

# Exploring the Relationships between Pedagogy, Ethics & Technology: building a framework for strategy development<sup>1</sup>

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*Abstract* The various political and technological drivers that are currently prevalent within many educational institutions increasingly encourage educationalists to experiment with tools that promote e-learning. Many then engage in this activity in the belief that this will help in the development of more autonomous, responsible learners. Strategies for the integration of technology are, however, often less well researched. This paper, therefore, explores the relationship between pedagogy, ethics and technology, as three important constructs for the development of an e-learning strategy. It then proposes a framework that will allow future research to define more clearly how each of these concepts overlap, and to identify the impact that they have on each other. As a consequence, the framework provides insight into the mutual dependencies of pedagogy, ethics and technology, with the aim of avoiding ethical risks in developing e-teaching and e-learning.

## 1 INTRODUCTION

For the purposes of this paper E-learning is defined as the use of information and communication technology (ICT) for supporting the educational process. E-learning can be seen to be increasingly gaining in importance (e.g. Kellner, 1999) as it is now becoming standard in many educational establishments ranging from primary through to higher education. In terms of supporting the learning experience E-learning now finds application in content delivery, in curriculum design and planning, in assessment and recording of achievement, and in communication between students and teachers, between students and between teachers. ICT use is, therefore, by now so closely interlinked with the educational process that it is hard to imagine a modern day educational system without it.

Despite the undisputable importance of ICT in education (see Lehtinen, et al, 1999 for a review), there clearly remain a number of issues that are not understood sufficiently (e.g. Lipponen, 2002; Phipps & Merisotis, 1999). These include the relationships between technological tools available for learning delivery and their links with ethics and pedagogy as depicted in Fig. 1.

In order to explore these relationships this paper will first outline the relevance of pedagogy, ethics and technology to E-learning. These particular constituents will then be broken down and discussed with reference to the specific areas of interest for the paper. Next, the overlaps between each of the three circles (pedagogy and ethics, pedagogy and technology, technology and ethics) will be discussed. The three arrows, which represent pressures and constraints on the content of the three circles, raise interesting questions in themselves, but it is not our intention to explore these within this paper. Instead they are left for later research. Finally, the conclusion will explore the centre of the Venn diagram, the overlap between technology, pedagogy, and ethics, in order to prompt the development of an online pedagogy that is cognizant of its ethical implications.

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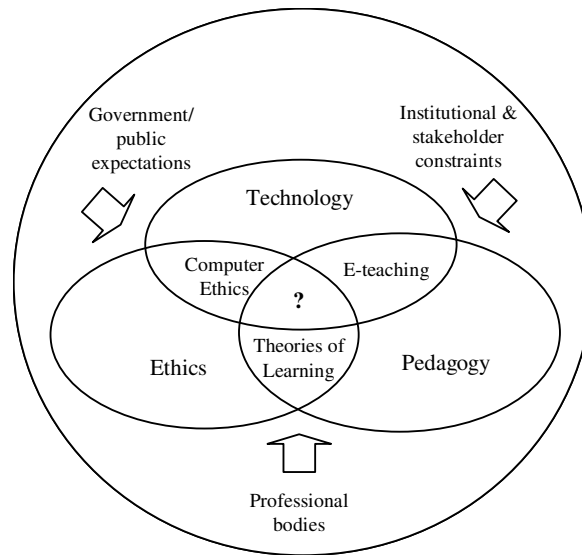


Fig 1. The links between technology, pedagogy and ethics

## 2 TECHNOLOGY, ETHICS AND PEDAGOGY - THE BUBBLES

In this section we will briefly introduce our understanding of the main constituents of the diagram depicted in Fig. 1 –technology, ethics and pedagogy – in terms of their relevance to the educational context. The first focus of our research will, therefore, be on pedagogy and the role of education in society. The second task will be to examine the ethical issues that may arise in relation to pedagogy in an e-learning context. Next, we will identify particular technological tools currently being used to support the learning and teaching process. This will then allow us to consider the assumptions that are contained within them.

