

The Curriculum of the Body in the Age of Electronic Mediation

by

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In an age where many forms of literacy are electronically mediated, what is the role of the body in learning? The fact that learning always necessarily occurs in a situated and embodied context is consistently overlooked in the literature of educational technology. In this literature, the learning process is most often reduced to terms that are themselves derived from the operation of computers and computer networks: Communication is understood as information transmission, thought is seen as symbol manipulation, and learning as a whole is viewed as a disembodied, placeless activity. Focusing on the issues of communication and language, this paper will undertake a review of these themes as they are presented in the literature of educational technology. Drawing on Merleau-Ponty's phenomenology of perception and the body, it will also consider alternate ways of conceptualizing these educational experiences in their lived, concrete, embodied reality.

In the literature discussing the mediation of linguistic and other communication through computer networks ("computer-mediated communication" or CMC), this communication is almost inevitably understood in "linear" and "sequential" terms (Krendl, et. al. 1996). More specifically, it is analyzed in terms of the transmission of information from sender to receiver. Roy Pea, for example, describes this understanding of "communication as [the] transmission of information" as being the "reigning view" in both educational theory and practice (1994).

As such, the origins and subsequent educational interpretations of this understanding of communication deserve further attention. What follows, then, is an introductory précis of what has come to be known as "information theory." Whether communication is textual or multimodal, synchronous or asynchronous, it tends to be understood in this theoretical framework as being a set of discrete "signals" or "cues" transmitted through a particular medium or "channel". In his overview of the literature of CMC, Joseph Walther describes how this transmission or mediation is often understood as the "filtering out" or "limiting" of these cues through the constraints (or "bandwidth limitations") of a particular channel (Walther, 1996, p. 6). Because text-based communication, for example, does not transmit audible tone or visible gesture, it is seen as "limiting" or "filtering out" these particular signals or cues. Meanwhile, audio-visual communication media are understood as providing greater "bandwidth" for these same signals or cues, and therefore a higher "ranking" or degree of "presence" (Lombard and Ditton, 1997).

These dominant approaches to communication, as Walther explains, "speak, conventionally enough, to four different but related elements of the communication process: receivers, senders, characteristics of the channel, and feedback processes." That which is communicated passes from sender to receiver (or receiver to sender in the case of feedback). The characteristics of the channel through which it passes are understood as being able to change the nature of the message and its effect on the receiver. These four elements have their origin in "A Mathematical Theory of Communication" formulated by Claude Shannon. This theory, developed while Shannon was working for Bell Laboratories in the 40's, forms the basis for contemporary information or communication theory (Pierce, 1961), and is a cornerstone of cybernetic theory (Hayles 1999). Shannon's document provides the following schematic of the communication process:

