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ABSTRACT

The educational use of computers is changing the way people think and steering culture toward a more functional and self-conscious form of literacy. This supposition is based in Walter Ong's theory of orality and literacy (maintaining that literacy caused a removal from immediate, everyday existence and enabled the development of an analytical sense of a separate self) which he uses to explain the profound changes in human consciousness brought about by the technologizing of the word. Ong's notion of reflexive intelligence provides a theoretical framework, a skeleton of symbolic relations onto which descriptions may be structured, that accommodates the desire to examine the hypothesis at a philosophical, social, political, and educational level concurrently. Connections exist between J. D. Bolton's description of what is happening to human consciousness in the transition from print to computer and Ong's description of what happened when people moved from primary orality to literacy. Just as Plato was afraid writing would dull the mind, cause people to rely on external characters that are not part of themselves and mistake the "appearance of wisdom" for wisdom, operational literacy may encourage utility, cause people to rely on what their network "thinks" and mistake technique for knowledge. (Twenty-three references are attached.) (RS)

al Time Literacy

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Macintosh II

In this paper, I maintain that the educational use of computers is changing the way we think and steering our culture toward a more functional and self-conscious form of literacy. I base this supposition on Walter Ong's theory of orality and literacy which he uses to explain the profound changes in human consciousness brought about by the technologizing of the word. Ong's notion of reflexive intelligence (in the sense that intelligence incorporates the external tools it uses into itself so that they become part of one's restructured intelligence that then uses external tools, and so on) provides me with a theoretical framework, a "skeleton of symbolic relations onto which descriptions may be structured" (Keeney,1983, p 46), that accommodates my desire to examine my hypothesis at a philosophical, social, political, and educational level concurrently.

Ong's theory of orality and literacy.

The shift from orality to literacy was culturally agonizing according to Ong (1982), but the connection between orality and literacy ought not be seen as a matter of reductionism but rather of relationism (p 175). Language, that is, articulated sound, can exist without writing, but writing cannot exist without the spoken word. Texts, in order to be meaningful, have to be related in some way to the world of sound. Written words on a page are only cueing symbols that evoke real words--in actual or imagined sound--in informed human beings (p 75). Ong (1982) argues that the computer is seen as an external, alien technology because we have not yet as deeply interiorized it as we have the technology of writing. Ong theorizes that the technology of writing is more than an external aid even though it is artificial and distanced from the world

of real persons. It is, he claims, a deeply interiorized transformation of consciousness (pp 81-82). In order to investigate the influence technology is beginning to have on our mental processes, we need to understand the nature of orality and literacy and how the transition from one to the other affects our ways of knowing.

Orality

In oral cultures knowledge is closely referenced to the human experience, to the familiar exchanges among human beings. "Oral cultures tend to use concepts in situational, operational frames of reference that are minimally abstract in the sense that they remain close to the living human life world" (Ong, 1982, p 49). They tend to think operationally (see, for instance, Luria's (1976) account of his fieldwork with illiterate people). In an oral society, words have no visual existence, they are just sounds. As they are spoken they disappear--there is no 'residue'. Spoken words cannot be found or pointed to or referenced. They are immediate events. Even though thinking about concepts requires a certain amount of abstract thought, learning or knowing in oral cultures is typically achieved through apprenticeship, through identification with the known. Oral cultures do not, in essence, 'study' (Ong, 1982).

Ong's account of operational thinking in a primary oral culture strikes me as analogous to the current theory of situated cognition. For example, Brown, Collins, and Duguid (1989) describe learning in terms of enculturation and the "social construction of knowledge". This kind of learning, they maintain, involves conversations and shared explorations. Brown (1989) writes that learners must be allowed to make sense of what they are learning through

dialogue and experience. Schon (1983) calls this "knowing-in-action" and a "reflective conversation" in his seminal work, *The Reflective Practitioner* in which he talks about the importance of integrating thinking and doing. Similarly, embodied skills--as described in the critical pedagogy and experiential learning traditions--are "context-bound discourse-practices" (Streibel, 1989). They are the ordinary, practical, knowledge of "Just Plain Folks"--to borrow a term from Lave (1988).

