

# Knowing Practice: A More Complex View of New Media Literacy

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**Abstract--In this paper, I examine the pervasive quest for invisible computers, applications, and interfaces in order to make a case for resisting the pressure to standardize platforms for delivering on-line courses and other Web-based applications. We need to be especially wary of the argument that the ideal information resource or technology imposes no cognitive load on its users. Although usability experts like Jakob Nielsen present a cogent case for routinizing, for example, the colors of visited and unvisited links in HTML documents, such a strategy may fail to provide the cognitive scaffolding knowledge workers will need to confront changing technological environments in productive ways. In other words, too great a reduction of the cognitive challenge in the present may prevent people from developing effective learning strategies they can apply to future technologies. Drawing on constructivist theories of learning, I argue that applications and interfaces must remain visible and accessible to knowledge workers if they are to develop new media literacies.**

**Index Terms—literacy, education, new media.**

## INVISIBLE COMPUTING

USABILITY disciplines and cybertextual theory may not seem to have much in common but they have recently come to share a long dream of frictionless computing. We see this longing in Donald Norman's most recent book, *The Invisible Computer* [1], and it forms a recurring theme in the work Jakob Nielsen has done over the past decade and more [2], [3]. We see a related direction in the work of Brenda Laurel and in Janet Murray's *Hamlet on the Holodeck* [4].

A cognitive psychologist, Norman argues for a world of what he calls "information appliances," each one doing a specialized job, each one unobtrusively supporting the goals and objectives of people pursuing the specific task it was designed for. As he articulates the goal, we should "[d]esign the tool to fit the task so well that the tool becomes a part of the task, feeling like a natural extension of the work, a natural extension of the person." He wants to "[m]ake it possible to have all the material needed for an activity ready at hand, available with little or no mental overhead" [1].

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Nielsen, a usability engineer, argues that interfaces, especially on the World Wide Web, should require little learning from their users. Thus he advocates using design strategies others have used, even when those designs are not optimal from a usability perspective. For example, rigorous scientific inquiry leads to the conclusion that blue is not an optimal color for any text but especially not for signaling the presence of an unvisited link, yet Nielsen argues that Web designers should use that color so as not to create unnecessary cognitive burdens for Web site visitors [2], [3]. Both Nielsen and Norman promote an ideal of the interface that is as seamless, as invisible, as possible. Both believe that information technologies are simply tools, much like hammers, internal combustion engines, or microwave ovens. In their implicit account, a tool is an object and a set of practices that we use without any explicit or even any implicit understanding of its inner workings.

Although they come from a completely different, even orthogonal, set of disciplines than Norman and Nielsen, Brenda Laurel [5] and Janet Murray [4] both take the position that interactive environments should be largely invisible to their users. These scholars derive their theories about engagement from traditions of theatrical performance or literary reception but like Norman and Nielsen, they believe that the device should insofar as possible become merely a vehicle or mechanism for an activity. They argue that the vehicle or mechanism itself should play no detectable role in directing or shaping the activity. Ideally the user never becomes aware of the system's representations but only of that which the system represents.

In her discussion of interactive narratives Murray claims that "[e]ventually all successful storytelling technologies become 'transparent': we lose consciousness of the medium and see neither print nor film but only the power of the story itself. If digital art reaches the same level of expressiveness as these older media, we will no longer concern ourselves with how we are receiving the information. We will only think about what truth it has told us about our lives" [4].

These theorists argue that developers need to strive to create an ideal sweet spot or perfect fit between system and user such that everything standing between the user and her goals is functionally and metaphorically transparent. In educational circles the dream reappears in the wish for perfectly transparent "course containers" that require no user to attend to the interface and its affordances in order to acquire the knowledge the course conveys. This fiction of content and container harks back to early theories of literacy.

Indeed, the general idea that there should be a perfect fit between human beings and their tools may be related to historical accounts of traditional literacy because the written word is possibly the first medium acknowledged as such. As Richard Lanham notes, Eric Havelock theorized that the Greek alphabet became such a successful vehicle for literacy because after the childhood learning process was completed, reading would proceed as if the visible marks on the page were really invisible. “Thoroughly internalized [in childhood, the alphabet] would become a transparent window into conceptual thought. The shape of the letters, the written surface, was not to be read aesthetically; that would only interfere with purely literate transparency. ‘Reading’ would not, except in its learning stages, be a self-conscious, rule-governed, re-creative act but an intuitive skill, a literate compact exercised on the way to thought” [6].

