

Maintaining the Affordances of Traditional Education Long Distance

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We learn whenever we attempt to make sense of experiences. Thus, learning occurs alone or in groups; at home, at work, and at play; in face-to-face settings, as well as online and on television; in natural and in constructed settings; with and without books; for toddlers and elders and everyone in between. Yet the word learning is often thought to apply to that special set of situations we find in school. School (or college, university, training center, etc.) brackets learning into manageable chunks for purposes of funding, delivery, assessment, and accreditation.

Schooling is often defined as the activity that occurs within a certain space, the classroom, and a certain time, the school day, or the 50-minute hour. Despite what we may assert about learning beyond the walls of the school and about lifelong learning, it is difficult to avoid the equation of learning with school, and therefore, the equation of learning with sitting at a desk, looking at a blackboard attached to the front wall of the classroom. The center of learning is identified with the classroom. It seems heretical to challenge the centrality of the school building or the school calendar. Such a challenge is rightly interpreted to imply challenges to other aspects of formal learning: the textbook, the assessment system, and even the teacher. Many now see learning, even fully-accredited, formal, certificate-driven learning to be possible anytime, and anywhere.

The frame for formal learning consists of practices associated with time, space, knowledge, and participants. Online learning, often conceived as learning anywhere/anytime, promises to radically alter that frame. The advent of the Internet has now led to an exponential growth in the number of distance course offerings. Where once one could point to a few special cases such as the "Open University" in the UK, now, virtually every institution of higher education is considering, if not implementing, online course offerings. Consider just a few of the claims that are being made about these changes and see what they might mean for education:

The frame for learning first of all defines its space. For example, the school building is clearly defined and separate from other structures. It sits in a schoolyard, surrounded by a wall or fence. Often, there are signs on the nearby streets warning motorists to slow down. These things serve practical functions, not the least of which is to define the space where

learning is to occur. General learning occurs within that space in the classroom or auditorium. Specific forms of learning occur in designated spaces, such as laboratories, libraries, or a playground. Online learning challenges these structures and the assumptions underlying them. It is already leading to significant changes in terms of where one accesses educational resources, especially at the secondary and higher levels. External degrees from open universities are now common and well-accepted. These programs are particularly attractive to those living in areas far removed from centers of higher learning. Students with disabilities, and those who work are finding increased opportunities to learn. One's country, even the language one speaks, is becoming much less a barrier to educational access.

There is also a time frame. We define programs of study involving multiple courses. A semester-long course comprises units enacted in weeks or days. Lessons are defined as short-time segments, with mini-lessons even briefer. The most complex areas of inquiry are ultimately broken down into numbers of minutes of study. Online learning is increasingly attractive even to those geographically near to centers of learning for reasons of time and convenience. As the programs expand, we see the many ways that online education can expand learning opportunities. For many people, who must fit coursework within constraints of family and part-time work, online courses make higher education attainable.

The frames of time and space are associated with other frames. Knowledge itself is typically framed within books, or even the sole "textbook." What we do with what we learn is usually framed as well, perhaps as that which is written in a "blue book" or as checkmarks on a multiple-choice quiz. These knowledge practices are now changing. As schooling is tied more to work we will see the benefit of learning that can be used directly in careers. The ability to remain in one's home community may provide better grounding for educational experiences. We cannot say yet how these changes will affect other goals of education, such as promoting a common understanding, developing capable citizens, and enlarging the individual's capacity to appreciate and contribute to the larger culture?

Participants are framed as well—the teacher and students, administrators, and classroom aides. With online learning, these roles may change in dramatic ways. The lecture may have to be re-conceived given the emerging technology for high-speed, low-cost delivery of video, or even, virtual reality, on demand.

Schooling as an institution is another frame, which will undergo fundamental reorganizations. The lines between schools, community colleges, technical colleges, universities, museums, nature centers, and workplaces are becoming fuzzy. As more courses are offered online, students will find it easier to continue full-time work while studying. There will be less need for the local college in each community or region. How many institutions of higher learning will survive? One half of those in operation today? One tenth? Will students even continue to study through public institutions, or will they turn to corporations or new organizations for coursework? The technological revolution in the workplace is leading to an increased integration of schooling and work. Moreover, just to use the Internet is to enter into the commercial world. Online education is both a reflection of and a

stimulus for a blurring of the lines between students as learners, as workers, and as consumers.