### 2.1 Pedagogy: Constructivist versus Positivist Theories

The literature on pedagogy is large. We have, therefore, focused on two groups of pedagogical theories, which can be broadly characterized as positivist and constructivist. E-learning and ICT use in education can, of course, be geared towards either paradigm. Positivist pedagogy starts with a realist ontology, meaning that reality is independent of the observer. Based on this ontological view, truth can be defined as a correspondence relationship between statements and facts. A statement is true if it adequately represents reality. The epistemology associated with this paradigm necessarily concentrates on the discovery of verifiable objective truths, and thus teaching has the purpose of transmitting known, objective truths to learners.

On the other hand there are the constructivist pedagogies based on non-realist ontologies. In this paradigm, truth is a matter of social construction and agreement. The associated epistemology also concentrates on negotiation and agreement, since it is assumed that reality is constituted by the observer and through the act of observation. . As Vosniadou (1994) notes, “recent approaches to learning emphasize the active, constructive nature of the knowledge acquisition process wherein the learner is not a passive recipient of information but an active and constructive interpreter of meanings”. Thus, the ultimate goal of a constructivist approach is on learning how to construct knowledge appropriate to the situated task – similar to the idea of metacognition, which is the higher order process of reflecting on our own thinking and problem solving processes. This has a powerful problem solving potential. Teaching in this sense cannot

be simply the transmission of truth. Rather it is aimed at helping learners to construct their own realities in accordance with social norms.

However, one of the fundamental problems for teachers is to relate the different theories of learning to their teaching strategies as well as to their use of technology. For example, Sfard (1998) argues that there are two metaphors for learning – the “acquisition metaphor” (that which has been acquired by a learner – the *product* model) and the “participation metaphor” (the learning process itself – the *process* model). In the first metaphor the act of learning may easily be perceived as being actively engaged in the acquisition of knowledge that, in turn, may be packaged and transmitted (the *transmission* model). However, in the second metaphor the implied process is a more collaborative, participatory approach, although this seems to neglect the fact that something (i.e. learning) must be acquired. On the other hand, Koschmann (1994) believes that such a dichotomy is too restrictive, and proposes a “transaction metaphor” that encompasses both acquisition and participation.

A further issue then lies in the fact that “learning” may be seen as either an individual or a social activity. For example, Gifford & Enyedy (1999) argue against both the domain-centered approach to learning – which they state reflects the *transmission* model of knowledge transfer – as well as learner-centered design – which they suggest is founded on the *information processing* model of cognition. Rather, they propose an “Activity-Centered-Design” model whose central tenets are that: “Activity is mediated by cultural artifacts, that activity must be analyzed at various levels and that internal activity (thinking) first occurs in the social plane (contextualized activity)” (Gifford & Enyedy (1999).

Dewey (1901), Vygotsky (1978) and many other researchers have similarly argued that learning begins from a social context. For example, Vygotskian social theory proposes that learning occurs as a result of first participating in activities with others who scaffold the process. Learners then internalize and appropriate skills that then allow them to develop from a novice status to more expert (Hoadley & Enyedy, 1999; Wertsch, 1985). However, Gifford & Enyedy (1999) further suggest that mediation changes the nature of the task and that “learning to participate in a cultural practice means moving from partial participation in that practice to full participation”. Here again, the actual process of what constitutes “learning” seems to be open to a variety of interpretations although there is clearly a distinction to be made between the conflicting didactic and conversational models of learning as depicted in Fig. 2.

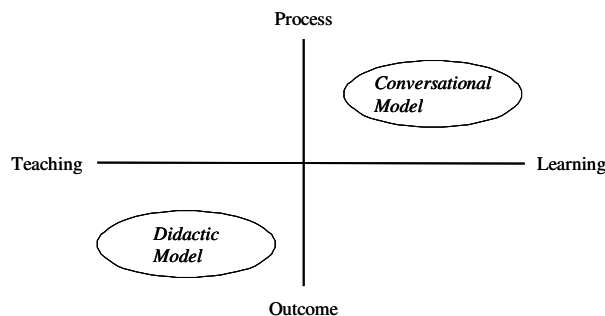


Fig. 2. Conversational versus Didactic model of learning and teaching

## 2.2 Ethics: Computer and Information Ethics

The field of philosophical ethics may be the largest of the three we have chosen to discuss. Rather than even attempt to mention the most important theories and topics, we will concentrate our discussion on the area of computer and information ethics. From its earliest beginnings, arguably in the work of Wiener