The Havelock compact, then, is fulfilled when the vehicle for communication – the marks on the page – disappear, dropping below the horizon of the reader’s awareness. By extension, the argument goes, computing environments also need to become transparent before they can hope to deliver fully functioning teaching and learning environments. It is important to note, however, that Havelock’s concerns were limited largely to reading, to the reception of texts rather than their creation, and were also limited to communications via language. One question we need to ask, then, is whether it is appropriate to desire to maintain the relationship between mediations and communications established by print in a post-print era.

#### NEW LITERACIES FOR NEW MEDIA

A literacy of new media, I argue, will require a different orientation, one that understands the problem of literacy as more than a mere question of reception, one that re-examines the pernicious tendency to separate container and content, medium and message. It needs to account for multiple modalities of representation and for the ability to create as well as to receive communications. Finally, it needs to account for the fact that digital environments are fundamentally procedural. The scope of action new media environments afford is an order of magnitude greater than the scope of action afforded by print. As a result, new media literacy differs from print literacy not merely in degree but also in kind.

Print — broadly understood as words represented on a material such a paper or stone — is a tool, in the sense Norman and Nielsen use the term. Both the processes for producing print and the results of those processes narrowly constrain the scope of human action. Simply put, there are a small number of ways to embed marks on paper or other material surfaces and relatively few ways to make sense of those marks. Once they are produced, the marks do not change. And while it is possible to alter them to some degree, by underlining or by scribbling notes in a margin, such alterations also have a limited scope. Thus the resources of verbal languages are enormous — much can be expressed through words, even words without other channels of communication — but the

resources of words represented through print processes are limited.

The most famous observation of this phenomenon is Plato’s account of Socrates’ complaints that writing will destroy memory and produce dumb, by which he meant inert, ideas. Dumb ideas are those that can respond to queries only by repeating the ideas the reader wants to interrogate in exactly the same words used to express the ideas in the first place. Essentially, Plato was the first to notice that a written work is not “interactive.” It may well have effects on readers but readers have no effects on its structure or on the system of social and economic relations in which every work is embedded. A better way to understand this limitation is to say that, outside of digital environments, writing is not and cannot be procedural. The representations received via the printed page are no longer open to configuration and reconfiguration but only to interpretation and to a limited extent commentary.

In a digital environment, in contrast, the analogy with tools is fundamentally misleading. Digital environments are procedural in the sense that they can sustain transformations and reconfigurations. By procedural, I mean much the same thing that Janet Murray means: when a person operates procedurally he or she engages with an orderly system of causes and effects which can be extensively or even totally transformed by rule-governed interventions. For example, it’s one thing for you to read the three characters *rm\** on this page; it’s quite another for a Unix operating system to receive this message. You the reader may shrug or frown in some puzzlement. Unix operating systems, though, will instantly erase all the data on the relevant hard drive. This fact alone creates that wider scope of human action that characterizes the radical or root difference between print literacy and new media literacy.

The expanded scope of action makes new media environmental rather than purely instrumental, a system of articulations rather than a unified tool capable of supporting a limited cluster of activities. Environments are characterized by the complexity of the relations among their constituent elements. An environment is defined and bounded by all of its participants — machinery, software, techniques, rules, and of course human agents — and the interdependent activities the participants engage in.

In the print condition, an author of a work does not expect that interpretations of or commentaries about that work will influence it in any substantive way, apart of course from a few influential reviews that might affect sales, for example. In digital publishing environments that are networked, like the World Wide Web, however, new documents can and do have effects on the work. Even though they may not change the words, images, sounds, or other representations constituting the work, they surely do change what Roland Barthes calls “the text.” The text differs from the work in the sense that the work is bounded whereas the text is not. Text, in Barthes’ sense, consists of all the social and economic relations within which each work is embedded [7]. From the point of view derived from the print paradigm — as a message that happens to be digitally mediated, a particular Web page may appear to

be as static as any printed page. After all, the Web's technologies prevent someone other than the author from rewriting "the content" of the document. But to view the Web page in that light is to misunderstand its situation. For on the Web, relations change every time a new Web page is posted. Thus my document is in fact altered in important ways, in operational ways, by the presence of other documents, especially when those other documents participate in a wider sphere of discussion. Whether through links or through cognate words or through both, any set of documents available on the Web can transform the situation of other documents, as repeated use of search algorithms such as those employed by Google can easily demonstrate.