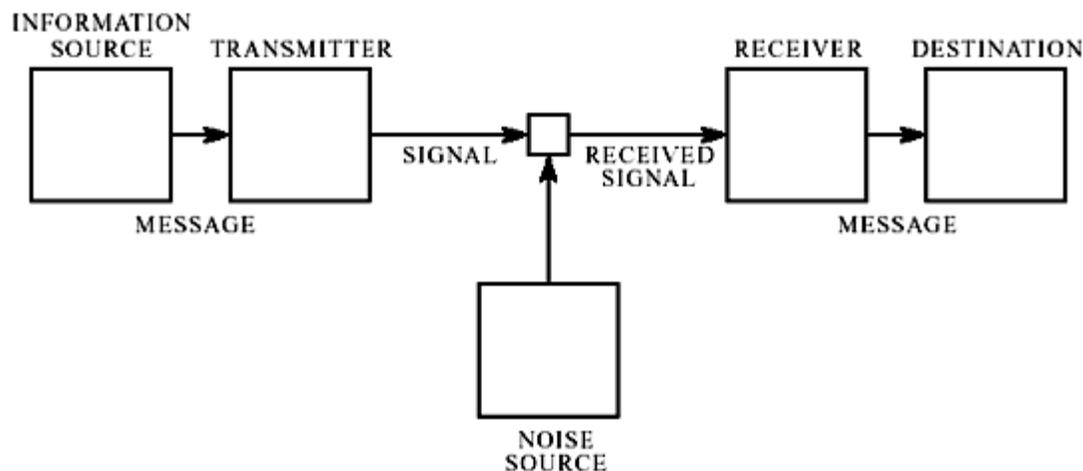


Figure 1: Claude Shannon's Mathematical Theory of Communication

Unlike the four elements of the communication process outlined by Walther, Shannon's theory breaks down "sender" and "receiver" as well as the information sent and received into clearly differentiated sub-components: The sender becomes information "source" and "transmitter", and Walther's more generic notion of receiver is broken down into "receiver" and "destination." Signals or cues, in turn, are understood in terms of "message" and an "encoded signal." Shannon's model is further differentiated from Walther's description in its emphatic exclusion of any notions of meaning or semantic significance. As Shannon himself explains,

The fundamental problem of communication is that of reproducing at one point either exactly or approximately a message selected at another point. Frequently the messages have meaning: that is they refer to or are correlated according to some system with certain physical or conceptual entities. These semantic aspects of communication are irrelevant to the engineering system (Shannon, 1948 p. 1; <http://cm.bell-labs.com/cm/ms/what/shannonday/shannon1948.pdf>).

Instead of focusing on questions of meaning, Shannon goes on to explain that he elects to "represent the various elements involved as mathematical entities, suitably idealized from their physical counterparts" (Shannon, 1948, pp. 2-3). Shannon's model thus separates information from the human world of meaning or semantics --and in this way sets the foundation for information theory specifically as a *science*. In this context, information is not so much decontextualized or fragmented as it is removed altogether from the human world of intention, interpretation and meaning. Information is understood exclusively in terms of abstract, mathematical patterns. These patterns are further seen as being independent of any specific physical instantiation or substrate in which they might become intelligible to human beings --whether they are traveling through a modem or network, stored on a computer hard-drive, or flickering on a computer screen (see Hayles, 1999; <http://englishwww.humnet.ucla.edu/faculty/hayles/Flick.html>).

Unfortunately, the literature in education that discusses CMC is not nearly so clear on the question of meaning and its relationship to abstract signals or patterns that travel through a "communication channel." According to Walther's own description, this literature dispenses with the distinction between "information source" and "transmitter" on the one hand, and "receiver" and "destination" on the other. For Shannon, these sub-components serve to separate the potentially meaningful "message" from the purely mathematical "signal" which he is able to identify as the proper object of his study. It is important to note that the "signals" or "cues" that the literature of CMC describes as being transmitted (or alternatively, "filtered out") by the communication channel or medium are *not* mere signals or patterns devoid of meaning. They are expressions, gestures and tonalities that are qualitatively different from encoded signals that form the subject matter of Shannon's information theory. In this way, the literature of CMC conflates and confuses the qualitatively different orders of signal and expression. It mistakes, in other words, the concrete, substantive and semantic for the abstract, mathematical, and formal. Similar confusion seems evident in diagrams from Laswell and

Schramm that schematize aspects of communication research and mass communication (respectively; Saettler, 1990, pp. 265, 266).

