems become the primary "back-end" systems for individual contracted instructors working the open market and for learning companies who either keep their own set of commodified learning resources or license them from someone else. These systems are networked with a variety of different media – portable devices, desktop and laptop computers, cell phones, even the seemingly remote "human dialogue system" – through interactions with which the human learner is invested with the knowledge necessary to become any manner of clearly identified social subject through the cognitive effects of direct interface with technology and technically-mediated educational content. While this depiction may appear extreme, it is a logical expression of what online education can and should be under the terms of the evangelical discourse.

The technological systems and visions sketched in the previous section reflect a reform programme in universities aligned with the evangelical discourse – aligned, that is, with a logic of commodification, commercialisation, deskilling and automation. This is not to say that these goals and values are what is achieved in their implementation, but rather that under the horizon of a particular idea of the nature and direction of change in the university, such technologies come to be understood and developed largely with reference to the affordances they bear in support of evangelical reforms. As ways of concretising the educational potentials of multi-media, Web-based, networked education, they tend to resolve what we have seen in previous chapters is the basic ambivalence of educational computing and networking – the tension between *product* and *process*, between *representation* and *relationality*, and between *information* and *communication*. Where conferencing had instituted a technical code encouraging the latter term in each pair, the evangelical discourse appropriates technology on the basis of the former, guiding interactive online education towards the kind of computer-mediated learning concretised in CAI and reflected in the kinds of systems and initiatives described above.

Critics of online education are correct, then, to identify a set of trajectories in educational reform in these technical realisations of online education. As an ambivalent phenomenon, online education is open to the kinds of appropriation sketched in this chapter and thus to instrumentalisation in line with the reform programme critics oppose. The evangelical discourse is not simply an ideological screen thrown in front of neutral systems to prompt submission and conformity to historical change. It is embodied in real systems and initiatives whose concrete materiality and functionality lend historical weight to the claims for change that reformers make. However, critics are wrong to identify online education as such with the claims made for it by reformers. This is to mistake an *agenda* for technological change for the essence of technology without attempting to see the historical manoeuvring on the basis of which such an agenda gains ascendancy and shapes concrete developments in a field of technical activity. The evangelical discourse is not simply a description of the essence of online education at the level of its form and historical tendencies. Rather it is an interpretative framework on the basis of which a vision of and a developmental direction for online education can be specified and on the basis of which educational technologies can be encoded to embody and support a particular programme of institutional reform. Far from uncovering the ultimate meaning of online education, the evangelical discourse supplies a technical code for resolving its ambivalent potentialities in favour of realisations that support an agenda of commodification, commercialisation and deskilling/automation.

The basic technical foundations of online education – digital computers linked through the Internet and the World Wide Web – provide facilities for realising the vision of online education promoted in the evangelical discourse. Instantaneous, distributed access to information, powerful modes of multimedia representation, new forms of digital interactivity and relationality between content elements, seemingly infinite capacity for the production and distribution of information – these are all affordances on which the proponents of evangelical reform fixate in envisaging online education as a concrete basis for a transformation of education. However, these affordances do not, in and of themselves, constitute a technical proof of the kinds of change imagined by reformers. They must be interpreted relative to a set of values, assumptions, requirements, and goals that grants them particular significance as potential elements in educational processes. Together these values, assumptions, etc. constitute a technical code for online education, the elements of which include:

- A clear and absolute distinction between tradition and technology, and a subsequent identification of traditional instructional practices and forms with faculty interests;
- A definition of online education as a strategic institutional practice, with a subsequent articulation of its pedagogical principles in relation to operational values;
- A definition of online education in terms of mass customisation in response to the overriding requirement to enable interactive online learning while controlling the costs of education;
- A definition of the ideal learning situation as a one-to-one relationship between instructor and student at the level of both information transmission and dialogic interaction;
- A definition of education as “student-centred” where this concept is seen in terms of expanded consumer choice rather than in terms of increased attention on the learning process;
- A definition of learning as a kind of information processing whose success is dependent on the form in which information is represented both in and to the mind;
- A definition of learning as a process defined by needs and competencies with respect to particular applied situations, with a resulting demotion of disciplinary knowledge as a basis for professional expertise;
- Conceptualisation of the educational process as a set of disaggregated functional moments that can be distributed across networks between various institutions, individuals and machines
- Conceptualisation and organisation of institutional systems as competing providers in an open market for the production, distribution and sale of virtual courses;

- An overarching definition of computer-based network systems as means of information distribution and access, with the result that communicative potentials are either externalised or reduced to mechanical processes of information transfer.

The vision of online education provided in the evangelical discourse is the result of an encoding of online education – at the levels of discursive definition and technical realisation – under the horizon of these basic prescriptions. However, as prescriptions, we must see their relationship to online education as wholly contingent – or rather, we should see the alignment of online education with the reform programme they represent as contingent. The ascendancy of this code as a framework for interpreting the meaning, value and nature of online education is itself conditioned by a number of factors which, while powerfully favouring the evangelical reform programme, do not inevitably lead to a binding of online education under the terms of that programme. And as the historical circumstances of the university continue to shift, it is likely that the frameworks within which online education develops – as a figure for pedagogical and organisational change and as a concrete sociotechnical practice – will also shift to admit of different kinds of realisations.

