Ubiquitous Learning, Ubiquitous Computing, and Lived Experience

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Abstract

Ubiquitous learning implies a vision of learning which is connected across all the stages on which we play out our lives. Learning occurs not just in classrooms, but in the home, the workplace, the playground, the library, museum, and nature center, and in our daily interactions with others. Moreover, learning becomes part of doing; we don't learn in order to live more fully, but rather learn as we live to the fullest. It is understandable to see ubiquitous computing necessary for this kind of ubiquitous learning and sufficient to make it possible. Education would certainly be easier to promote if we could simply identify some new technologies that would make ubiquitous learning occur. But the new technologies are neither necessary nor sufficient for this to happen. This paper argues that it is our vision for ubiquitous learning that matters most, not simply the technical affordances. We need to define ubiquitous learning in an historically legitimate way, one which recognizes the possibilities afforded by the new technologies without reducing the argument to a technocentric position.

Keywords

Ubiquitous computing, lived experience, audio-visual materials, learning ecology

Ubiquitous learning is more than just the latest educational idea or method. At its core the term conveys a vision of learning which is connected across all the stages on which we play out our lives. Learning occurs not just in classrooms, but in the home, the workplace, the playground, the library, museum, and nature center, and in our daily interactions with others. Moreover, learning becomes part of doing; we don't learn in order to live more fully, but rather learn as we live to the fullest. Learning is through active engagement, and significantly, is no longer identified with reading a text or listening to lectures, but rather occurs through all the senses - sight, hearing, touch, feel, and taste.

It is understandable to see ubiquitous computing necessary for this kind of ubiquitous learning and sufficient to make it possible. Education would certainly be easier to promote if we could simply identify some new technologies that would make ubiquitous learning occur. But in the sense presented above, the new technologies are neither necessary nor sufficient for this to happen. This paper develops these ideas more, arguing that it is our vision for ubiquitous learning that matters most, not simply the technical affordances. We need to define ubiquitous learning in an historically legitimate way, one which recognizes the possibilities afforded by the new technologies without reducing the argument to a technocentric position.

Why Do We Need Ubiquitous Learning?

Writing in 1939, Harold Benjamin imagines a “saber-tooth curriculum.” It is based on teaching skills that were useful in the Stone Age, but no longer needed in the modern world. Even though the skills are irrelevant to present life, they are still taught, and then justified on the grounds that they foster the development of skills, which *might* carry over to life. For example, "wise old men" say "we don't teach tiger-scaring to scare tigers; we teach it for the purpose of giving that noble courage which carries over into all the affairs of life."

Instead of seeking learning environments that would help students develop courage in relation to their present experiences, the saber-tooth curriculum presents essentially artificial activities, disconnected from those lived experiences. Benjamin considers that in a similar way, much of the curricula of his own day is

outmoded and irrelevant to the world he and the students inhabit. One might describe that curriculum as the antithesis of ubiquitous learning. Benjamin argues that the curriculum should instead respond dynamically to a changing world and connect to the lived experiences within that world. He would have celebrated ubiquitous learning as the alternative curriculum for today.

Benjamin was undoubtedly influenced by John Dewey, and others of the progressive education era. In *The School and Society,* Dewey (1915) articulates a similar vision. He starts by identifying a problem in the separation of academic knowledge from daily life. He might have responded to this separation by relegating schooling to one or the other of these pursuits. In the former case, schooling would be focused on classroom-based study through books and lectures; in the latter, it would be apprenticeship in contemporary work. But Dewey rejects this dichotomy. Instead he envisions connecting the school to life. Activities in the school would occur in spaces lying between the academic realm represented by disciplines, libraries, and museums on the one hand, and the everyday realm of work and family life. Figure 1 shows part of what this school might be, with a library at the center and activity rooms at each corner linking to activities in life beyond the school. In fact, the activities would serve to integrate these realms, thus making everyday life richer and more reflective, and making academic work more relevant to lived experience. Within the full development of this idea lies Dewey's belief that education is key to social reform.