Similar claims have been heard before, first with correspondence courses and external degree programs, later, with educational radio and television, video cassettes, teleconferencing, and similar media. But the integration and expansion of all these tools through the Internet, and the increased accessibility of digital media, raises anew questions about the future of education. Many of these changes will be good, and many, not so good; what is clear is that the structures and modes of learning are already undergoing dramatic changes. In this context, it is well worth asking: Is anywhere/anytime learning possible? What is lost and what is gained? and, at an even more fundamental level, What is really different?

Some Definitions

Terms such as "online learning" have definite meanings, unfortunately, far too many ones. Because I want to examine here arguments for and against "online learning", it will be helpful to define a few terms in advance.

Asynchronous communication—the exchange of messages in a medium that does not require the simultaneous presence of the sender and the receiver. By this definition, ordinary postal mail qualifies as asynchronous communication, but the term usually refers to asynchronous electronic communication, such as email.

Synchronous communication—the exchange of messages in a medium that requires the simultaneous presence of the sender and the receiver, for example, in an electronic chat system. The line between synchronous and asynchronous is a function of the sociotechnical system, not just the technologies per se. For example, two conversants could use email in a chat-like, synchronous fashion by agreeing to be online at the same time and sending rapid replies. Another pair might use instant messaging in an asynchronous fashion by leaving messages in the chat window. Or, they could use the away function, which is available in most programs, allowing users to leave messages saying what they're doing or when they might be available (Bruce, 2003, pp. 2-5).

Distance learning—distance education provides a unique opportunity for those who wish to study but cannot attend residential institutions because of personal circumstances or occupational obligations. The term was once synonymous with "correspondence course," and later with educational television, but has increasingly been used to refer to learning through an array of communication technologies, including video, teleconferencing, email, and the web. These tools have now emerged as integral components of on-campus courses as well, so distance per se, the physical location of the student relative to the class, has become a less defining factor. Thus, the concept of distance learning may fade away as the means by which it is enacted parallels other modes of learning.

We can distinguish four situations for instruction, two of which might be considered distance learning. Many courses and programs today are hybrids, with some of each of these modes of learning. The LEEP program is a notable example, with its on-campus sessions,

synchronous classes, and bulletin board interactions. But for the purpose of analysis, we can focus on specific learning events, which tend to fall into one or the other of these categories:

Real-time distance learning—students and teachers interacting in real-time, but in different locations. They may do this through computer-mediated means, such as chat systems or web sharing, or through audio or video channels. The key features are that they have simultaneous interactions, but are not in the same room.

Asynchronous distance learning—interactions may occur at different times and places. Typically, this case involves bulletin board systems, online assignments, and a web-based syllabus.

Conventional classroom—students and teachers are co-located; their interactions occur in the same time and place. This is the most familiar case, one in which students occupy the same room at the same time. Although the traditional mode, it embodies in the fullest sense the high-tech concept of synchronous communication.

Asynchronous co-located learning—A fourth logical case, can occur in certain circumstances, but is much less common. This could occur when students interact in the same place at different times. For example, students might check an experiment in progress in a science laboratory and communicate through a lab notebook there.

Binding Time

Binding time is a term from computer programming language theory. It refers to the fact that terms in a language can be assigned values early or late in the process of carrying out a computer program. For example, a constant, such as "2" is bound early, whereas a variable, such as "x" is bound later. Wegner (1968, p. 17) defines it this way: "The moment during execution at which a given set of attributes is fixed (bound) is said to be the binding time of the given set of attributes." When a program is compiled, attributes are said to be bound early, because they are fixed well before they are executed; when a program is interpreted, attributes are bound late. In general, binding early makes the program more efficient, but less flexible. Think of planning a vacation. It may be simpler and more efficient to fix the mode of transportation early (one less thing to think about, if you buy the tickets now), but doing so is less flexible, and could create a problem, should conditions change.

Although the technical term, binding time, applies only to formal languages and interpretations of sentences in those languages, it provides a useful lens for examining the varieties of learning structures made possible with new technologies. Table 1 shows some of the major features of instruction, and how they are realized in different cases. The first two rows designate the defining characteristics of each mode. Thus, time is bound early in the conventional classroom; the timetable sets when the class is to meet, well in advance. This is also the case for synchronous, or real-time distance learning. But for asynchronous distance learning there is learner control over the time of the learning, hence "anytime." Similarly, space is set or bound early for the conventional classroom. It is often set early for real-time distance learning, especially if learners need to go to a place with special tele-

conferencing equipment. But again, for asynchronous distance learning, that choice of space is much freer, hence "anywhere."