And so, while this discussion has focused on the formation of the evangelical discourse and its concretisation in technical systems and initiatives, its ultimate aim is to illustrate that it is only as a result of an array of interventions, shifts, and appropriations that this discourse takes hold in online education to direct its development. This should direct the attention of critics away from the dazzling figure of technology and back towards the conditions within which notions of the ideal forms, functions, development paths, and practices associated with online education take shape. As long as the field of online education remains relatively open to determination, there is no guarantee that the evangelical discourse will continue to occupy the fabled cat-bird seat in its ongoing development. What remains, as I will briefly illustrate in the concluding chapter, is to see whether such openness remains, to what degree and where, and thus pinpoint where critical interventions might still be made to ensure that the technocrats do not necessarily live happily ever after.

CHAPTER 7: THE POLITICS OF ONLINE EDUCATION: RECENT DEVELOPMENTS AND DIRECTIONS FOR FUTURE RESEARCH

Si hoc signum legere potes, operis boni in rebus eruditio iunctus alacribus et fructuosis potiri potes.

- Anonymous

7.1 Introduction

This dissertation has presented a history of online education in which the latter figures not as the reified object it is imagined to be by the mainstream of scholarly critics, but as a contingent system that is increasingly determined as its underlying technologies come into contact with the values, interests and goals of (and interaction between) social groups, as well as with institutional structures and pedagogical traditions. What this analysis has, I hope, demonstrated is the need to shift the terrain of critical debate around online education from the essence of its technologies to the conditions of its encoding. Critical opposition to deleterious reform initiatives in higher education does not have to take the form of a rejection of technology as such – a position which, in a climate of pervasive technological innovation at the foundations of society and economy, can only appear as reactionary. This does not relinquish critics of their duties, nor does it acquit technology of the charges laid against it as an instrument of neoliberal reform. Rather it cautions us to see that critique must do more than draw attention to present evils – it must also be amenable to activation within local struggles for pedagogical and professional values. It must frame itself, that is, as a potential element in the *articulation* of online education.

I consider it to be beyond the scope of this dissertation to lay out in detail what such a positive articulation might look like, though the preceding chapters have given an indication of some of its elements. There, I preferred to focus on providing some empirical demonstration of the theoretical claims made in the first chapters, using the orientation supplied by genealogy and critical theory of technology to explore the relation between contingent values, goals, propositions, and assumptions about the nature and purpose of online education and various potentials for its realisation. Despite the fact that my end point has been an analysis of the formation of the evangelical discourse and of its contingent foundations, I would like to extend the discussion briefly into three areas of recent development in online education that merit closer attention and that indicate shifting political fortunes in the role of technology in educational reform. These are: “hybrid” or “blended” learning as a framework for integrating technology into educational practice; the emergence of an open source movement in online education, which gestures towards alternative models for the development and diffusion of educational systems; and the creation of policy frameworks by universities and national faculty associations which set guidelines governing relations between faculty, administration and the development, selection and implementation of online learning systems.

Each of these areas addresses a specific concern voiced by critics of evangelical online education. Hybrid learning offers potentials for a critique of “virtualisation” and the *commodification* of learning by imagining technologies, like texts, to be objects around which students and teachers gather in the conduct of reflective dialogue and critical activity. Open source online education offers a development and implementation model that differs in its form and substance from that of for-profit online education ventures, and that can be seen as an answer to the charge that online education is a lever of *commercialisation* in education. And the formation of distance education policies, often on the heels of faculty and student resistance to university-corporate initiatives and commercial eLearning, demonstrates that critical participant interests can employ conventional channels of community representation and control to construct an environment in which innovation can take place in concert with those interests and against the *corporatisation* of the university. The following discussion treats each of these in turn, albeit briefly, suggesting how they contribute to a more desirable climate of development in online education for faculty, students, and the university in general.

7.2 New Pedagogical Models: Blended Learning

As noted in chapter 4, Plato’s critique of writing stands at the fountainhead of a critical approach to new educational media most recently expressed by critics of online education (Noble, 2002; Plato, 1973). This critique focuses on the informational and representational functions of new media and predicts the automation of the didactic functions of teaching and the impoverishment of education as new media spread – displacing the professional relation to knowledge upon which the institutional status of university teachers rests, and reducing rich social interaction with technical interactivity. Given the formal parallels between Plato's critique and that of critics of the evangelical discourse, it seems strange that the latter, even when they draw upon the work of Plato and the figure of Socrates to justify defences of critical dialogic education (Klass, 2000; Pegrum, 2007), fail to reflect on how ridiculous Plato's suggestion of a displacement of teachers by writing or books actually is in hindsight and what this might mean for the extension of his critical arguments to new media.

Far from being replaced by writing, teachers in the western academic tradition – Plato first of all – have thoroughly interiorised the written word into their professional self-definition, their principal currency, and one of their most powerful modes of interaction. Books and writing are not seen as automated educational commodities, but as valuable expressions and focal points of ongoing scholarly dialogue. University teachers have long since figured out how to integrate writing into dialogic interaction in the classroom. Contrary to Plato's fear of displaced teachers and commodified learning, education has adapted into a hybrid of text and dialogue that is now second nature and no longer seems to be a form of hybrid teaching at all – it is simply part of the code through which education is defined and organised, and by which we identify and understand the work of teaching and learning. Given the discursive nature of new digital media, is it not possible that the real role of technology in education can be drawn out in analogy to this history of writing? The experience of early conferencing suggests that it can, as do more recent pedagogical approaches focusing on "blended" learning.