(1954), this field has developed to become a well established academic sub-discipline. As is true of most academic disciplines, there is no agreement on appropriate approaches or theories. However, there do seem to be a number of recurring topics, which seems to imply an implicit agreement on the subject area of computer ethics. Without claiming completeness, we believe that among the most important issues of computer ethics one can find questions of data quality, access to data and systems, intellectual property, privacy and data protection, change of social structures through technology, and the impact of ICT on our view of human beings (Mason, 1986).

For example if programs are of poor quality and do not fulfill their purpose then this can have repercussions for the working of critical systems, can lead to financial losses, and endanger humans. Similarly, high quality data is necessary for ICT to fulfill its purpose (Littlewood & Stringy, 1995).

However, intellectual property and privacy are probably the most visible and salient issues discussed in computer ethics. While there is no agreement on what exactly the problem is and how it relates to ICT, there is little disagreement that both are important and related to technology. For example, intellectual property increasingly determines the way the economy of the information society works but it is unclear whether traditional concepts can fruitfully be applied to modern technical means (Stahl, 2005). Similarly, there is little agreement on what privacy means or why we value it or how it can be protected. Nevertheless, most scholars agree that privacy is related to the electronic transmission of data and that it can constitute an ethical issue (Stahl, et al, 2005).

### **2.3 Technology: E-Learning Tools**

Recent surveys have found that a variety of both custom-built and commercially produced virtual learning environments (VLEs), are increasingly being deployed to support education across the HE sector. Each VLE comprises a number of tools that seem to be primarily designed to support content delivery. The tools provided can be used to a) develop repositories that contain a variety of resources (e.g. Powerpoint presentations, Word/PDF documents, Excel/Access files, links to interactive tutorials and other external resources); b) provide assessment through on-line quizzes; and c) provide email communication between tutors and students. There are also tools for supporting discussion forums and synchronous chat; as well as management tools that enable teachers to track student access, to record assignment grades, to manage groups as well as the facility to set up evaluation surveys. It might be perceived that a range of non-routine technology has been developed as a consequence of customized research and development, to support the complex, developing system that is education. (See Fig. 3.)

However, whilst such development is quite likely to have been customized for the educational context, some may view ICT as neutral tools used to achieve the same ends as non-electronic tools previously did. However, such an assumption would patently be false, as there is a large body of literature which concludes that no technology is value neutral, but rather that all have inbuilt assumptions and ideologies which determine and constrain their possible use (for example, Sachs, 1995; Winner, 1993; Latour, 1996). In this, ICT is no different from any other technology.

For example, within the e-learning context, whilst the ability to provide such things as content or online quizzes within a VLE may provide for autonomy and flexibility of access to learning, it also implies that knowledge can be packaged and transmitted. Thus the assumption reified within the use of these tools is that reality can be objectively defined, packaged and transmitted, and the tools actually support a more traditional, objectivist approach to education. For example, Taylor & Richards (1987) report that "Bobbitt argued for a scientific approach to planning school curricula by systematic analysis of those human activities which the curriculum was intended to develop. The activities to be focused on were those which made for efficiency in living as a healthy, gainfully employed citizen. Those activities, analyzed in detail, would be the intended outcomes of the curriculum". This, in simplistic terms, may be seen to reflect a deterministic view of a 'closed' system in which specific outcomes may be defined for appropriately

developed processes to achieve. Theories of education such as that proposed by Bernstein (1977) added weight to such approaches through the identification of what were perceived to be desired, observable behaviors. To a great extent, traditional, positivist approaches to education stemmed from particular beliefs of what learners ought to learn, and these, in turn, were based upon the notion that the goal of learning is to understand reality, which is taken to be objective. For theorists such as Bernstein (1977), achievement of learning was also deemed to be measurable through observable behavior. Assessment could therefore be framed in simple stimulus-response terms, reflected in the use of online quizzes where a determined truth is presented to students, and they are graded according to their ability to pick the right answer.