A key element of situated cognition is conversation. Bowers (1987) depicts this conversation as taking place between cultural things and their symbols and human imagination. Conversation is also representative of the concept of embeddedness contained in Seely Brown's "new epistemology of learning". I interpret the concept of embeddedness as asking preliminary questions such as is *how* one knows something an integral part of *what* one knows (Keeney, 1983). One could also refer to embeddedness as the sub-text of a question (Peterson & Maciejewski, 1988). The process of asking embedded questions or carrying on a conversation with our social and cultural environment is how we get information and how we discover what sort of stuff this information is (Bateson, 1972). These elements of situated cognition--conversation, embedded questions, and learning through dialogue and experience--are congruent with Ong's (1982) summary of the characteristics of orally based thought and expression. A sound-based (oral) society is

> consonant with . . . situational thinking . . . with a certain humanistic organization of knowledge around the actions of human and anthropomorphic beings, interiorized persons, rather than around impersonal things. (p 73-74)

Literacy

Ong (1982) contends that human consciousness was transformed more by the development of the technology of writing than by any other particular invention. He claims that the written word, by removing us from our immediate, everyday existence, enables us to develop an analytical sense of our separate interior selves making possible what Eisner (1983) calls "the invention of mind". The written word depends on sight which Ong (1982) designates the "dissecting sense". In contrast to sight which isolates and externalizes, sound is a unifying sense. Sound envelopes a person; it "pours into the hearer" (p 72). Written words cannot rely on the support of gestures, intonation or speaker-hearer interaction to clarify their meaning. Therefore, written words require deliberation, precision, and correction--qualities that are unnecessary and undesirable in oral cultures. Written words have to address an invisible audience and anticipate the reader's range of possible interpretations. They have to be exquisitely precise.

Literate cultures concentrate meaning in language itself unlike oral cultures that relegate meaning to context (Olson cited in Ong 1982). In other words, the written word not only stores what we know but influences how we know it. Lakoff and Johnson (1980) explain this phenomenon as metaphors defining reality. They suggest that because new metaphors are capable of creating new understandings they can also define what we accept as real. Before I move on to discuss electronic technology, particularly the computer, in terms of Ong's theory of orality and literacy, let me redraw the orality/literacy framework

We are born into orality. Language, the spoken word, is what initially explains and makes sense of our world. Language "ties human beings to one another in society" (Ong, 1982, p. 179). In oral cultures, learning means identifying with the known. Contextual metaphors, repetition, and redundancy are important aids to conserving and remembering a culture's knowledge. Word meanings, though shaped by the past, are continuously reconstructed from the present situation in which they are used, from the gestures and inflections that accompany them. Questions are often interpreted interactively: for example, respondents typically reply to requests for information by proffering their own requests for information intended to uncover the questioners' real intentions. The person to person interactions, not the words, are the focus of attention in oral societies.

The development of the sense of personal privacy that is so highly valued in modern society is a product of literacy (Ong, 1982). Reading separates human beings into little islands of silence (Steiner, 1967). The printed word appears complete and final and tends to subtly suggest that the information in the text is similarly complete. The meanings of words are contained in dictionaries and though affected to a certain extent by current usage and by the written context in which they are used, their meanings are located in the word-things themselves. There is an interaction between the author and the words and the reader and the words, but these are separate unrelated occurrences.

Electronic technology

Orality

Electronic technology in the form of audio tape, television, radio, and the telephone have created a new form of orality which Ong (1982) identifies as 'secondary orality'. Secondary orality is reminiscent of the old form of orality but also bears a resemblance to literacy in that the technologies of writing and print are used to manufacture and operate the machines in the age of secondary orality. Whilst primary oral cultures foster personalities that are, of necessity, externally focused, people in the age of secondary orality choose to be focused outward, to be socially sensitive. Literacy which encourages self-examination and individual reflection has led to a more self-conscious and deliberate form of orality (Ong, 1982, pp. 135-138).

Literacy

Initially the technology of writing was used to produce manuscripts, hand-written texts that were used to cue spoken words. Eventually, however, print pulled words into the sight-dominated world of literacy. Printed texts look quite different from manuscripts. They are tidy, evenly spaced, and mass-produced. They are "less like an utterance, and more like a thing" (Ong, 1982, p. 125). Each book in a printed edition is identical to the other books. Two copies not only contain exactly the same words, they look exactly alike. Print has its own distinctive cueing characteristics. Just as the spoken word relies on body language and intonation, for example, to enhance communication, so printed text employs techniques such as 'white space' and spatial relationships. The next stage in the technologizing of the word, according to Ong, is the computer. Why then does this technology incite such a range of emotional

responses and wealth of publications? Let me briefly digress from my discussion of Ong's theory and consider some other scholar's opinions of the computer.