Put simply, blended learning is an approach to the organisation of education that strives to combine face-to-face interaction in the classroom with a variety of technical platforms. If this definition seems vague, this is because blended learning is not a set of prescriptions for how teaching and learning should be conducted. It is an orientation that takes as its starting point the principle that effective education relies on a combination of interactional and delivery modes and on diverse instructional strategies and materials. Blended learning, therefore, includes the incorporation of new media into the structure of classroom interaction, as well as a division of instruction between classroom and online components (Holden & Westfall, 2005). This range of articulation gives it a high degree of ambivalence – while many of those developing the concept focus strictly on issues of pedagogy and technology, there is also an element of institutional rationalisation in it, where the reduction of classroom contact hours is taken as an occasion to render the use of space on campus more “efficient” (i.e., to allow increased enrolments without undue expenditures on extra physical space).[115] This ambivalence makes the concept of blended learning one to watch in terms of its role in the articulation of online education systems and practices. However, it also suggests the possibility of a deeper level of pedagogical reflection in the integration of technology into the classroom.

At its core, blended learning is based on a simple principle – that the value of new technology is to be realised by finding ways to weave it into everyday

[115] Such a strategy does not, of course, absolve institutions from having either to expand the faculty complement to accommodate such increases, since the assumption is that the technology will take pressure only off space allocations and will not automate teaching functions.

practices in the classroom – or to extend those practices into networked spaces (Holden & Westfall, 2005). But it is also based on an analysis of the dynamic interrelations of media forms, teaching strategies and learning processes – it is, in other words a subordination of technical functions to the goals and dynamics of educational situations (Heinze & Procter, 2004). This means that, to be truly successful as a *pedagogical* endeavour, blended learning must take technology into account at a level much deeper than one of simple correlation of technical function and teaching practice, as did earlier approaches to technology in the classroom (Laurillard, 1994; Kozma, 1996; McGreal & Elliott, 2004).

Like the integration of the written word into educational interaction, blended learning with new digital media, if it is not to be turned into simply another instrument for managing seat allocations and parking spaces, will depend upon the development of new forms of media literacy. By this I do not mean simple familiarity with the mechanical operations through which a media system operates (knowing how to read and write), but knowledge of how these operations relate to meaning-making practices and to critical and creative expression (knowing how to manipulate and work within representational systems for self-expression, critical practice, and community formation). If this seems a lofty goal for things with names as clumsy as “blog,” “wiki,” and “YouTube”, it should be remembered that this is the same basic goal applied to the alphabet and books in the tradition of liberal education (Delanty, 2003; Readings, 1996). The test of literacy in education is, of course, not simply whether a student can make out words on a page or parrot those words having run them through some mnemonic technique. Rather, its test is a discursive and practical facility with knowledge that is gained through engagement with its various technologies and media and that is capable of expression through those media. This kind of technological literacy is one which sees new media not simply as delivery devices for information, knowable only through their functions; but as the kind of objects around which, like the book and the academic essay, students and teacher gather to test the limits of expression. This requires thinking deeply about the pedagogical role of new media as much as it means understanding that the latter are tools of expression as well as of information.

7.3 New Developmental Models: Open Source Online Education

One of the primary targets for critics of online education has been the threat of commercialisation through the ongoing diffusion of networked educational technologies in higher education. There are several ways in which commercialisation is perceived to spread in higher education: via the production and marketing of online courseware by private eLearning ventures or by universities trying to create new revenue streams through the Internet; via the formation of consortia of public universities and private corporations working in conjunction to commercialise educational software or online courses; via the incorporation of commercial entities on the basis of research undertaken at universities; and via the acquisition and licensing of commercial software systems for the delivery of instruction or the management of students, an arrangement which ties the development of online education in universities to the development- and market-cycles of commercial organisations. I argued above that, with respect to the formation of technical codes of online education, commercialisation is not simply about taking products to market – the idea that online education *should be* a commercially viable sociotechnical practice encourages the development of certain kinds of technology and pressures certain ideas about appropriate online pedagogies.

In order to combat the problems associated with commercial online education, then, we need an alternative that addresses commercialisation as both an economic and a cultural force in educational systems and in the practice of networked teaching and learning. This section discusses recent initiatives in open source online education as such an alternative. To understand the significance of open source, we need to reflect briefly upon how proprietary software development relates both economically and culturally to higher education institutions. Since I will be discussing two open source learning management systems below, Moodle and Sakai,[116] I will focus here on one of the most easily recognisable commercial LMSs – WebCT[117] – to illustrate the problems of commercial educational software development at the economic and cultural levels.

Commercial LMS are, like any proprietary software product, organised as private property not only by the legal regimes that protect them, but at the level of their technical articulation. Where the underlying code that allows the LMS to

[116] Though, as I will discuss below, Sakai comprises more than a learning management system if by that we mean a discrete software package.

[117] WebCT was bought, in 2005, by the other major player in the commercial LMS market, Blackboard, and is now called Blackboard Learning System (Clabaugh, 2005). I prefer to use WebCT here to avoid anachronism.

function is the principle value-generating commodity for the developers, there is incentive to protect this code by releasing it only in a form that human beings cannot immediately read or understand – that is, in binary code (Weber, 2004). We can use such systems and experience the effects of their coding, but we cannot see how these effects are produced nor modify the code in order to alter system performance to suit our needs or create other systems. There is no technical inevitability to this arrangement – computer programmes are written, after all, by human beings in languages that can be learned, read and understood. In order to control the relation of users not to the technology only but also to the company who sells it, the commercial organisation has an incentive to hide the details of system operation by rendering them impenetrable. Control of knowledge is thus a key underpinning of the software industry – a means, so we are told, to encourage continued innovation by providing incentives to the producers. While several convincing arguments against this kind of intellectual property control have emerged in relation to digital technologies (c.f., e.g., Dandekar, 1997; Ku, 2001; Lessig, 1999), this arrangement defines a dominant understanding of how technologies develop and how we relate to them as users. So what are the effects of this in terms of the diffusion of commercial LMS in higher education? They are two-fold and relate both to the economics of software licensing as well as to how technology relates to the culture of higher education.