Table 1

Binding Time for Key Features of Learning Situations

	Conventional Classroom	Real-time	Distance Learning	Asynchronous	Distance Learning
time	early (synchronous)	early (synchronous)	late (asynchronous)	space	early (co-located)
early-mid	(distant, but set)	late (distant)	syllabus, readings	early-late	early-mid
objects, visuals	late	never-early	never-early	activities	late
early	teacher response	late	early-late	early-late	student work
					early
					late

The succeeding rows in Table 1 refer to various aspects of the instructional process. For each aspect, the designations of "never," "early," "mid," and "late" are tendencies given the affordances of the technologies. Most are sociotechnical, reflecting a combination of social and technical factors. For example, most instructors try to write a syllabus and select readings before a course begins. But the current mechanisms for preparing web-based courses and the expectations of distance learners make that more imperative for asynchronous distance learning than for the conventional classroom. In the case of LEEP, early syllabus development is promoted as a best practice.

Objects of study and visuals, such as science apparatus, books, maps, archaeological remnants, music players, or technical devices, play a role in many classes. In the conventional classroom, they don't appear the students until the moment of their use in class, and for the instructor can be selected close to the time of the class. In the distance cases, they are difficult to use at all (i.e., "never") or must be chosen well in advance of class ("early"). Similarly, the form of class activities and dialogue remain less fixed in the conventional classroom case until the moment of enactment ("late"). In the distance settings, more elements need to be set up ahead of time ("early"). Teacher response in a conventional classroom can also come late, for example, comments as graded assignments are returned in class. In the distance cases, these responses tend to come earlier, and students often expect early responses (as in "you haven't replied, but I posted my message last night!"). On the other hand, student work can be bound early in synchronous settings (face-to-face or distance), e.g., whenever the instructor says "so, Daniel, what do you think of the author's argument about the effects of the Renaissance?". The next two sections discuss these issues further.

None of the modes of learning stand out as purely early or late binding. It is almost as if there needs to be a balance of flexibility and efficiency. In general, the conventional classroom requires an earlier binding time for place and time, but it allows a later binding time for course elements than do either the real-time or the asynchronous distance learning cases. Thus, a binding time argument says that the conventional classroom is more flexible in terms of learning activities, but less efficient. Similarly, it fixes the meeting place and time quite efficiently, but is inflexible about those.

The Case for Anywhere/Anytime Learning

Proponents of anywhere/anytime learning typically conceive their work as arising from the affordances of new technologies, such as videoconferencing, interactive simulations, the web, email, or electronic bulletin boards. To a large extent, these tools, especially hypertext, provide a later binding for course content, which can increase flexibility for both students and teachers." The rich information resources of the web and electronic data bases, which are widely accessible, can be designated as part of the class materials if the instructor chooses. Instructors can also add examples, elaborations, extensions, and qualifications, which cannot be included in other media because of space limitations. They can even add them after the class has met, in a very-late binding way. Multimedia possibilities are expanded. It is becoming relatively routine now to incorporate video, audio, animations, and a variety of graphical formats.

Rather than being simply readers as they investigate the medium, students can learn through writing as well. They can respond through email and bulletin boards or use web forms; they can create web content. Active engagement, which is encouraged through interactive features such as dynamic simulations, online laboratories, and point-and-click interfaces, promises greater opportunities learners to explore and create.

The case for anywhere/anytime learning can also be explained in terms of other binding time phenomena. The late binding of time and place for asynchronous distance learning is what gives it the purported anywhere/anytime character. If the time and place of learning do not have to be determined until the moment of interaction, then the learner has the maximum possible flexibility. This breaking of the frame permits the claimed advantages of greater access, and greater connection to community and work.

Educational administrations and commercial organizations are often very intrigued with the idea of distance learning, and especially its realization in web-based courses, because of its apparent efficiencies. Decide on the syllabus once and for all, and it is no longer necessary to pay people to develop multiple variants.