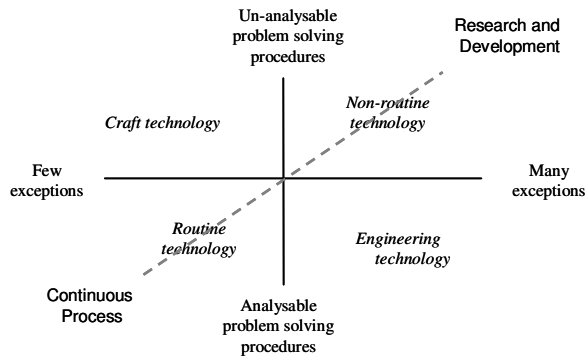


Fig. 3. The Perrow model of technology [5]

However, the use of such tools can also be seen to reinforce a particular relationship between technology and our view of humans (Wiener, 1954; Weizenbaum, 1976). For example, if we see humans as information processing machines, then failure to process information in the desired way is a failure of the machine, which may require reprogramming or being exchanged. This view may conflict with ethically inspired views of humans.

On the other hand, the use of discussion boards can be seen as supporting a completely different approach, in that the learning to be undertaken is not necessarily gained from acquiring “chunks” of knowledge but instead is constructed through discourse (Jefferies, 2003; Jefferies & Rogerson, 2003). This wider scope of discourse in learning is further expressed in the work of academics on reflective learning in professionals (Schon, 1983), action learning sets (Beatty, 1997) and cognitive development (Vygotsky, 1978). Thus use of this type of tool can be seen to relate to an underlying philosophy regarding the role of education in general and the teacher in particular and it is suggested that it is these more complex conversational frameworks that are clearly the type of constructs that Perrow (1972) identifies as requiring ‘Non-routine technology’ when seeking a technological solution.

### 3 INTERSECTIONS

Having established the main content of each of the three aspects of our analysis: pedagogy, ethics and technology, we will now briefly discuss the areas where they overlap.

#### 3.1 Ethics and Technology: Computer Ethics and E-teaching Tools

To start this section, we should state that there is a close link between ethics and education in general. Scrimshaw, (1983) for example, identifies several different educational ideologies – Progressivism (meeting individuals needs and aspirations), Instrumentalism (meeting requirements of the socio-economic order), Reconstructionism (moving society in desired ways), Classical humanism (transmission of cultural

heritage), and Liberal humanism (creation of a vision of common educational experience). Thus education is usually seen as an ethical good that allows the student to develop independence, autonomy and the skills to provide for his or her livelihood (Stahl, 2004). We have stressed several times already that e-teaching tools are not value neutral but their use has consequences which have ethical importance. To return to the list of issues raised in our earlier discussion of technology, we can look at the impact that e-teaching tools have on privacy, intellectual property, data quality, social structures, and the view of humans.

In all cases, it is relatively simple to observe or imagine relationships between computer ethics and e-teaching tools. If we take the example of VLEs then we can identify aspects of these that are related to ethics. Privacy and data protection, for example may be affected when data on students or staff is collected that previously was not available. As noted earlier, many of the standard commercially available VLEs, such as Blackboard, allow teachers to check the usage of the site by their students. Teachers thus have information as to how often students have accessed which part of the VLE, at what time of the day etc. This can affect the teacher's evaluation of the student and thus have grave consequences for the student. Similarly, a VLE may raise issues of intellectual property. If teaching material is put online and students are able to download it, then they may use and modify it electronically, thus allowing them an easy route to infringement of copyright. Data quality is also important because the quality of the learning experience will be affected by the quality of the data provided. This was certainly true before VLEs but it becomes more salient due to the reliance on quantitative data in an information technology environment.

Another ethical issue regarding ICT is its impact on social relations, be they between nations, within societies or organizations. One part of this is the question of digital divides but it also extends to political and organizational power relationships. These tend to produce social consequences, that in turn have ethical importance. For example, some tools, such as multiple choice tests, are very reliable, easy to use and therefore favored by teachers. What is noticed less often is that they also imply a certain relationship between teachers and learners, namely that of the 'sage on the stage' who tells students the truth rather than 'guide on the side' who encourages students to fulfill their own goals. In effect, this translates into a very strong centralized position of the teacher whereas other teaching tools, such as online chats, voting tools etc, imply different power relationships. Such organizational relationships are central to the way we perceive humans and the resulting ethical questions. Are students machines of data digestion that need to reproduce the truth as taught and then function in their economic role or are they autonomous persons whose purpose in life is to flourish? Such questions of course go beyond the use of technology in teaching, but they are affected by our use of technology.

