

Social interactions and the construction of knowledge in computer-mediated environments

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Abstract: A growing body of research suggests that the interpersonal relationships and interactions that mediate learning online may differ in a number of respects from those pertaining within face-to-face educational environments. Even people whom we ‘know’ in other circumstances may not interact with us in the same way within computer-mediated contexts. Furthermore, electronic learning spaces often encompass a greater range of participants than is customary within traditional classrooms, in some cases including personified and ‘intelligent’ software and interfaces. This paper explores some theoretical perspectives that support recognition of the importance of these factors in designing online educational experiences for students.

1. INTRODUCTION

While the social dimensions of learning in face-to-face contexts are well recognised and researched, in relation to computer-mediated educational environments they are less well understood. A considerable body of research, much of it taking place outside the specific domain of education but of great relevance to it, suggests that computer-mediated interpersonal interactions have particular qualities which differentiate them significantly from their face-to-face equivalents. Even people whom we ‘know’ in other circumstances may relate differently to us within electronic contexts. Furthermore, within these notional social spaces, students are increasingly being required to interact with a far broader range of people than in the traditional classroom.

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Other potential participants in the social interactions which mediate learning may include significantly personified interfaces and software 'agents'. At a conscious level both we and our students are well aware of the difference between a fellow human being and a computer. Nevertheless certain aspects of the way we talk and think about this technology, combined with factors such as the part played by language in the majority of interfaces, encourages us to frequently respond to computers much as we do to people. Where personification is a deliberate part of the design of an interface, this tendency is almost irresistible. A further dimension of personification exists in the form of programmes, in particular those now known as 'agents', designed specifically for the purpose of interacting with users in a manner indistinguishable from that of a human being. Yet another ground for making a distinction between the social aspects of computer-mediated and traditional educational environments is the belief held by a number of theorists that our own self representation through electronic text may encompass qualities and attitudes not characteristic of our face-to-face 'selves'. The result is an educational milieu encompassing a more complex social scenario than that to which we are accustomed in the traditional classroom. If we are to seriously accept the concept of knowledge as being socially constructed, then a close examination of the special qualities of the interactions which take place within these new educational environments is imperative.

2. REPRESENTING OURSELVES WITHIN ELECTRONIC ENVIRONMENTS

In the physical world we represent ourselves through a range of behaviours, signs and symbols which together constitute a complex and multi-faceted impression of who we are. These include aspects of our appearance, our voices, our facial expressions, our clothes and other possessions, our chosen companions and so on. In the traditional classroom both teachers and students quickly become 'known' through such characteristics of their physical presence, both as individuals and as elements of the social dynamic of the class. Where the 'self' is revealed solely through electronically mediated text, this richness of information is obviously not available.

It has long been established that even word processing, the most apparently straightforward of all computer based writing environments, can involve subtle but significant changes to the way in which we constitute ourselves through language. Theorists such as Heim would go so far as to suggest that, "... the word processor creates a new relationship to symbols, to language, and, by extension, to reality" (Heim 1993), including the reality

of the 'self' as manifested through these symbols. As Poster writes, "... electronically mediated communication upsets the relation of the subject to the symbols it emits or receives and reconstitutes this relation in drastically new shapes" (Poster 1990). It seems possible that the apparently infinite malleability of computer based text may itself militate against the realisation of a coherent and integrated personality through this medium. If there is no limit to the changes I can make to my textual representation, is there actually a 'real' me? At a more practical level, even factors such as lack of expertise at keyboarding can have a marked effect on choice of words and structure of sentences, giving an 'impression' of the writer which might be significantly at odds with that obtained during a face-to-face conversation.

Not everyone perceives this as cause for concern. While most of take comfort from the concept of at the very least some stable 'core' to our selves, we readily accept the fact that we often behave, speak or dress differently in different contexts, according to what we believe to be appropriate. This may be in part involuntary and in part deliberate – a mix which most likely pertains to electronic environments as well, though not necessarily in the same proportions.

Apart from the involuntary differences which might exist between our physical and our online selves, electronically mediated environments provide a wealth of opportunities for the deliberate creation of alternative manifestations of ourselves which are welcomed by many computer users and theorists. The exploration of dimensions of our personalities which are denied expression within the traditional ideal of the integrated persona is not necessarily detrimental to our well-being. Turkle, for instance, suggests that the creation of multiple online personae is very much in keeping with many contemporary theoretical positions in which flexibility, multiplicity and openness to change are increasingly considered to be valuable and appropriate qualities. As she puts it, "... the many manifestations of multiplicity in our culture including the adoption of online personae, are contributing to a general reconsideration of traditional, unitary theories of identity" (Turkle 1995). She also aligns these developments more specifically with strands of thinking within established psychoanalytic theory which encompass the possibility that, "You can have a sense of self without being one self" (Turkle 1995). Examples and discussion of flexible self representation within electronic environments, including the often contentious area of gender identity, are documented by a growing body of literature (Dery 1994; Jones 1995; Spender 1995; Cherny and Weise 1996; Mitchell 1996).