For students, the early binding of course materials and format actually allows a later binding for student work. For example, in an online course, a lecture is set out early. It may typically be read or viewed long before the designated day, or anytime (and anywhere) afterwards. The act of student engagement (reading, comprehending, responding) can be relatively late in the process of the course, and relatively much under student control (late binding). This makes it easier for students to adapt the course activities to their own lives. In comparison, in a face-to-face lecture, there is the possibility of that dreaded moment when the professor calls on a particular student. This requires at least the semblance of attention and processing of the course materials (early binding), a requirement that reduces student flexibility.

Teachers, too, appreciate the efficiency of web-based courses, although many recognize that they lose flexibility, which can hamper their ability to meet learner needs (see next section). Proponents argue that interactive software, multimedia software can address these concerns about flexibility. The web allows learner control of information access. Students can experience online labs at any time and from any location. It is easier to move around on a website and attend to the portions that meet learning needs. The web thus

provides opportunities for self-directed inquiry and for exploring phenomena in depth. Material on the web is hyperlinked, both within a document to show connections of concepts and between one document and another. A consequence is that learners can more easily move from one idea to another. The web also provides greater learner control of the pace of learning. Learners can repeat activities, linger over them, or skip parts they already know.

Anywhere/anytime means that formal learning comes to the student, rather than the other way around. It also means that learning may not be so removed from other life experiences: It occurs in the workplace, in the context of immediate problems; it occurs in the home, with family present; it occurs in the community, in the context of the history, values, and needs of that community.

Thus, beyond the technology-driven argument, the energy and appeal of the anywhere/anytime learning idea is also a reprise of the progressive education movement, which sought to remove the separation between formal and informal learning. John Dewey's idea that all knowledge begins and ends in ordinary experience resonates with current notions that learners need not abandon their home, family, community, or work to extend their learning. Instead, formal learning may be connected to those situated experiences. Dewey saw this as connecting learning to life:

Thus I have attempted to indicate how the school may be connected with life so that the experience gained by the child in a familiar, commonplace way is carried over and made use of there, and what the child learns in the school is carried back and applied in everyday life, making the school an organic whole, instead of a composite of isolated parts. (1907, p. 106).

The case then for anywhere/anytime learning rests on several arguments. Some pertain to the medium, with its multimedia, hypertextual characteristics. Some pertain to the binding time configuration. Early binding time for course construction leads to greater efficiency, and later binding time for enactment, especially of student activities, provides greater student flexibility. And some build upon an explicit or implicit desire to have learning more deeply connected to life. This is particularly the case for online learning in the workplace environment, where the late binding of student work means that it can be deeply connected to ongoing work. Of course, any particular instantiation of an online course may fall far short of these ideals.

The Case against Anywhere/Anytime Learning

The movement promoting learning anywhere and anytime builds in part upon our recognition that learning in life is much more than what occurs in the confines of a classroom or a designated time period for a class. For example, we see that students graduating from a university often describe opportunities to learn from other students and informal learning experiences derived from the environment of the university as being even more important than their formal coursework.

This acknowledgement of life learning is part of what we think about when we respond positively to the rhetoric about learning beyond the walls of the classroom. And yet, an interesting irony emerges. The movement to online learning often means that formal education is then reduced to navigating courses divorced from any shared social context. The "online learning community" established by a course can be a thin community with strictly limited modes of interaction, shared beliefs, or common purposes (cf. Dewey, 1916). The concept of learning freed from the constraints of time and space thus curiously reduces to learning confined within a new frame of asynchronous communication without the serendipitous experiences that many of us most value.

In the language of binding time, the conventional setting offers late, and unpredicted, binding of a host of attributes: How does today's history lecture relate to the debate on student government? How does this science topic relate to news of a recent discovery? How does the weather affect our interpretations of a poem? How does the professor's insight from research add to the current class discussion? How does a chance encounter in the hallway provide a new perspective on the themes of a course? Current events, social relations, physical surroundings, and more, ensure that learning in the conventional setting in fact does occur anywhere and anytime. Of course, distance courses can in principle provide much of this late, and hence situated, binding. But the argument against typical realizations of anywhere/anytime learning is two-fold. One part is that without the shared time and space it is simply not possible to do some of this late binding. (Imagine a history instructor saying "The lack of heat in the building today gives us a sense of what life in the middle ages must have sometimes been like.") The second part is that the typical and often recommended early binding of course materials and activities makes those situated linkages less feasible.