One lesson learned in the rapid move to enterprise learning management systems such as WebCT and Blackboard during the 1990s was that they represented a major variable cost – primarily through annual licensing fees, installation and upgrade costs, training of support staff (or buying support from the company), and fixing bugs (Wheeler, 2004). Upgrades were, of course, at the vendor's discretion and were often accompanied by increased fees for licensing, installation, testing, training and integration of the new software into other campus systems. The "versioning" of computer software, which often involves the addition or modification of a few features, feeds into the popular experience of planned obsolescence and acts as a key value-generator for commercial organisations. But it also makes enterprise systems, once so attractive for their infinite "scalability", robust engines, and rich tool sets, a regularly shifting cost for universities already harried by budgetary constraints (Fuchs, 2004).[118]

For example, WebCT "Vista 3.0" – the last version of the system prior to the purchase of the company by Blackboard – was an upgrade from its Campus Edition (CE). Such upgrades are normal in the software world, and since they are not usually organised as "forced migrations", those who choose to continue using a prior version are able to do so and retain access to technical the support systems of the commercial provider. However, WebCT announced that, with the upgrade to Vista 3.0, they would be, as of December 2006, discontinuing support of CE entirely (Morningstar *et al.*, 2004). The choice would be to continue using CE without support – an impossible option, since universities would not actually be able to do anything about any problems they might encounter[119] – to shift to Vista, or to adopt another LMS. With many institutions already familiar with the

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[118] A situation that is hardly likely to improve now that WebCT has been bought by its major competitor, Blackboard, making the latter unquestionably the dominant player in the LMS market (Clabaugh, 2005).

[119] C.f., Blaisdell (2004).

WebCT software and wanting to continue their use, this left only one option. But this option was not an inexpensive one, since WebCT had scheduled an increase in its licensing fees with the upgrade (from USD 40,000 to USD 48,400), and also required a high first year perpetual license (USD 290,400) (Morningstar *et al*., 2004). According to an estimate provided by New Mexico State University, the total first year cost of running Vista would be USD 650,800 (Morningstar *et al.*, 2004) – a prohibitive expense for large and small institutions alike. In subscribing to commercial systems, universities put themselves at a number of disadvantages having to do with a lack of control over the quality of the software and the costs of providing it. Such a situation can lead university managers to think about where to cut corners and shave expenses to the degree that an enterprise LMS is considered a necessity in contemporary higher education.

There is, however, more than an economic disadvantage to a situation like this – a disadvantage which brings us back to essential differences between commercial and academic cultures. The culture of the academy is, in a critical understanding, defined by the open sharing of and access to knowledge between members of a community whose work and whose relation to that community is predicated on and mediated by such sharing and access. This is simply fundamental to the work that academics do both in research and in teaching. This does not mean that such knowledge is "free", but rather that it is liberated from the kinds of artificially rarefying constraints on which commercial products depend. Academics are *invested in* rather than merely *compensated for* what they do – a quality which distinguishes creative, professional labour in general

(Dyer-Witheford, 1999). The introduction, therefore, of systems which, on the one hand, give shape to their labour and, on the other, are not open to transformation on the basis of their own local definitions of that labour, will likely be met with suspicion – at least by those who do not share a simple enthusiasm about technology and technological change for its own sake. The economic pressures introduced by commercial LMS combine with the cultural tensions commercial educational products bring to academic settings to create a less than ideal scenario. So what alternatives are there?

Although in the popular imagination (as well as in legislative and empirical fact) software and digital information are now widely understood as property, there has, since the invention of computer networking, been a strong tradition of the free (as in liberated) sharing of code amongst distributed programmers seeking either the input of their peers or simply to contribute new applications to the community of computer users. In a sense, it could be said that this kind of open distribution was one of the major motivations behind the development of distributed networks in the 1960s (Abbate, 1999). Today, this tradition is commonly referred to as the Open Source movement (c.f., Weber, 2004). Open source is an approach to software development predicated on the idea that users should be able to have access not only to the surface operations of software, but also to the logic that underlies that operation – that is, to the code on the basis of which the software runs. Providing access to this code is analogous to having access not just to a meal, but to the recipe that allows the meal to be prepared. And, as those with even a passing familiarity with the culinary arts know, access to the recipe is not only about replication of the same rules, but about *a practice on the basis of which these rules can be modified* to create different flavours or different recipes entirely. So access to source code for software programmes allows those who use them to analyse their underlying logic as well as to innovate new ways of doing things based on local preferences.