Beyond the creation of identity through text alone, networked contexts already exist within which users are also able to represent themselves graphically, with increasing sophistication. While fewer people as yet have

access to the modelling capabilities of three dimensional virtual reality environments, these will certainly offer increased opportunities for personal choice and creativity in determining how we represent our electronically mediated selves to others.

The fact that our 'telepresence' may differ in certain respects from our physical presence lends an unprecedented degree of uncertainty to the extent to which we 'know' our fellow participants in online learning environments. While not necessarily a 'problem', it is certainly a feature which distinguishes such educational contexts from more traditional settings, and one which has the capacity to impinge on our usual understandings of the way in which the interpersonal relationships between the participants will mediate the learning which takes place.

3. INTERACTING WITH OTHERS WITHIN ELECTRONIC ENVIRONMENTS

The special qualities of interactions taking place through the medium of screen based text have been recognised since the earliest use of electronic mailing systems. Reports of the implementation of the Minitel electronic mail system in France in the 1980s, for instance, feature heartfelt complaints of the disruption afforded to a hitherto rigid social system by the new-found capacity for communication across different strata of society (de Lacy 1987). At around the same time, research undertaken within large organisations which were early adopters of this technology suggests that in some cases the processes of corporate decision making are altered by those qualities of electronically mediated communication which blur the usual hierarchical distinctions between participants. More recently, reports have abounded of extreme levels of verbal abuse or 'flaming' recounted regularly and often gleefully by the popular press, of normally quiet and retiring individuals pouring out their hearts online to relative strangers, or of people deliberately adopting personalities far removed from their usual identities and expressing themselves accordingly. It should be noted that instances of unwelcome interactions are well balanced by accounts of the many groups and individuals who describe, with great eloquence, supportive relationships and a new-found experience of community (Rheingold 1994; Turkle 1995; Spender 1995; Jones 1995; Preece 1998).

An interesting aspect of the descriptions of both positive and negative social experiences online is the degree to which they are given the same emotional status as a face-to-face encounter. For the participants, the feelings and reactions evoked are as strong and as 'real' as those pertaining to interactions in the physical world. The old adage that "sticks and stones can break your bones, but names can never hurt you" may not hold as true in

electronic realities where sticks and stones are absent, and 'names' are everything. The effects of both positive and negative remarks on students might well be magnified under these circumstances.

In face-to-face situations, a multitude of cues and constraints determine the manner in which we speak to one another. These may include the nature of the space in which the interaction takes place, the perceived status or role of the each participant relative to one another, physical appearance including age and gender, and so on. Within electronic environments, few of these indicators apply. Such liberation, while intrinsically democratising, is also well removed from the ethos of many classrooms.

The role and relative status of each participant within the face-to-face classroom is generally clearly defined and understood, whether explicitly or implicitly. While the traditional scenario within which the teacher has the knowledge and the authority and the student is there to learn, primarily from the teacher, has long been under challenge, the potential for undermining its fundamental assumptions is greatly magnified within most online environments. These contexts incorporate the capacity for a range of styles of interpersonal interaction, all of which need to be fully explored and evaluated in terms of their efficacy in promoting learning. For example, within real time interactive educational environments of the Multi-User Dimension (MUD) type, should the persona adopted by the teacher incorporate 'wizard-like' capacities for control, commensurate to an extent with the advantages enjoyed by teachers in physical learning spaces, or should all participants be of equal capability and status? Where the teacher adopts the role of facilitator rather than instructor, a scenario currently favoured in many existing learning contexts where constructivist principles apply, will other, perhaps unanticipated configurations and hierarchies of inter-relationships arise, and will these necessarily be conducive to learning? It is through consideration of questions such as these that we can determine whether online learning environments will simply replicate the social organisations which exist in face-to-face settings, or will provide the possibility for new types of interaction through which knowledge may be socially constructed.

A frequently cited benefit of electronic classrooms is their capacity to extend beyond regional or national boundaries. This raises a whole range of issues to be considered. It is well recognised that different cultures vary in the types of interactions between teacher and student that are considered acceptable. From a young age, students are inculcated with a range of protocols and expectations in regard to matters such as who speaks first under different circumstances, the type of language which is acceptable in particular situations or when addressing certain people, the various means of showing degrees of acknowledgement of and respect for the opinions of

others, an appreciation of the rights of others to be 'heard', a common understanding in relation to the 'ownership' of work and so on. Many of these understandings differ across cultures. More generally, there may be different cultural expectations governing interpersonal interactions for instance between young and old, or between novice and expert. A lack of awareness of and sensitivity to such differences can cause misunderstandings, particularly in online situations where, for instance, a consequence of keyboarding rather than speaking may be the use of short sentences which could convey an unintended impression of being peremptory or simply rude.

4. INTERACTING WITH ELECTRONIC 'LIFE FORMS'

In addition to interacting with electronic manifestations of other human beings, students in online environments are increasingly likely to encounter software 'entities' in some cases so thoroughly personified as to be indistinguishable from real people.