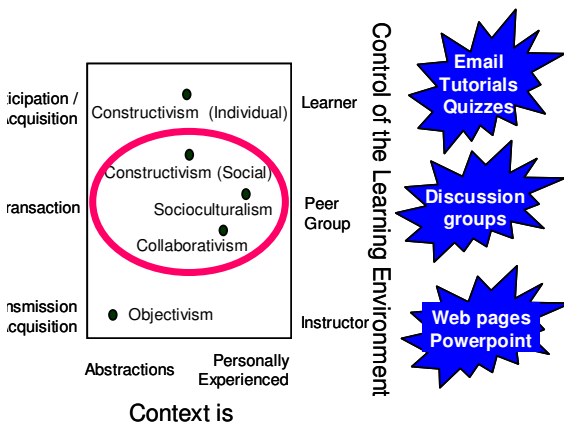
Another example was recently directly observed by one of the authors. During an external quality review at his faculty, several assessors were temporarily 'enrolled' as guests on a number of module VLE sites. This was conceived as a way of providing access to documents such as module outlines, assessment specifications and so forth, and there was no prior consultation with module tutors. It emerged that no-one in authority had considered that this also allowed access to email communications, online discussions and virtual classrooms – areas where teachers and students might reasonably expect their discussions to be private, and where normally no inspector or manager would intrude without prior arrangement and due warning. While there is no evidence of a hidden agenda in this particular case, it clearly raises questions about the sorts of information that could be collected and the uses to which they could be put, thus illustrating Feenberg's (1999) argument that control of technology is tantamount to a form of legislation.

### **3.2 Technology and Pedagogy: E-teaching Tools and Pedagogical Theories**

As noted earlier the use of a number of VLE tools (email, tutorials, quizzes, Web pages, and Powerpoint) are all clearly related to a positivist pedagogy in that the learners are provided with tools that will scaffold

and mediate their learning experience through giving them access to what has been selected and designed by the teacher.

Use of the discussion boards however, has been shown to not only have the potential for supporting the participatory/transaction models of learning but can also facilitate a more androgogic (Knowles, 1970) social constructivist pedagogy. There is, for example, a great deal of empirical research that reports the benefits and potential of networked learning (see Lehtinen, Hakkarainen, Lipponen, Rahikainen and Muukkonen, 1999 for a review) and, in particular, the positive effects of social interaction during learning (e.g. Crook, 1999; Dillenbourg, 1999). Additionally, other research has found that collaboration amongst students has been shown to stimulate activity, make learning more realistic and to stimulate motivation (e.g. Harasim, 2000; Veerman, and Veldhuis-Diermanse, 2001). Furthermore, Bligh (1998) concluded that discussion methods are more effective than didactic methods (e.g. lectures) for stimulating thought, for personal and social adjustment, and for changes of attitude, and were hardly worse than lectures for effectively transmitting information.



4. Dimensions of learning mapped to technological tools

Nevertheless taking the three models of learning that Koschmann (1994) proposes and applying this to a modified version of the Leidner and Jarvenpaa (1995) framework, the diagram shown in Fig. 4 might more usefully illustrate the dimensions of learning, as well as relating these to the different uses of ICT within a networked learning environment.

### 3.3 Pedagogy and Ethics: Pedagogical Theories and Computer Ethics

In distinguishing earlier between constructivist and positivist pedagogical theories, we have already identified that there may be a link between computer ethics and pedagogy. A closer look at these theories reveals that they are not predominantly of a pedagogical nature but rather result from a general philosophical stance, based on a specific view of ontology. Positivism is based on a realist ontology, which states that the world exists independent of the observer. Constructivism, on the other hand, holds that reality is a (social or individual) construct. If positivist realism is correct, then truth can be described as a correspondence between a statement and reality. True statements can be taught, learned, and reproduced.