Works in networked digital environments permit procedural activities to be carried out within and around them. Technologies such as XML and XLINK increase the configurability of documents employing them, enabling readers to rearrange or re-present information, to set preferences for viewing or managing the communications environment, and to perform all manner of structured operations on them.

Our account of literacy in the age of new media then must begin by understanding literacy, not as a simple and single act of encoding or decoding messages by means of various (and largely interchangeable media), but as a complex collection of technological, social, and material practices that together promote the development of radically new affordances. As Norman writes, "The set of possible actions is called the *affordances* of the object. An affordance is not a property; it is a *relationship* that holds between the object and the organism that is acting on the object. The same object might have different affordances for different individuals" [1]. In other words, affordances are those actions that the system enables combined with what people can imagine using the system to accomplish. Affordances, then, are not designed into systems. Rather they arise from practical uses of systems. In their invention and deployment lie the seeds of innovation.

Elsewhere I have defined new media literacies, or e-literacies, as "the knowledge and skill required to make marks in an electronic age with electronic devices" [8]. Today I would extend that knowledge set to include the knowledge and skill it takes to configure and manage one's semiotic environment.

I go on to make the case that we must always be dealing with two kinds of literacy: first the ability "to record language or pictures or whatever in some form or other, to store and to retrieve the records, perhaps even to combine these records in meaningful ways" and second to "mak[e] one's mark -- in print's terms, being published, authorized to speak on a given subject" [8]. The World Wide Web has significantly loosened the constraints on making one's mark: witness the important contribution made by scholarly archives like the one Dr. Ginsparg at Los Alamos set up for physicists. The effect of ready access to publishing has been startling for it has enabled people who would not be able to publish in professional print journals an important, even a prominent outlet.

The first hurdle — the knowledge and skill knowledge workers now require — still remains. The Web's environment affords a wide and rich range of literate practices, but only for

those who know how to manage the technologies. In the rush to standardize, to use courseware "packages" and ready-made "containers" for course "content," we may well be replicating the print paradigm and undermining our abilities as educators and our students' abilities as learners to engage digital environments fully and effectively.

#### MAKING SOMETHING HAPPEN

Our current efforts to deliver courseware exemplify the nexus of code (the locale of potential actions) and desire: what the makers of Blackboard and other commercially available products for delivering online education have provided is a set of tools for posting a list of readings and assignments together with some support for interpersonal communications: chiefly e-mail and threaded discussion. What they have not provided is support for novel or I should say innovative educational practice. They have "simulated" some aspects of the traditional classroom, including its hierarchy of power relations, and some aspects of the book, though oddly enough they fail to provide many of the important affordances printed books and articles offer.

They ground their applications on what is in effect "pre-arranged" as the contents of printed books are pre-arranged, rather than on what is "configurable" or procedural. Databases certainly lie at the heart of these systems but neither faculty nor students need be aware of their structures, functions, or even presence in the system. In hiding their operations from both teachers and students, in packaging the course, such systems prevent everyone from penetrating their mysteries, from understanding the ways code constrains what they can do within the system.

To be sure, pedagogical practices have always been shaped in part by the technologies they use. Everything from building codes and materials to the properties of blackboards and books has its way of influencing what we teach and learn, when we teach and learn it, and so on. Digital environments perform also shape, constrain, and structure. There is no jump outside the system. But, as I have been arguing, there are important differences between devising buildings and making meaning with digital media. Digital environments always remain more plastic and malleable than material environments do. And therein lies their power.

Taking full advantage of digital environments, however, requires constant engagement with interfaces and even with code. Because the range of activities digital environments can support is so great, they can never become as ubiquitous and as invisible as motors or door handles are and yet remain powerful and flexible environments.

Constructivist theories of learning focus on the learner's problem-solving strategies and experiences as the ground for acquiring new knowledge. That which is unproblematic or routinized to the point of invisibility fails to provide grounds for learning. Constructivist understandings are instructive here because they foreground the role of experience and meaning-making in cognitive activities. They help us repair the rift between the what and the how by reminding us that

mediations shape messages not only by their system of permissions and prohibitions but also by their invitations to imagine and create. In other words, communications are best understood as fully environmental and therefore truly immersive though not in the least transparent or invisible to participants.

If our definition of literacy in this post-print era fails to include construction (configuration) we will have a cognitively impoverished user, one who cannot transfer working knowledge from one technological environment to another. Serious education for the 21<sup>st</sup> century needs to operate out of a new model of literacy, one that allows the space of literacy to sustain both interpretation and configuration.

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