This can be seen by examining the key aspects of learning situations shown in Table 1. For example, a syllabus and selection of readings are the norm, especially for secondary- and tertiary-level classes. In the conventional classroom, these are usually prepared in advance, but a well-known feature is that they can be changed. An instructor may find a new article that fits the course goals or the particular interests of the students. Relevant news items can easily be brought into the discussion of the day. Assignments and lectures are frequently adjusted to fit the questions students ask, or ideas the instructor has developed. This last-minute adjustment account for the "on-the-fly" experience of teaching, which many instructors admit to sheepishly, but also value as a means to make their classrooms more dynamic. This on-the-fly adjustment depends on a host of factors in the situation: students' facial expressions, the weather, events on campus, availability of materials, the day's colloquium. In a real-time distance learning situation, it is possible to do some of these adjustments, but less easily, because those factors are less accessible to all. In the asynchronous distance learning, it is even more difficult to adjust on-the-fly. A terrific idea in a shared temporal and spatial setting may lose its timeliness when enacted over the time-span of a week, and without the shared spatial context, it may lose relevance. A new-found article cannot be distributed to the class by photocopying it ten minutes ahead of the session. We can describe these differences by saying that the asynchronous distance learning case requires an earlier binding time; the syllabus and readings are typically set

earlier and are less subject to change. The conventional classroom allows the latest possible binding time.

Similarly, we can look at other features of the classroom (objects of study, activities, dialogue, teacher responses) in terms of their binding time. For example, objects of study, such as a book, an image, a device, or a nature specimen, are used often in many classes. In the conventional classroom, an instructor can select such an object or change the selection at the last moment. A photograph or object can simply be held up to the class or passed around. In the two distance cases, one would typically need to digitize the object and post it on the class web site, with a message ahead of time to class members to examine it. It is possible to arrange for similar objects to be brought in. For example, the Lesley University Science in Education program has students do hands-on science investigations in their homes, or wherever they may be taking the course. Using similar materials (one experiment involves a jar, olive oil, a cork, string, and a timer), students are able to experience phenomena and discuss them with other students and instructors. Thus, "hands-on" is not an attribute that clearly distinguishes between face-to-face and distance learning. But though it is possible to achieve hands-on learning in any of the environments, the setup for hands-on learning in the Lesley University program must be done well in advance (early binding), just as the setup for web-based materials is typically done. Similar problems exist for students making pictures (e.g., workflow diagrams, physical force models) or physical objects (e.g., an electrical circuit), and sending those objects to the instructor. One can imagine ways to do that (send a digital image, send by mail), but it is unlikely to be both timely and complete as it could be in the conventional classroom.

In the "case for anywhere/anytime learning" it was noted that students in asynchronous settings experience a later binding time, which gives them a greater sense of control. Not surprisingly, many teachers feel a loss of control of student work directly proportional to the students' increased sense of control. These shifts in binding time for different aspects of the course index other changes in the teacher-student relationship as well, which can be problematic given the institutional expectations of teacher control over course content and grading.

The flexibility of the conventional classroom regarding course content and modes of interaction leads to a potential (though not always realized) richness of the learning experience. It is an affordance, not of the chalkboard technology so derided by proponents of new technologies for learning, but of the larger sociotechnical system in which learning is embedded—the system comprising human activity, spaces, artifacts, tools, and communications media. Various approaches such as information ecologies (Nardi & O'Day, 1999) provide ways of understanding how the lectures, textbooks, and tools of the classroom are only a few of the actors within the network of human and technology actors in the school.

Traditional face-to-face education claims to offer learning specified in syllabi, delivered by instructors, and assessed on tests. Despite these claims, its greatest contribution may be in what it affords, rather than what it ostensibly delivers. Or, to put it another way, its contribution may be through its invisible elements rather than its visible ones. If that is true, then the new frame offered by online learning may deliver just as well, but in so doing, it ex-

cludes the anywhere, anytime learning that in fact characterizes much of the overall traditional experience.

The case then against anywhere/anytime learning rests on several arguments. One is that the very success of online learning has changed the conventional classroom. Thus, the rich media used online are now a part of face-to-face classes as well, and can no longer be used as an argument for online learning per se. What the early binding time for course construction gains in greater efficiency is lost in terms of reduced flexibility, especially if one considers the myriad situated extensions of the classroom. The later binding time for student work provides greater student flexibility, but loses in terms of building a learning community. Finally, the desire to have learning more deeply connected to life may argue even more strongly against the online environment.