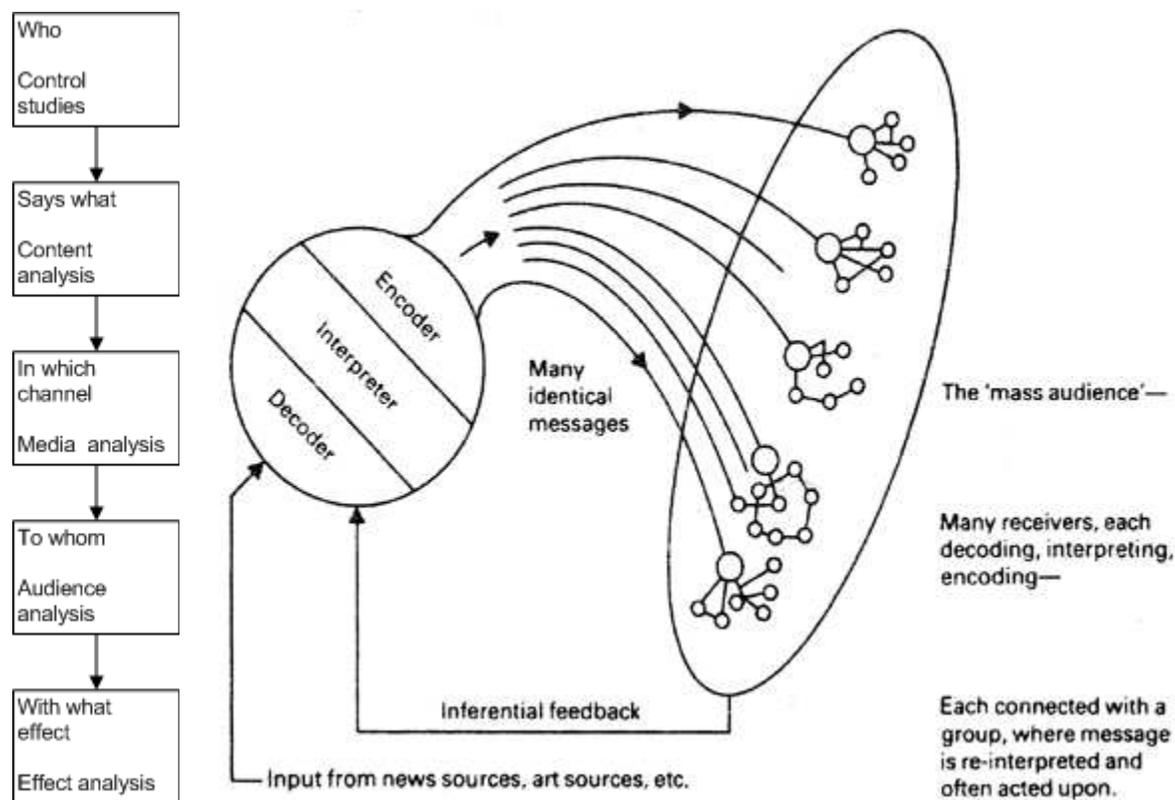


Figure 2:
Laswell;
Communication
Research

Figure 3: Schramm, Mass Communication

To avoid this confusion, and to effectively address the role of CMC in learning, we should not use a theory that simply reproduces the terms used in computer engineering, and imposes them on the experience of the use of computer technologies. Instead, we should recognize the radical difference separating the way we experience the use of these technologies from the sheer mechanics of their operation. We should look at the experience of using this technology through reference to a methodology and a language suitable to the study of human experience itself. Writing in the 1960's, Maurice Merleau-Ponty advocates just such an alternative to this purely operational, "cybernetic" understanding. This alternative takes the form of a phenomenology of embodied experience. His argument for such a form of enquiry in the fact of the "operational" thinking of cybernetics or engineering is very eloquent; I quote it here at some length:

To say that the world is, by nominal definition, the object x of our operations is to treat the scientist's knowledge as if it were absolute, as if everything that is and has been was meant only to enter the laboratory. Thinking "operationally" has become a sort of absolute artificialism, such as we see in the ideology of cybernetics, where human creations are derived from a natural information process, itself conceived on the model of human machines. [We] must return to the "there is" that underlies [science]; to the site, to the soil of the sensible and opened world such as it is in our life and for our body --not that possible body which we may legitimately think of as an information machine, but that actual body I call mine...not the body as a chunk of space or a bundle of functions[,] but that body which is an intertwining of vision and movement (1964).

I will address the matters of the "ideology of cybernetics" and "operational thinking" later; for the time being, I would like add to Merleau-Ponty's description of the body as the intertwining of vision and movement the

similarly interrelated aspects of expression and emotion. For it is these dimensions of corporeality that can readily provide us with a phenomenological illustration of communication outside of the "information transmission" model.