Bateson (1972) describes the computer as "only an arc of a larger circuit which always includes a man and an environment from which information is received and upon which efferent messages from the computer have effect" (p. 317). Bowers (1988) argues that technology acts on us through its ability to amplify and reduce certain kinds of knowledge. For example, one-dimensional, objective knowledge that is explicit and organized into discrete components is amplified by virtue of the fact that the computer can handle it, whereas tacit heuristic knowledge is de-emphasized (reduced) because it is outside the computer's processing capabilities. Broughton (1985) warns that because educators have so eagerly adopted the symbolism of the computer and have come to identify so completely with it, education has become a "means to the end of technological progress" (p. 116). Jonassen (1984) and Streibel (1986) write about the mediating effects of educational computing and the social and cultural values and biases associated with this technology.

All of these authors present unique points of view, yet a thread of communality in their work, is the non-neutrality of technology. For instance, Broughton (1985) argues that educational computing represents a push toward the latest version of instrumental reason and attacks what he terms "systems positivism" for attempting to "biologize rationality and merge the mechanical with the human" (p. 114). Ong (1982) describes intelligence as "relentlessly reflexive" (p. 81) and maintains that human intelligence so definitively absorbs the tools it uses into its own structure that they eventually become part of the

whole reflexive process. He conjectures that the reason we think of the computer as an "external, alien technology" is because we have not yet interiorized the technology or made the tool a second nature, a psychological part of ourselves (pp. 79-80). This line of reasoning is consonant with Salomon's argument that what we consider today to be 'natural thinking' was at some point in time, in the past, considered an 'artificial' way of thinking by others.

Cognitive restructuring

In *AI in reverse,* Salomon (1988) suggests that there are technological tools that may be able to 'restructure' the way we conceptualize thinking, but like Ong, he theorizes that for this to happen the tools need to be interiorized. My immediate response to this idea is to vigorously reject it, to recoil from the possibility of the mind becoming a copy or extension of the computer. I am an ardent advocate of the arguments that reveal the negative side-effects of computer technology on the mind, an ethical position that is ably addressed in the scholarly work of Ellul (1964), Illich (1973), Weizenbaum (1972), Bowers (1980), Dreyfus & Dreyfus (1986), and Sloan (1985), for instance. However, I decided to reconsider Salomon's conjecture that there are technological tools that may be able to 'restructure' the way we conceptualize thinking, in light of Ong's orality/literacy framework.

Salomon's hypothesis that there are technological tools that could be used to enrich our cognitive capacities is supported by Ong's description of how intelligence was restructured as literate cultures interiorized the technology of writing. Another provocative idea presented by Ong, that lends credence to

Salomon's inference, is that once a society is literate there is no effective way to criticize the technology that brought about that literacy without using the most advanced form of that technology. In effect, Ong is saying that our ability to critique a technology is possible only because of the effects that technology is beginning to have on our mental processes, effects that we, who are caught up in the process, are unable to truly comprehend. Similarly, our ability to critique the relationship between computer technology and cognition is only possible because computer technology has already begun restructuring our cognitive processes.

Bolton (1991) expands on Ong's evaluation of the computer as the most advanced stage in the technologizing of the word. Prior to the advent of the computer, the process of reading and interpreting signs could only happen outside of the text in the eye and mind of the reader. However, the computer unlike any medium before it, can also be an activator of signs; elements, behind the screen, can alter or regroup as we look on (p. 198). Bolton claims that the whole semiotic process, "the movement from one sign to another in the act of reference" takes place in the self-contained world of the computer (p. 196-197). In addition, the meanings of signs are no longer the exclusive territory of the reader: for example, prescribed links (in hypertext) are acts of interpretation and the reader has to be willing to interact with the paths of interpretation predetermined by the author, to respond to the connections structured into the text.

Ong claims that written words are still strongly connected to spoken words since texts in order to be meaningful have to be related to the world of sound, but Bolton disagrees. Bolton maintains that "as the act of

reference becomes explicit in hypertext" increasing significance is placed on "visual meaning (and) diagrammatic signs that cannot be spoken" either out loud or silently (p. 201). He concedes that there might be some "aural residue" when people read text on a screen but implies that this does not overshadow our growing understanding of words as arbitrary, artificial mediators.

Conclusion

What are some of the implications of computer technology for human consciousness, for the way we think? Ong's description of the transformation of human consciousness that accompanied the transition from the spoken word to the written word (especially the printed word) is, I think, the foundation from which we can launch the next set of questions concerning literacy. Ong maintains that literacy by removing us from our immediate, everyday existence, enabled us to develop an analytical sense of our separate interior selves.