In terms of online education, open source software – even large scale LMS – can help to resolve the control problem universities face by opening development processes to a wider group of potential innovators than is available to even a large commercial organisation, internalising innovation to the communities that the technical systems in question are meant to serve, and also allowing local innovators to make changes when and as they see fit, rather than appealing to commercial providers and waiting for the next version to be released (Green, 2004). Of course, some might question the viability of such an approach – in the first place, who in their right mind would engage in the development of software solely on a voluntary basis with no guarantee of compensation; and for another thing, is it not the case that the kind of disorganised innovation process on which open source depends will result in substandard products? The answer to both questions is rooted in the ideals of community on the basis of which both open source development and academic culture are based. Two concrete examples of open source LMS – Moodle and Sakai – can help to illustrate this case

Moodle is an open source LMS developed in Australia by Martin Dougiamas and first rolled out beyond experimental contexts in 2003

(Dougiamas & Taylor, 2003).[120] The system has a similar modular design as other LMS, but its open license means that distributed end-users can introduce new functionality as well as modify the existing tool set without hampering other users' implementations of the software. This technical difference is a product of a key philosophical difference in the way Dougiamas imagined Moodle to relate to educational processes (c.f., Dougiamas, 1998). From its inception, Moodle was not designed simply to manage course content or those functions (such as delivering quizzes and updating grades) which relate to administrative and informational functions of teaching and learning. Moodle does, indeed, offer these facilities, but the logic of its organisation stresses the interrelation between teachers and students as a communicative and collaborative one. As the technology has developed through the hands of its large community development network, a range of features supporting social interaction – forums, blogs, collaborative authoring tools, and so on – have been introduced and also proven to be the more commonly used applications on the system. Indeed, it is a combination of the diffusion of the development initiative among the Moodle community and the nature of that community which could be said to have produced this developmental trajectory. This is because, by and large, the openness of Moodle allows for a closer collaboration between the practices and philosophies of professional teachers in the classroom and the technical resources available on campus in the creation of usable applications. Developers have incentive to create applications not because they are earning a wage, but

[120] www.moodle.org

because it is an extension of their normal work as members of academic institutions. As a result, the applications that are developed are more likely to reflect the logic not of efficiency or expediency, but of practitioners with an interest in developing their pedagogical practice. The success of this venture is reflected in the rapid growth of Moodle over the last five years - as of this writing, Moodle has over 48,000 registered sites, over 2.1 million courses, and close to 22.5 million users.[121]

To take another example, the Sakai project,[122] announced in 2003 with the first version of its open source learning management system introduced in July of 2004, is a USD 6-million software development project founded and operated by researchers and designers at MIT, the University of Michigan, Stanford, Indiana University, the uPortal open source educational portal consortium and the Open Knowledge Initiative (OKI).[123] Begun with funding from the Andrew W. Mellon Foundation and Hewlett Packard, Sakai's mandate is three-fold. First, like Moodle, it provides a modular, open source LMS – this is available at no charge to anyone who wants to implement it. Secondly, like Moodle, it hosts a development community – the Sakai Educational Partnership Program (SEPP) – that both provides support for the implementation, use and modification of the Sakai tool-set, and defines the bounds of the development community. Partner institutions sign on for USD $10,000 per year (a fraction of the licensing costs of

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[121] C.f., http://moodle.org/stats/ for current figures.

[122] www.sakaiproject.org

[123] The latter is charged with the development of a set of standards for integrating a range of different software products into a single interface without translating from the underlying code – making it easier for distributed programmers to pool resources and design interoperable applications without time-consuming and costly reprogramming. C.f., www.okiproject.org.

a commercial LMS) and thus gain access to community support as well as an avenue into sharing new applications across the Sakai community. And finally, it has developed a Tool Portability Protocol using OKI standards which allows distributed development teams to either modify existing educational tools or build new ones on the basis of local needs. These are then added to the Sakai tool-set and made available to anyone who uses the Sakai LMS. Through these three elements of the Sakai project, those universities who subscribe or partner are able to retain a much greater level of control over development, adoption, support, and implementation than is possible with commercial systems.

Both Moodle and Sakai transform a popular understanding of open source as simply “free software” (inaccurate in any case, since there are, albeit relatively nominal licensing fees to support the central development teams of both initiatives) into one that emphasises open source as “community source”. Community source refers to a combination of open source software development models and community definitions and structures provided by specific institutional cultures (Brooks, 2004). In Moodle, this community comprises the global network of Moodle developers, while with Sakai it is the more formal structure of the SEPP. In both cases, it is recognised that effective technical development must be *organised*, but also that this organisation must be in and through the primary communities that the technologies being developed are designed to serve. This ensures not only a substantial degree of local control over what is developed and how the technology is used, but also that the values of the community will play a formative role in the development of the technologies themselves.

For many, open source represents not just an interesting option for educational software development, but the real possibility that universities (and their various members) can transform themselves from consumers of educational products into developers in their own right. The commercial take-over of educational software development during the 1990s meant that the direct engagement of practitioners and teachers in the design and development of educational software was no longer, as it had been for experiments with computer conferencing, a viable option. The technology was too complex, too expensive, and was in any case far enough beyond the ordinary business of the university as to be left to professionals in the private sector. But, as those at WBSI realised in the 1980s, the design of educational software is by no means independent of substantive questions of educational philosophy and pedagogical practice. From this perspective, the design and development of educational technology is exactly what the university is about. The affordability, flexibility, and openness of systems like Moodle and frameworks like Sakai suggest not only that academic values of knowledge sharing, collaboration, and distributed control can support an alternative organisation of online education, but also that those within the university can occupy a more central role in defining it as a practice in conjunction with the design of its underlying technologies.