To begin, it can be useful to consider the experience of any intense (or even mild) emotion in a social situation, in a classroom or elsewhere. In such a situation, it can often be difficult to repress our expression of these emotions --whether it is a yawn of boredom, a blush of embarrassment or a frown of confusion. In the conceptual framework that predominates in discussions of educational technology, these emotions would be considered "signals" that are either "filtered out" to a lesser degree by video or audio, or to a greater extent by text. However, if we think back to what it is actually like to be angry, bored or enthusiastic in, it seems clear that these emotions are not communicated as signals whose meaning is first deliberately encoded by a sender and then decoded by the receiver. Speaking specifically of cues, signals or "signs", Merleau-Ponty observes that

...we cannot say that only the signs of love or anger are given to the outside observer and that we understand others indirectly by interpreting these signs: we have to say that others are *directly* manifest to us as behavior (emphasis added; 1962).

We do not receive a "signal" informing us, in other words, that someone is angered or embarrassed when their face turns red in rage or shame. Instead, we share the experience of their pain or their embarrassment without engaging in a "deciphering" process. The type of "literacy" involved, to use the term loosely, is much more immediate. The sight of another person (or even animal) in pain provides another good example of this. The pain from a child's scraped knee or the agony of the long distance runner becomes our own for a moment. Using the term "gestures" to refer generically to this un-mediated, corporeal communication, Merleau-Ponty explains this as follows:

I do not understand the gestures of others through some act of intellectual interpretation (or "cognitive operation").... Communication is achieved when my conduct identifies this path with its own. There is mutual confirmation (, a "concurrence") between myself and others (1962).

The meaning of the gesture, Merleau-Ponty concludes, is "immanent in it". The key, he explains, is a kind of "intercorporeality" or corporeal "identification", where there are no signs, signals or cues to be considered separately from meaning, and where meaning is inextricably embedded in concrete, physical particularities. The intercorporeal identification that Merleau-Ponty describes, moreover, is prior to any sort of intellectualized understanding of signals, symbols, decoding, sender and receiver.

All of this points towards an understanding of computer mediated communication as something that is experienced quite differently than accounts of information transmission would suggest. The modalities through which we experience the world as embodied beings are not simply subtracted one by one as we move to a medium that admits only of vision or voice. Instead, our experience of these media is reconfigured in novel ways, and around different experiential elements.

In the case of text-based CMC, for example, the identification and intercorporeal elements that would otherwise be associated with the body can be seen as being closely linked with participants' names. These most often appear in message headers, as well as in listings that provide an overview of messages by both chronology and subject (as shown here):

Question [Forum: Week 1 Discussion]

1. [Terry Smith](#) (Wed, Sep. 2, 1999, 15:34)
2. [Terry Smith](#) (Thurs, Sep. 3, 1999, 16:12)
3. [Susan Marcus](#) (Fri, Sep. 4, 1999, 9:34)
4. [Maria Plummer](#) (Tue, Sep. 4, 1999, 10:50)
5. [Diane Hayes](#) (Wed, Sep. 4, 1999, 14:47)
6. [Dan Merceau](#) (Wed, Sep. 4, 1999, 20:14)



Figure 4: Message list in a CMC system.

Figure 5: Full screen image of a CMC system; select to enlarge.

These names, in a sense, are all that users have to identify one another. Even as participants may come to know more about each other through their textual communications, these names, in a sense, are all that this knowledge can refer to. Users' names --along with the ID's and passwords often used to log into CMC systems-- can be said to play a role similar to the body's as a "guarantor" and a "manifestation" of one's identity (see Friesen, 2003 for more: <http://techne.cjb.net>).

At the same time, the communicative identification described by Merleau-Ponty is perhaps translated into textual, literary terms --a process and a corresponding type of literacy that will be considered later in this paper. In one of the few articles that consider CMC in terms similar to those used here, Andrew Feenberg hints at how this identification might occur. "Ordinary individuals", he argues, "possess the 'literary' capability necessary to project their personalities in written text. The loss of the interlocutor's bodily presence does not signify impersonality, but rather calls forth a compensatory effort" (1989).