In the constructivist ontology, truth can only be an agreement by those who are involved in the construction and teaching should concentrate on the process of being involved in creating useful constructions.

If this characterization is correct, then certain pedagogical theories correspond with certain ethical approaches because they are based on similar ontologies and general philosophical worldviews. In the positivist / realist world, one can presume that there are valid ethical theories and that these will lead to determined morally correct actions. The task of computer ethics will thus be to find out what the moral problems are, how they should be evaluated, and to help individuals and collectives do what is ethically desirable. This reasoning is represented by prescriptive approaches to computer ethics, which concentrate on professional duties of the individual (Gotterbarn, 2004). Van den Hoeven (1997) calls this approach the "engineering model" of ethics, because it assumes that there is one correct solution to an ethical problem.

Ethicists closer to the constructivist understanding of reality would be careful about the possibility of such a determinist approach to ethics. If reality is a social construction, then there can be no objective ways to determine the ethicality of an action and thus no general moral rules that are binding for everybody under all circumstances. For the constructivist, addressing ethical issues of ICT must therefore involve a process of agreement on the definition and understanding of the problem and a collective attempt to define an adequate response. Constructivists will therefore be more participative and discourse oriented, and will try to involve all stakeholders in a solution (cf. Rogerson, 2004).

While this characterization is more black and white than actual positions tend to be, it does indicate that there is a link and an overlap between certain positions in computer ethics and specific pedagogical theories.

#### **4 CONCLUSION: THE CENTRE**

The aim of the paper was to develop a framework that would allow us to locate areas of interest in the overlap of ethics, technology, and pedagogy. Based on the assumption that e-teaching and e-learning are ethically relevant uses of technology in education, we tried to identify areas of overlap and commonalities which might help us concentrate our research efforts with the aim of facilitating a better use of ICT in education. Our discussion of these issues has shown that there are fundamental philosophical assumptions which we need to be aware of in order to deal with the issues. One such central assumption stems from ontology. Depending on whether we follow a realist / positivist view of the world as external to the observer or a constructivist view, we will have a different understanding of technology as well as ethics and pedagogy. A similar fundamental issue is that of the nature of humans and their role in society. Philosophical anthropology is closely linked to ethics and education but it also has links with technology.

Currently there seems to be little interest in the exploration of the intersection of these areas. E-teaching and e-learning are timely issues of interest but the majority of research in the area is narrow in its scope. This is of course legitimate and the consequences of the use of a certain technology or the relationship of a particular pedagogy with technology are questions of interest. What appears to be lacking, however, is a good overview of the relationships of the different issues involved. In this paper we have made a first step to address this shortcoming of the debate. We are sure that there are many more views and theoretical approaches worth exploring. It is therefore not the purpose of the paper to present a comprehensive framework. Instead, we see the framework developed here as a starting point that can and should be added to. We are also aware of the fact it is not likely that there will ever be a general agreement on the matters presented here. Our own ontological, anthropological and ethical beliefs are sure to have coloured the narrative. It is nevertheless important to discuss the issues raised here. One reason for this is that there are instrumental and functional objectives that can be linked to it. If a given technology is not compatible with the underlying pedagogy or if the pedagogy conflicts with ethical ideas, then it is likely that the purpose of the use of technology, namely to educate, is in danger of not being fulfilled. Closer attention to these issues

can thus arguably lead to higher success rates. This is an argument that should appeal even to those readers whose philosophical assumptions differ radically from ours.

A second and more important reason is that the above considerations go to the heart of what education is about. Education and the institutions delivering it have a high degree of legitimacy, which is partly caused by the perceived moral advantages they offer (Stahl, 2004). Developments that lead to doubts about the moral acceptability of education have the potential to undermine its legitimacy can therefore threaten the way we perceive education. It is therefore in the interest of everybody involved to consider the relationship of ethics and education and, as we have argued here, this includes reflecting on the conceptual links between technology, pedagogy and ethics.

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Technology, Pedagogy & Education, Vol. 16, No 1, pp. 111-126, 2007

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Technology, Pedagogy & Education, Vol. 16, No 1, pp. 111-126, 2007

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