Salomon (1988), adds computer technology to the idea of the written word and grapples with the concept of an augmented self. He attempts to describe how internalizing an "intelligent tool" might change a person's style of thinking, might help to develop a learner's metacognitive activity (p. 137). His research (see for example, Salomon & Globerson, 1987; Salomon, Globerson & Guterman, 1989) focuses on the general hypothesis that "intellectual partnership with a computer tool that provides reading-related, metacognitivelike guidance leads to the internalization of the guidance" (Salomon, Globerson & Guterman, 1989, p. 625).

Bolton (1991) raises a number of radical and disturbing questions about what he calls the 'textual mind'. He points out that while the computer would seem to be able to dissolve the barrier between what an author thinks and what an author writes, the computer is actually turning thought into writing rather than enabling writing to be unmediated thought (p. 217). Computer technology is closing the gap between what the human author thinks and tne symbolic representation of those thoughts in the electronic space by "making the human mind over in its own image" (p. 219). If we conceptualize thought as the manipulation of signs then it makes sense to talk of the mind as computer.

Bolton argues that the transition from print to computer has been the catalyst for the transition from a hierarchical social structure to what he calls a "network culture" (p. 232). He characterizes this culture as giving the individual greater freedom of action and choice. Standardization and sameness, traits of the printed word, are being replaced with change and individualism. Texts are even expected to change to suit the style of a reader rather than readers conforming to the standards of the texts (p. 233). To some, the world of electronic literacy is a mishmash of conflicting ideals; but, argues Bolton, this is true only if you judge it according to the outdated values of print--stability and order maintained by a hierarchical social structure.

I see a connection between Bolton's description of what is happening to human consciousness in the transition from print to computer and Ong's description of what happened when people moved from primary orality to literacy. What is especially interesting is that some of the characteristics of orality seem to be resurfacing in this age of electronic text. Ong talks about oral people thinking operationally and Bolton describes cultural literacy as having

to be defined operationally. Spoken words are immediate events. In like manner, computers seem to make text an immediate event. Author's thoughts are transmuted as text capable of changing at each reading.

There are also clear traces of 'printed-word-literacy' in Bolton's operational literacy. For example, Ong talks about literacy causing people to become introspective and self-conscious and Bolton describes the new literacy as giving people the chance to believe and do what they want, in effect, the liberty to rewrite their own life stories (p. 233).

The only tentative conclusion to this paper, that I can presently offer, is a paraphrase of Plato's concern about the effect writing would have on the human mind. Just as Plato was afraid writing would dull the mind, cause people to rely on external characters that are not part of themselves and mistake the appearance of wisdom for wisdom, I am concerned that operational literacy will encourage utility, cause people to rely on what their network "thinks" and mistake technique for knowledge.

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Real-time Literacy

FOCUS

In this paper, I maintain that the educational use of computers is changing the way we think and steering our culture toward a more self-conscious form of literacy. This is a recursive, not a new phenomenon. Just as human consciousness was transformed by the development of the technology of writing (Ong, 1982) so the use of the computers' intelligent tools as cognitive aids is once again altering or at least modifying our awareness--an agonizing process that seems to incite a range of emotional responses and wealth of publications

In formulating this hypothesis, I realized I needed a theoretical framework that would allow me to pursue my inquiry at a philosophical, social, political, and educational level simultaneously. A search of the body of literature loosely categorized as Educational Technology and particularly of extant theories of learning and instruction proved somewhat frustrating. Initially, I considered Seely Brown's (1989) "culture of learning" and "situated cognition" theory. Then, reading across several disciplines, I rediscovered Ong's (1982) seminal work on orality and literacy in which he describes the profound changes in human consciousness brought about by the technologizing of the word. Ong's concept of reflexive intelligence in combination with Bateson (1972) and Keeney's (1983) cybernetic epistemology, appeared to provide "skeletons of symbolic relations onto which descriptions may be structured" (pg 46), that is, theoretical frameworks that would accommodate my desire to examine my hypothesis at a philosophical, social, political, and educational level concurrently.

RATIONALE

A key element of situated cognition--conversation between cultural things and their symbols and human imagination--parallels Ong's description of orally based thought and expression. In contrast, literacy reifies words. Written words not only store what we know but influence how we know it (Lakoff & Johnson, 1980). However, according to Ong, one's "relentlessly reflexive" intelligence incorporates the external tools it uses into itself so that they become part of one's restructured intelligence that then uses external tools, etc., etc., and eventually we no longer recognize the externality of the tools (for example, written words which have become second nature to us). Bateson (1972) typifies this process as a recursive dialectic between form and process.

Encouraged by Ong's suggestion that our ability to critique a technology is possible only because of the effects that that technology is beginning to have on our mental process, I surmise that interiorizing the computers' intelligent tools is moving us through a process of cognitive restructuring that will result in a new form of literacy.