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Having shown how discussions of CMC tend to reduce communication to abstract terms of information transmission, it is instructive to consider a similar abstraction in understandings of "thought" and "learning". Recent discussion in the area of educational technology --perhaps most prominently among those calling themselves constructivists-- describes how thought itself is "mediated" by computers and other technologies. The computer is seen as a "cognitive" technology or tool, and human thought processes are understood as being "amplified" and even "reorganized" through their use (Pea, 1985; Jonassen and Reeves, 1996; Derry and LaJoie, 1993). A leading theorist in this area, David Jonassen, uses the word "Mindtools" to refer to the use of computers as "cognitive reflection and amplification tools". He characterizes his understanding as follows:

Cognitive technologies are tools that may be provided by any medium and that help learners transcend the limitations of their minds.... The most pervasive cognitive technology is language. Imagine trying to learn how to do something complex without the use of language. Language amplifies the thinking of the learner. Computers may also function as cognitive technologies for amplifying and reorganizing how learners think (1999).

Central to Jonassen's understanding of Mindtools is the idea that the mind and the computer --especially human language and computing-- are similar. This comparison of human thought and computer processing derives from theories of cognitive psychology. In their simplest form, these theories understand thought, or the activity of the mind, as "cognitive functioning", as analogous to the operation to computer: They "assume the mind is an instantiation of a Turing machine (an abstract model of a computer processor), a symbol manipulation device" (Duffy and Cunningham, 1996). Roy Pea articulates this in a slightly different way: "Computers are universal machines for storing and dynamically manipulating symbols, which appear to serve as the currency of human thought" (1985). This "appearance" --or the "assumption" noted earlier by Duffy

and Cunningham-- is not interrogated further. Indeed, this notion serves as a common truism of the late 20th century, referred to, for example, by

Vannevar Bush, a professor of Claude Shannon at MIT, who articulated one of the earliest visions of the World Wide Web (see video bush.mov, right; see also: <http://www.kerryr.net/pioneers/bush.htm>). Instead, Pea (and other constructivists like Jonassen) turn to Vygotsky's notion of the linguistic sign as acting "as an instrument of psychological activity in a manner analogous to the role of a tool in labor" (Vygotsky, 1978). Language consequently comes to be understood as a sort of collective, aggregate tool, and the mind itself is understood as a machine for manipulating such tools, symbols or signs. We are literate only insofar as we can effectively process, input and output these signs. As a corollary, these linguistic tokens are understood as being able to circulate between mind and cognitive technologies like computers, to constitute a type of "distributed intelligence":



[bush.mov](#)

Our conception of technologies is broad. In it, the user and the hard technologies (computers, video, etc.) blend together to form a single entity with distributed intelligence, where learners contribute what they do best and technologies contribute what they do best... (Jonassen, Peck and Wilson, 1999).

In understanding language as a technology and a symbol system comparable to those processed by computers, this theory engages in the same conflation or confusion that was identified earlier in this paper. Like theories of computer-mediated communication, it reduces the essence of what is being communicated or thought to abstract information --something that can be transmitted as a signal, and processed as formal symbols by human and computer alike. The entirely abstract realm of formal patterns that computers process is confused with the more concrete world of human meaning and intention.

However, as was the case with "signal" and "message" in the context of CMC, the "symbol" and its "meaning" are also qualitatively distinct. Writing in The Embodied Mind, Varela, Thompson and Rosch emphasize that the meaning of symbols manipulated or processed are themselves not comprehended by the computer. Such an information processor, they say, "operates only on the physical form of the symbols it computes; it has no access to the meaning" (1992). At the same time, these authors emphasize that the language used everyday by humans is defined precisely by its meanings, intentions and the concrete, embodied context of its human users. In fact, language is not so much an artificial tool waiting to do our bidding as it is something always already an inextricable part of the human lifeworld. When Jonassen asks us to "imagine [learning] without the use of language", he is in fact asking us to consider something that is doubly impossible: Complex learning cannot, of course, occur without language. More significantly, however, we cannot take a position outside of language from which we can elect to either ignore it or use it. Human language is always already a part of the context in which we are embodied. It provides the way in which we can try to understand purposes related to the use of any artificial tools.