Indeed there is a sense in which the computer itself may be regarded in this light. Whether or not the interface through which the computer's 'self' is manifested is deliberately personified, a degree of personification is conferred automatically and inevitably through our widespread acceptance of the 'intelligence', albeit 'artificial', of computers, allied to the use of language as a significant component of most interfaces. Intelligence and language use are, after all, traditional distinguishing attributes of human beings. As Shirk puts it:

Although there is some dispute among software critics concerning the advisability of having 'personalities' in computer programmes, their presence seems unavoidable. Any time there is communication between a computer and a human, the information presented by the computer has a certain style, diction, and tone of voice which impact upon the human's attitude and response toward the software. (Shirk 1988:320)

While some theorists, perhaps most notably Shneiderman (1992), play down the importance of personification in favour of the advantages of 'direct manipulation', a term which has become a focus for that style of interaction most familiar to us in the form of graphical user interfaces, other researchers and software developers see it as conferring some important advantages. Laurel, for instance, suggests that deliberately personified computers, whether portrayed as companions, servants, pets or whatever, are helpful in mobilising our existing understandings of social interactions in mediating "... a relationship between the labyrinthine precision of computers and the fuzzy complexity of man" (Laurel 1990). Andersen, on

the other hand, warns that some users are threatened by the potential for 'interpersonal intimacy' implied by a heavily personified interface (Andersen 1990). This relates to the concern of a number of theorists and software designers for appropriateness and consistency of rhetorical 'tone' throughout any one interface.

The tone of the interface is particularly important in defining the status of the computer within the social milieu of the classroom. Many students perceive computers as possessing an aura of expertise, indeed of infallibility, which may not sit well within a constructivist environment. Indeed the 'authority' of the computer might often appear to surpass that of the teacher. While it can certainly be argued that such considerations are less important in online learning environments than in traditional computer assisted learning, the reality is that many students use computers in a variety of modes, often including segments that are effectively CAL applications. Even accessing the Internet involves interaction with particular styles of interface.

Attempts to design to design interfaces imbued with 'character', capable of interacting in varying degrees with the user, have so far met with mixed success. Many of us are familiar with various versions of Apple Computer's 'Phil', an entity realised in different graphical formats, and having some capacity for 'conversation' with the user. Microsoft's 'Bob', a later attempt at an anthropomorphic interface, has been abandoned in its present form, although Microsoft has not rejected the overall concept in relation to future interface developments. In their representation and behaviour, both of these interfaces relate to Laurel's original conception of an 'agent', as "A character enacted by the computer, who acts on behalf of the user in a virtual environment" (Laurel 1990).

With the expansion of the Internet, 'agency' has become a flourishing area of research and development. In addition to interface agents of the type described above, a range of software 'knowbots', 'spiders', and the like already scurry around the Net in the service of increasingly sophisticated search engines, while software 'personalities' interact, often undetected, with human participants in MUDs and Object Orientated MUDs (MOO). The work of Pattie Maes and her team at the Massachusetts Institute of Technology (MIT) is particularly interesting in relation to the connections which have been made between the idea of agency and research into 'artificial life'. This approach encourages a high degree of autonomy in software agents, which raises many questions of a psychological, philosophical and ethical nature concerning the nature and definition of our own 'personhood' and the many implications of interacting with artificially constructed 'persons'. The role of software agents within electronically

mediated educational contexts is rapidly becoming a focus for discussion at educational computing conferences (Chan et al. 1998).

It certainly seems likely that, in the near future, students in online environments may be required to interact with software interfaces and entities which are far more deliberately and deeply anthropomorphised than is the case today. Will they be able to distinguish between these artificial 'personalities' and real human beings? Will it matter? In what sense will such entities be able to participate actively in the social construction of knowledge within computer-mediated educational environments? What sort of intellectual collaborator is a piece of software? The answers to these and other such questions might well change over time, as agents grow in complexity and sophistication.

5. CONCLUSION

Within electronic environments, the dimensions of the social interactions which mediate learning are undoubtedly increasing in complexity. In addition to a degree of unavoidable 'social' engagement with the computer itself, within the vast social space constituted by the Internet there is the potential for a huge variety of other participants, both human and digital, to be involved in those social and cognitive relationships and interactions through which students learn.

What this will eventually mean for student learning, only time will tell. The move from the tightly structured, enclosed environment of the traditional classroom in which relationships and information are strongly mediated by the teacher, to a world which is in some senses more open and diverse even than that of the student's own environment outside the school grounds, is without precedent. Perhaps one of the skills which will grow in importance as a consequence of the unregulated nature of the social aspects of knowledge construction within these new contexts is the capacity to be 'people smart'. This might involve students being more conscious and aware of the subtleties of interpersonal interactions and using these understandings in order to better comprehend and evaluate the rich and complex information sources and exchanges which are becoming available to them.

There are considerable challenges here for researchers, for teachers and for students themselves. The one thing that is certain is that there is no going back!

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BIOGRAPHY

Carolyn Dowling is an Associate Professor and Head of the School of Arts and Sciences (Victoria) at the Australian Catholic University. Prior to becoming a university academic in the area of computing and information technology she worked as a high school teacher of English Literature, French and Mathematics, then for a number of years as a freelance writer. Her teaching and research interests focus on a range of HCI issues, social and ethical aspects of computing, computer-mediated writing and aspects of Internet use.