7.4 New Organisational Models: Policy Formation in Higher Education

The basic question to ask in a revised politics of online education is whether its realisations will foster the movement of static information, and standardised modes of interaction between atomised users, machine processes and commodified knowledge, or whether they will be rooted in an essentially social ideal of education, extending and enabling forms of mediated interaction between instructors and students. At a formal level, of course, technology can support either one of these programmes. But they are not given as outcomes prior the appropriation of technology in particular educational settings. These settings, given that they are occupied by a variety of groups with diverse interests and interpretations of the role of technology, should be seen not just as places where technology is implemented, but as structures influencing the interpretation of technology according to the situated interests of those who have a stake in them. Where such interpretations differ from one another (and insofar as the context is structured for it) there will be conflict over the meaning of technology and over its implementation. And where one interpretation gains supremacy and generality over others in as formal a context as a university, this interpretation will usually filter into the rules governing the organisation and practice of the institution itself, becoming policy and influencing further encounters of the members of the institution with the technology in question.

Struggles over technological change take place, then, in social contexts that have their own historical dynamics, and that provide their own affordances for action, authority, and intervention to participants in them. The university is no exception. It is a complex social institution organised around an administrative core whose relative power has increased significantly over the past half century, but in which there is still a strong tradition of professional self-governance and participatory decision-making. Despite the growing discretionary power of both administrative bodies and state/corporate interests, faculty and students still have representation in the institution, and can thus intervene in institutional change. One last area, then, in which current directions in the development of technical codes of online education can be traced, is the formation of policy concerning educational technology and online distance education. Looking at policy developments provides evidence that the critique of online education must include an account of and intervention through the community-based structures of the university and professional associations protecting the rights of faculty. These can act as powerful structures for the mobilisation and incorporation of faculty interests in online education. Two relatively well-known examples can serve to make the case.

In the late 1990s, San Diego State University (SDSU) introduced CETI, a $300-million dollar program for the development of an information infrastructure to support education that was sponsored by a who's who of multinational corporations, including Microsoft and MCI (Feenberg, 1999c). The initiative was the brainchild of university administrators keen to join the rush into the information age through the development of a sophisticated support system for virtual learning and research. Little thought, however, was given to CETI's pedagogical implications – as if the design and implementation of educational technology were somehow separate from questions of pedagogical utility and value. It soon became clear that the real motive was the ability to create marketable educational products online, “to be sold by the CETI consortium for a profit” (Feenberg, 1999c). Here we have the familiar scenario, discussed in chapter 6, of corporations leveraging access to learner markets by aligning with a recognised and legitimate “brand” and reaping profits from the production of commodified courseware.

But faculty and students at SDSU, once it was understood what the programme was about, opposed it – vehemently and publicly (Feenberg, 1999c). Under great public pressure, the CETI initiative folded. But there was another outcome that speaks more to the point here. As a result of the CETI debacle, and with the explicit input of faculty, SDSU developed a comprehensive distance education policy that addresses issues of automation, deskilling, and commercialisation.[124] The policy grounds the development of distance education, including offerings through new technologies and media, in the traditional mission, decision-making structures, and value frameworks of the university. New educational technologies must be evaluated according to sound pedagogical and professional principles; relations with external organisations developed for the creation of distance materials, technology, and offerings must be open to scrutiny from within the university; and, most importantly, educational technologies and distance programmes must be organised in a way that respects faculty autonomy, academic freedom, and intellectual property. The policy also

[124] C.f., http://www.sfu.ca/~andrewf/sdsudisted.html.

contains guidelines for the employment of adjunct and part-time non-tenured faculty, thus engaging directly with a main points of contention in debates over online education – its role in the deprofessionalisation of university instruction.

The second case concerns one of the most famous “just so” stories of the critical resistance to evangelical reform – that is, the 1997 York University faculty strike which, in part, was the occasion for Noble’s “Digital Diploma Mills” essays. While online learning was not the only issue on the table for faculty during the strike, it formed a key area of concern. The university administration had introduced a unilateral initiative to leverage online course material for attracting corporate advertising, which it thought to add as a revenue stream on the back of faculty labour (Noble, 1998a). As in the SDSU case, it was clear that there was nothing of pedagogical benefit to this initiative, and that it was driven by purely pecuniary motives. In addition, the university was poised to make mandatory the provision of online content by every instructor – rendering the initiative an insult to both academic values and faculty autonomy. Of course, the administration were not doing anything out of the ordinary – they were, as most institutional managers do, manipulating the guidelines of their organisation to create an environment conducive to the realisation of their interests and goals. As such, they were engaged in an effort to define a technical code under which online education would take shape.

Faculty resistance to these proposals did not, however, only take place on the picket lines. Faculty countered them in part through the same channels administrators were trying to use to define online education – i.e., in policy formation. In doing so, they successfully opposed the administration's initiative by reshaping the policy environment according to their own interests. In negotiating their new contract, faculty insisted on provisions which would give them "direct and unambiguous control over all decisions relating to the automation of instruction, including veto power" (Noble, 1998a). This control covered technologies implemented for classroom enhancement and online course delivery, thus ensuring that online education will develop in concert with academic values, priorities and interests.