To understand language as a set of tools or symbols that can be used by learner and computer as "a single entity with distributed intelligence" is thus neither an accurate nor efficacious way of understanding technology in education. Instead, it again exemplifies what Merleau-Ponty describes as the "ideology of cybernetics": The hegemony of information as disembodied, de-materialized essence that leads to counterproductive notions of education and learning.

To see how language is used in the human lifeworld --the true site of learning and understanding-- we can again turn our attention to the concrete and commonplace. Consider this deceptively simple instance of language use --something so common that it could be found in a language learner or children's book:

Mary saw the dog in the window; she wanted it.

This sentence is used by Douglas Lenat and Edward Feigenbaum as an example of language that is very difficult (if not impossible) for a computer to process on a semantic level. Experts in field of "symbolic" artificial intelligence, Lenat and Feigenbaum point out the difficulties of parsing this sentence even in the simplest way. "Does 'it'" (in the phrase "she wanted it"), they ask, "refer to the dog or the window? What if we'd said 'She smashed it?,' or 'She pressed her nose up against it?'" (Lenat and Feigenbaum, 1991) But these types of questions --presenting self-evident answers to human readers-- are very difficult to answer simply through the application of formalized rules and abstract principles of computer processing.

The sentence appeals to an implicit knowledge that extends far beyond a finite set of facts about pets, pet stores and windows (as Lenat and Feigenbaum go on to argue --see video of Lenat discussing the same example, right).



Figure 6:
[Douglas Lenat](#)

In his critique of artificial reason, Hubert Dreyfus points out that this sentence appeals significantly "to how we would feel" in such a situation --and to how we would experience it as embodied beings: what it is like to want something, to see it through a window, but to be unable to be close to it or to "have" it (Dreyfus, 1992). This sentence invokes a wide range of implicit entailments and assumptions that exceed any symbolic formalisms or instrumental logic that a computer is capable of representing or processing. Understanding what is described in this sentence bring us to questions of value, desire, and self-consciousness that are clearly beyond the domain of computer logic. To read and understand this sentence without recourse to an infinite regress of formalized rules defining what the word "it" might be, implies that we are able to identify with Mary through the same type of intercorporeal identification described by Merleau-Ponty earlier in this paper.

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Again, this can perhaps be best illustrated through recourse to the evocative, associative, concrete and anecdotal language of phenomenological illustration. This time, for this illustration, we can consider two examples of a student receiving what can be termed "feedback." The first example is taken from a simulated online dissection:

From the "Course Outline," I access a site called "www.froguts.com." In preparation, I have read a short document written by the instructor that explains the dissection, what we are to do, and why we are required to do it. I am able to progress easily through the first few steps of the simulation.

[...] After I identify all of the organs using the mouse and the magnifying glass, the following message appears on my screen. "Excellent! you are now ready for a more detailed dissection!" But before I continue with the exercise, I decide to take a break to have lunch and watch TV. An hour later, I return to my computer, and I see the message still flashing on my computer screen: "Excellent! you are now ready for a more detailed dissection!"

The second example of feedback is taken from a different setting; a classroom or a laboratory:

After listening closely to the teacher's instructions, I swallow hard, bend over the pig fetus, and insert the scalpel gently into the spot described in our handouts and by the teacher. Trembling only very slightly in my hand, the scalpel slides in easily. Very gently holding the tiny pig's body in my other hand, I begin to slowly and carefully guide the scalpel up the length of the abdomen.