Rethinking the Debate

The issues around this debate are crucial ones, but in the final analysis it may be the wrong way to characterize the problem. Both the pro and the con positions, as presented above, follow a media effects approach. This is a dominant approach to analyzing the effects of technology or new media (see Gauntlett, 1995, 1998). Typically it follows the pattern:

analyze the technology

describe its effects

interpret those effects

Thus, a proponent says the technology does thus-and-so, and therefore it will have such-and-such effects. Are there other ways to understand the role of technologies? I'd like to suggest several approaches, which provide lenses for seeing the phenomena of user appropriation as well as frameworks for interpreting what actually happens when the system is deployed (see also, Bruce, 1999, 2003).

The first is to recognize that the online environment is what Roland Barthes (1974) calls a writerly text, one which locates the reader as a site of the production of meaning." Regardless of how well resources have been collected and organized, curricula have been designed, or even training delivered, the power of the reader/user to appropriate the system in ways that make sense within a local context should not be underestimated. Accordingly, how well the online environment supports education depends on how it is distributed, interpreted, and re-created through use. These issues are difficult to predict as Merkel (2002) shows in a detailed account of technology use in low-resource communities. She details the many disjunctions between well-meaning developers and the situation of community members, which affect what the technology is in practice.

These differences can be extreme. For example, in a recent dissertation, Wang (2003) showed how children collaborated in a first-grade classroom. The teacher had allocated five minutes for each child at the computer. On their own, children developed a system in

which one child used the left half of the keyboard, a second used the right half, and a third used the mouse. Thus, they managed to get 15 minutes each at the computer, while achieving greater success in navigation or game-playing than any one would have alone. The meaning of the applications, the children's use of time and space while interacting with the computer, and the learning that occurred were only in part determined by the hardware and software design. A similar re-interpretation and re-design of the human-computer system is repeated in many contexts and nearly always underestimated by developers (see Twidale, 2003, for similar examples in adult use).

These are examples of pragmatic technology. One sense of that term is the common-language notion of technology that works to meet real human needs, accommodates to users, and is situated in time, place, and setting. A second, related concept, comes from pragmatist theory (e.g., Addams, Dewey, James, Mead, Peirce), in which technology is seen as the outcome of resolving a problematic situation. The latter sees technologies as both means of action and forms of understanding (Dewey, 1938; Hickman, 1990). This is a constructivist view of technology itself. Technologies are not seen as fixed objects, with predefined functions, but rather as tools that are interpreted and re-made into other tools. The incorporation of a technology into social practice is a function of political and economic forces, historical accidents, cultural conceptions, and a host of other factors in addition to any characteristics of the technology as physical object itself. Moreover, the attributes of the technology are themselves shaped by social forces (Bijker, Hughes, & Pinch 1987).

This perspective is helpful for understanding divergent or unintended uses. It also helps in understanding whose problem is being addressed. For example, a problem may be defined by the systems designer as organizing a collection of high-quality resources on biology, whereas the high-school teacher user may be concerned with improving test scores. These two problems may have some overlap, but their difference needs to be understood if we are to make sense of how the system gets used, or not, in that classroom.

Closely related to the pragmatic technology conception is situated evaluation, a framework for understanding innovation and change (Bruce, Peyton, & Batson, 1993). This framework emphasizes contrastive analysis as it seeks to account for differences in use. An underlying assumption is that the object of study is neither the innovation alone nor its effects, but rather, the realization of the innovation, or the innovation-in-use. It produces hypotheses supported by detailed analyses of actual practices, which make possible informed plans for use and change (cf. Bruce & Rubin, 1993, p. 215).

Use of any new technology is a long-term process of adaptation (DeSanctis & Poole, 1994). This is not just to say that it takes time to learn how to use a new tool; more deeply it is that context determines use and in turn use determines context. The consequence is that we see processes of substitution, enlargement, reconfiguration. It then becomes crucial to ask where we are in a process whose end is not in sight. The Concerns-Based Adoption Model (Hord, Rutherford, Hiding-Austin, & Hall, 1987), which emphasizes examining the change process rather than a snapshot of use is one tool that can be used to examine

those processes, especially when it is coupled with a dynamic (pragmatic technology) model of the innovation.