These two university-based policy initiatives have been echoed in position statements on online distance education issued by national associations in both the United States and Canada – the American Association of University Professors (AAUP) and the Canadian Association of University Teachers (CAUT). These statements act as an important basis for local faculty intervention in the appropriation of educational technologies.[125] CAUT's position statement has been iterated explicitly with respect to issues of commercialisation, privatisation, and deprofessionalisation, with the association's position on online education emerging out of a critical response to these larger political-economic issues. By framing their position with respect to particular social issues, CAUT is careful to establish a critical framework which allows for the alternative development of online education, and that promotes critical engagement in local institutional appropriations of educational technologies. The AAUP statement is framed in terms of a disjuncture between academic policies governing traditional

[125] AUPP (2004); CAUT (2007, 2004).

means of distance education and those governing networked technologies. The recognition that these technologies have the capacity to do something fundamentally different from information delivery suggests that they should be embedded in basic academic values and priorities. Concerns of academic freedom, freedom of teaching, intellectual property rights, access to information, and so on are central to the position-statement and clearly outline the need to embed new technologies in traditional professional and institutional interests and structures. The responsibility for developing online education is situated within the academic community as a whole, with a recognition that new technologies must be integrated into education through the normal academic channels.

What is important about these policies and position-statements is that they provide a framework for the development and implementation of online education and educational technologies *within* the sets of values, norms, and expectations that typify universities as professional organisations. They strengthen an alternative technical code of online education by placing that code within the larger institutional and organisational frameworks of universities and professional associations. And, most importantly, they incorporate into the development and implementation framework, the primary concerns of online education's critics, appropriating critical discourse into the parameters of socio-technical decision-making. It is important to remember that social and institutional values, while not often understood as aspects of "technical" activity per se, give shape to technologies just as much as specific design decisions do, since they establish a horizon within which compliance must be attained in a specific social context.

The historically dynamic process of interpreting the technologies into a sociotechnical situation is given shape in the articulation of such principles and guidelines as those mentioned above. Thus the university itself can be leveraged by faculty to ensure that their expectations, interests, and values are incorporated into online programmes and the implementation of specific technologies and systems. There is wide latitude for faculty intervention and participation in shaping the terms in which online education will come to affect the academic labour process, the division of academic labour, and ownership of intellectual resources. The will of administration is still not so absolute within universities that there is no capacity for faculty contribution in shaping how online education will be adopted and implemented.

7.5 Directions for Future Research

Blended learning, open source, and currents in online education policy are all a result of a single historical circumstance – the general failure of the vision of online education promulgated in the evangelical discourse. This failure was three-fold. First, it was *a failure in the evangelical discourse* to deliver on its staggering promises given the lack of a workable technical foundation for it, with the result that, aided by the dot-com bust of 2000, much of the seemingly endless supplies of investment capital for research and development dried up and many a bold eLearning venture vanished into the ether. Second, it was *a failure in the legitimacy* of the vision of virtual education in the eyes of those upon whom it was foisted as an inevitable and beneficial future, with the result that its principle audience increasingly saw it, at worst, as a cynical move to gloss over pedagogical quality for the sake of economic exigency, and, at best, as just another boring technology that they could conveniently ignore. Finally, it was *a failure of technology* to sustain a process of closure in the face of the mobilisation of critical interests and activists in the university, with the result that the latter were able to keep the black box open to the point of reasserting their interpretation of the technology. These failures should not lead us, however, to the conclusion that “the bloom is off the rose” (Noble, 1998c) – especially given the resilience shown by programmes of automation, deskilling, and commercialisation in the history of educational technology. Continued critical attention needs to be paid to the field of online education to ensure that it can support the kinds of pedagogical and professional values and interests reflected in the three areas discussed briefly above, and to shore up the chances that online education can improve its immunity to evangelical claims of total transformation. Each of these areas thus supplies a substantive field for further analysis along the lines presented here as initiatives within them develop.

Apart from the continuation of the empirical investigations of online education suggested in this dissertation, another direction for future research concerns the further fleshing out of a critical historiographical method for technology studies based on a more thoroughgoing synthesis of genealogy and critical theory of technology. There are two interrelated dimensions to such a project. On one hand, it will involve a much deeper investigation of the philosophical roots of constructivist technology studies, Foucauldian genealogy and critical theory of technology in an attempt to detail a framework for the critical constitutive historical analysis of sociotechnical systems. The analysis above points towards some areas of overlap between genealogy and critical theory that inform the foregoing analysis of online education, but these areas of overlap suggest a more coherent articulation of a kind of genealogical method adapted to critical theory. On the other hand, undertaking such a project will require more extensive empirical analysis of cases such as that of online education, where the mobilisation of a diverse set of heterogeneous and often conflicting forces converge to create what is less a discrete technological system and more a climate of sociotechnical practice. Areas of analysis that are both appropriate to such a treatment and pressing from the perspective of the critical public interest include biotechnology (specifically in relation to genetically modified foods, the politics of global agricultural policy, changes in intellectual property law around organisms, and the development of a science and technology of genetics) as well as around technological responses to climate change (specifically the complex processes involved in selecting politically, economically, socially and ecologically feasible alternative energy paths). As complex systems of sociotechnical development, these areas of research are immanently suitable to the kind of analysis supplied by genealogy and critical theory, while also acting as empirical foundations for its further articulation.

7.6 Concluding Remarks

In chapters 4 and 5, I argued that CAI and computer conferencing were educational applications of the computer that drew, respectively, on that device's representational and relational affordances. The difference is, to reiterate, one between two different conceptions of the educational potentials of computers, of the optimal design of educational systems, and of the appropriate mode of integration of computers into educational organisation and practice. Focusing on representational affordances as definitive of the computer's educational potential tends to support automated, information-delivery style education; privileging the relational affordances, by contrast, highlights potentials for social interaction that lead to dramatically different realisations of the device. A similar opposition of potentials can be observed to take shape at the most general level of online education discourse in the 1990s, this time organised around Internet- and Web-based online education. This opposition emerged at the level of understandings of how these technologies related to the existing structure and practices and to the historical development of the university. Budget-conscious administrators, profit-minded venture capitalists and eLearning entrepreneurs, and fiscally conservative bureaucrats saw the Internet and Web as *replacement* media, while many faculty members, educational researchers, and practitioners, like the early innovators in educational computer conferencing, saw them as *enhancement* media. The differences in interpretation and implication for understandings of online education's significance and development are not hard to see.