[...] As the end of the class approaches, we pack up our dissection equipment, and return the pig's body to a plastic bag to prevent it from drying out. On my way out, the biology teacher takes me to one side, and says: "Norm, I noticed that you seemed to be having a difficult time at

the beginning of the dissection." I reassure him that I'm doing ok, and he says: "Well, I just wanted to let you know that you're doing well in this course. Keep up the good work," he says as he smiles and begins gathering the dissection equipment.

In these two instances of what can so easily be characterized with the name "feedback," the student has completed a task, and is provided with information on how well the task has been carried out. But understood in experiential terms, there are, of course, many substantial differences. The way that computers are able to use language and the way that humans speak and are "literate" in everyday contexts are quite different --and they differ in ways that go far beyond parsing sentences grammatically and determining the simple referents of pronouns. It is even more than just a matter of knowing about the body or desire in language. For humans, providing praise or feedback, asking a question, or providing an answer all have an effect for the speakers and for any others who may be involved in the exchange. When a teacher takes a moment to check on how a student is feeling and to tell her that she is doing good work, that teacher cannot be doing something else at the same time, and it is not something he would simply repeat verbatim an hour later. The teacher takes time to pay me the compliment, and singles me out for attention from the other students.

For the computer, however, there is a rather different dynamic. It is sometimes said that "being a computer means never having to say you're sorry" (Art Buchwald, as quoted in Cuban, 1986, p. 97). If a computer crashes, deletes a file, or causes other difficulties for its user, it doesn't make an apology. It does not apologize quite simply because it cannot. To be meaningful, an apology, like any other statement, implies a promise or commitment that an effort will be made to avoid the situation which necessitated the apology. (We have all had the experience of being disappointed by an apology where this implied promise was not kept.) But computers are incapable of making such a commitment. Because they do not own anything, and cannot "own up" to something, computers cannot meaningfully "give" praise or anything else to students who may be interacting with it.

In this sense, offering praise--as is done in the examples above--is rather similar to making a promise. It is not simply a statement of fact, or a description intended to designate a particular condition in the world. Instead, such a statement can be understood as a kind of gift that implies its own economy of exchange: To be truly meaningful, it cannot be offered all the time or at just any time. To be sincere, it has to be a true "gift," and it cannot be presented in direct exchange for something. As an unmotivated act of "paying" a compliment, it affirms the recipient as a person in their uniqueness and individuality. But at the same time, this gift does not necessarily cost the giver anything but a few moments of time and attention.

But a computer is, by its very nature, unable to do these things: to give gifts, or to single someone out for attention as a matter of deliberate, meaningful choice. Winograd and Flores explain that computers "are incapable of making commitments and [therefore] cannot themselves enter into language" (1986, p. 60). Instead, as these authors go on to explain, the power of computers lies elsewhere: "Their power as tools for linguistic action derives from their ability to manipulate formal tokens of the kinds that constitute the structural elements of language" (Winograd & Flores, 1986, p. 76). Although they can manipulate language in mechanical and structurally prescribed ways, computers cannot enter the world of obligation and concern that ultimately gives language its meaning, and that constitutes our "literacy" as embodied and "committed" language users.

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The experiences and implications of commitment, giving, promising and other acts similarly laden with human meaning are phenomena that we need to investigate and describe further to formulate an adequate curriculum of embodied learning for our age of computer mediation. These experiences point to an experiential reality that too often remains implicit and unexplored in understandings of educational technology and even in conventional understandings of language and literacy. This reality of embodied and committed experience

both precedes and accompanies all acts of abstraction and formalization, and it exceeds any means-ends rationality instantiated in the formal processes of a computer or instructional system. However, to recognize and affirm the importance of such phenomena does not mean that we simply jump to the conclusion that computers are inappropriate for learning and education. Instead, it implies that we recognize that the worlds of technical function and human experience are very different, and that they are best approached through two very different forms of enquiry. One of these is technological and scientific, and the other, more anecdotal, concrete and interpretive. For the time being, to understand the curriculum of the body in the age of mediation is perhaps to understand that the most significant result of the widespread use of educational technologies is not their direct effect on the learner, but the way they foreclose on different ways of understanding learning and thought itself.

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