Implications for Research and Practice

Taken together, these lenses point toward a critique of online learning that is dynamic, situated, participatory, and open to new possibilities. Rather than conceiving the classroom as a recipient of a finished and tested technology, we might see it instead as an example of a Community Inquiry Laboratory, a place where members of a community come together to develop shared capacity and work on common problems. "Community" emphasizes support for collaborative activity and for creating knowledge that is connected to people's values, history, and lived experiences. "Inquiry" points to support for open-ended, democratic, participatory engagement. "Laboratory" indicates a space and resources to bring theory and action together in an experimental and critical manner. A community inquiry laboratory is most importantly a concept, not a technology in the narrow sense. Thus, online learning becomes, not a thing with determinate consequences, but a space in which participants create meanings.

Moreover, they incline us to consider the entire learning experience, rather than the characteristics of one set of tools versus another. Changing the binding time for course attributes offers new possibilities, both positive and negative. The larger question is how those can be used to achieve quality learning.

References

- Barthes, R. (1974). *S/Z*. (orig. pub. 1970, Paris: äditions du Seuil; trans. by Richard Miller). New York: Hill and Wang.
- Bijker, W. E., Hughes, T. P., & Pinch, T. (1987). *The social construction of technological systems*. Cambridge, MA: MIT Press.
- Bruce, B. C. (1999, March). Challenges for the evaluation of new information and communication technologies. *Journal of Adolescent and Adult Literacy*, 42 (6), 450-455.
- Bruce, B. C. (Ed.) (2003). *Literacy in the information age: Inquiries into meaning making with new technologies*. Newark, DE: International Reading Association.
<http://www.isrl.uiuc.edu/~chip/pubs/03lia/>
- Bruce, B. C., & Bishop, A. P. (2002, May). Using the web to support inquiry-based literacy development. *Journal of Adolescent and Adult Literacy*, 45(8), 706-714.
- Bruce, B. C., & Rubin, A. (1993). *Electronic Quills: A situated evaluation of using computers for writing in classrooms*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Bruce, B. C., Peyton, J. K., & Batson, T. W. (Eds.). (1993). *Network-based classrooms: Promises and realities*. New York: Cambridge University Press.

Burbules, N. & Callister, T. (2000). *Watch IT: The risks and promises of information technologies for education*. Boulder, CO: Westview.

DeSanctis, G., & Poole, M. S. (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. *Organization Science*, 5, 121-147.

Dewey, J. (1907). *The school and society*. Chicago: University of Chicago Press.

Dewey, J. (1938). *Logic: The theory of inquiry*. New York: Henry Holt.

Dewey, J. (1916) *Democracy and education. An introduction to the philosophy of education* (1966 edn.), New York: Free Press.

Foucault, M. (1972). *The Archaeology of Knowledge and the Discourse on Language*, trans. A. M. Sheridan Smith. New York: Pantheon.

Gauntlett, D. (1995). *Moving experiences: Understanding television's influences and effects*. London: John Libbey.

Gauntlett, D. (1998). Ten things wrong with the "effects model". In R. Dickinson, R. Harindranath, & O. Linn» (eds.), *Approaches to audiences*Òa reader. London: Arnold.

Gay, J. & Cole, M. (1967). *The new mathematics and an old culture*. New York: Holt, Rinehart & Winston.

Hickman, L. A. (1990). *John Dewey's pragmatic technology*. Bloomington: Indiana University Press.

Hord, S. M., Rutherford, W. L., Hiding-Austin, L., & Hall, G. E. (1987). *Taking charge of change*. Alexandria, Virginia: Association for Supervision and Curriculum Development.

Merkel, Cecelia (2002). *Uncovering the hidden literacies of "have-nots": A study of computer and internet use in a low-income community*. Ph. D. Dissertation, University of Illinois at Urbana-Champaign.

Nardi, B. A., & O'Day, V. L. (1999). *Information ecologies: Using technology with heart*. Cambridge: MIT Press.

Twidale, M. (2003). *Over-the-shoulder learning* [website with articles]. <http://alexia.lis.uiuc.edu/~twidale/research/ots/>

Wang, X. (2003, August). *Constructing a third space at the computer in a first-grade classroom*. Ph.D. Dissertation, University of Illinois at Urbana-Champaign.

Wegner, P. (1968). *Programming languages, information structures and machine organization*. New York: McGraw-Hill.