In the model of replacement, the various tools of online education are seen in terms of parallel or equivalent functions performed by other media (e.g., the chalkface, print, audio and video), structures (the classroom, the student or faculty lounge), and people (instructors, support staff) in the existing physical system. In the enhancement model, they were seen as novel elements in a total system – ones which needed, first and foremost, to be interpreted and shaped according to articulated pedagogical values operant in the system. In the model of replacement, there is a tendency to structure understandings of the new technologies in a negative relation to existing technologies, structures, and functions, imagining the former only as improvements in the efficiency of traditional operations and positing the immanent replacement of one modality for another. In the enhancement model, the tendency is to see technical functions in terms of their complementarity with existing practices, to specify what pedagogical aims they might support and to integrate them to allow for mutual adjustments throughout the entire system. The evangelical discourse, while containing, as we saw in the previous chapter, a great many prescriptions as to the detailed processes of system adjustment, was most clearly grounded in the replacement model.

By contrast, the recent developments sketched above operate more through the notion of the technological enhancement of education with reference to the culture and values of academics. Hybrid learning seems to move digital media in the same direction as the academic community has long learned how to deal with print – namely, not as a potential replacement for instruction, but as what Albert Borgmann calls a “focal thing”: a meaningful object around which a group of people gathers in the conduct of its practices and the verification and reproduction of its identity (Borgmann, 1984). The idea here is to foster an orientation to technology that denies the replacement of human teachers or interpersonal contact, and tries to find ways of integrating technology into the fabric of teaching practice. Similarly, open source systems such as Moodle organise the development of online learning practices and technologies as itself a distributed system, enabling the local settings at which the technology is employed to intervene and innovate in response to their own pedagogical goals and interests. This openness is, indeed, an integral part of the definition of how the technology works – i.e., through a capacity for direct intervention in its form on the part of its users. And finally, policies written around the development of online education create a context which assures some measure of participation amongst the academic community.

It appears, then, that after a long and painful digression through the evangelical discourse, online education is beginning once again to take shape within a general orientation that bears (perhaps ironically) a remarkable similarity to the early computer conferencing experiments of the 1980s. In place of automated information delivery, the paradigm has shifted to classroom integration; from the threat of the commercialisation of flashy eLearning products, the paradigm appears to be shifting to non-commercial open source and greater localised faculty involvement in design and implementation;[126] and from the increasingly autonomous actions of corporate-minded administrators against the academic labour force, conditions have emerged for greater equity in the influence over decision making around online education as a force for change in the university. All of these latter conditions were typical of the early experiments

[126] Though the formation of an arrangement to integrate Blackboard – the dominant commercial learning management system – with Sakai strikes a somewhat ambivalent note. Whether the partnership will act as a foundation for the commercialisation of open license software on the part of the eLearning giant, or whether Blackboard, Inc. is discovering the merits of a more open development scheme will be a matter of continued critical vigilance. C.f., Guess (2008).

and were formative in the particular model they developed. The intervention of the evangelical discourse, however, has had the unfortunate effect of erasing a great deal of the memory of these early experiments from the collective heritage of online education. And so it appears that many current innovators in the field are busy reinventing the wheel in many respects, as this comment from the designer of Moodle indicates:

> [As students engaged with the software] [i]t seemed clear that we needed to further reduce the emphasis on individualized learning and increase the emphasis on engagement in reflective dialogue. We realized this could be achieved structurally, through modifications to the format of the unit and the instructional activities, as well as Moodle. And we realized also that [the instructor] needed to become more engaged in facilitating and moderating dialogue, by adopting a more interactive role similar to his role in on-campus classes; where he alternated (mostly spontaneously) between prompting and managing discussion and clarifying and extending students' conceptual development. (Dougiamas & Taylor, 2003: n.p.)

It is at once encouraging and disheartening to see that the same conclusions reached in 1982 by those employing text-based conferencing systems are now being reached anew by those using more advanced graphical software and the Web – encouraging because it indicates that developments in online education are moving in a direction more amenable to faculty; discouraging in that it is a reminder of how thoroughly the evangelical discourse silenced or sidelined alternative models. This should serve as a cautionary tale for the future of online education, one from which three important lines of critical defence against further forays of evangelical pundits can be identified. First, to be on guard against the fetishisation of technological change as an agent of transformation, we should note that differences in technical sophistication may, indeed, have little effect on what constitutes a viable online pedagogy. Second, to be on guard against the fetishisation of technology in general, we should note that technical artefacts and systems are open to intervention and transformation on the part of their users and on the basis of those users' interests, interpretations and values. And finally, to be on guard against the narcosis that often accompanies rapid technological change, we should note that the ultimate result of a discourse which cautions us to forget the past is the same as that which follows a hearty meal of lotus flowers or a refreshing dip in Lethe waters – namely, an oblivion to what we have lost in the transition. Whether this oblivion is temporary or permanent will be the result of critics' ongoing ability to see the difference between the inevitability of technical essences and the contingency of socio-technical programmes.

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