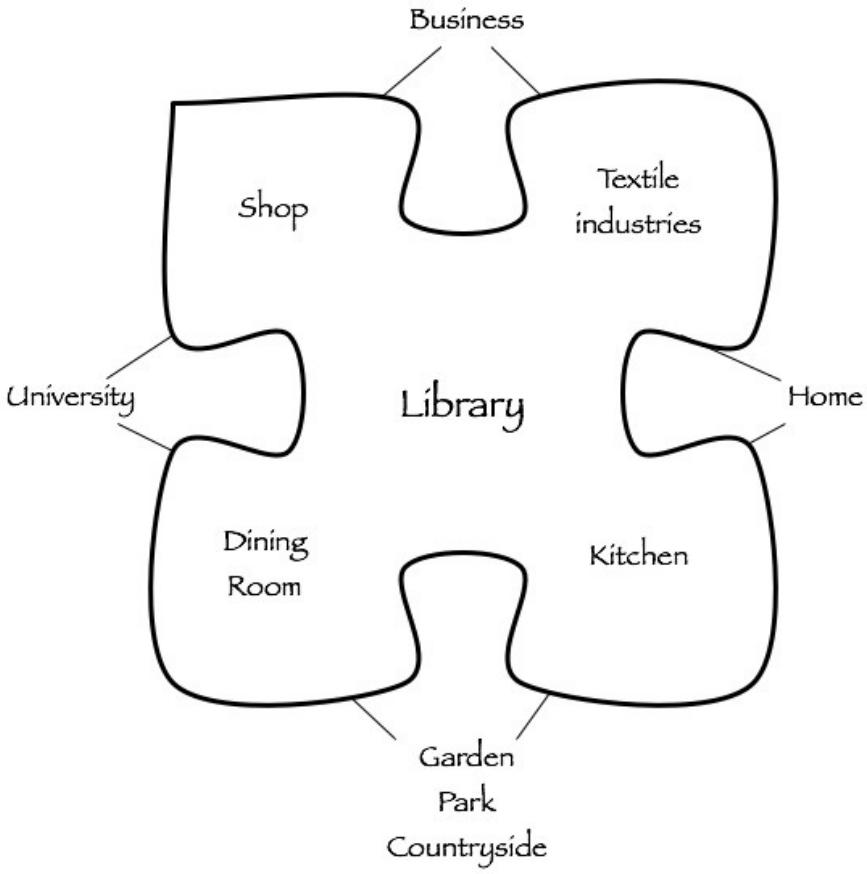

Figure 1. Part of Dewey's vision of schooling connected to life, adapted from *The School and Society,* Chart III.

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Dewey's vision rests upon the idea of three sets of technologies:

- technologies of the workplace, farm, and home--the technologies of the living society;
- technologies of the academy, such as curricula, books, and libraries; and,
- sitting between these, the technologies of learning, which exist in the kitchen or shop of the school.

Dewey judged that the technologies of the first two spheres of activity had grown far apart.

Just as Benjamin saw the irrelevance of the saber-tooth curriculum, Dewey criticized the formal learning of his day as irrelevant to a changing world. An elaborate apparatus was then needed to connect students' experiences with those of the school, including procedures to ensure compliance, increase motivation, or simply to explain what was going on. Dewey felt that the distance between the technologies of learning and those of life made them difficult to relate to one another, and as a result, they could not be used to respond effectively to the dramatic social and technological changes underway in the world at large.

Dewey's school would instead give students the opportunity to combine theory and action in a way that would enrich both, make learning more exciting and meaningful, and thereby establish a model for progress in the larger society. The school that became the actual Laboratory School is important for what it showed about the possibilities for learning, as well as for its failures (Tanner, 1997). Dewey's vision and the photos of engaged learners from the early days of the Laboratory School are inspiring. And yet, because the activities of the factory, the school, and the university were dissimilar; the school had to be radically transformed to mesh them together.

In contrast today, we find that ubiquitous computing has become part of home, community, work, and the academy. We connect with a friend, shop for a toaster, build a business, study medieval history, write a memoir, or arrange travel online, often using the same tools regardless of the sphere of activity. Dewey's dream of schooling that links the mind and the body, theory and action, or disciplines and ordinary experience seems more realizable than ever. It seems clear that ubiquitous computing is both necessary for this and sufficient to make it happen. But is it either necessary or sufficient? Do we have to have the new technologies to promote ubiquitous learning? If we have them, will ubiquitous learning automatically occur?

Is Ubiquitous Computing Necessary for Ubiquitous Learning?

For Dewey, the consequence of radical change in social life was that the school required a similar transformation. This led him to imagine new technologies for learning. Are there more seamless alternatives to his way of addressing this problem? Do we need to leap all the way to nanotechnology or implanted computers in order to enact more dynamic and robust learning?

Nearly a half century after the first edition of *The School and Society* (1900) and a half century before the Deep Blue (a computer) defeated Garry Kasparov in two chess matches, Gwladys Spencer was an instructor at the University of Illinois Library School. This was during what most people would consider the prehistory of the information age (see more in Bruce, 2003). I found a list of "Audio-Visual Materials and Equipment to be Utilized by Libraries in the Educational Program" from a course she taught in 1946.

This is a remarkable list (Figure 2), including expected items such as "blackboards and bulletin boards," but many unexpected ones as well. She included television (in 1946!), showing that she had foresight about its eventual prominence as a communications medium. She also included tools for investigation, such as microscopes, and "models, objects, specimens." She clearly saw that audiovisual materials were more than simply devices for transmitting information. But more striking still is the inclusion of "pantomimes, playlets, pageants, puppet shows, shadow plays" and "trips, journeys, tours, visits." The presence of these says that she saw all of the elements of her list as opportunities for enriching experiences, rather than simply as media for transmitting information.

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Types of Audio-Visual Materials and Equipment to be Utilized by Libraries in the Educational Program

1. Blackboards and bulletin boards
2. Posters, cartoons, clippings
3. Dramatics: pantomimes, playlets, pageants, puppet shows, shadow plays
4. Trips, journeys, tours, visits
5. Models, objects, specimens
6. Charts: organization or flow, table, tree or stream
7. Graphs: area, bar, diagram, line, pictorial statistics
8. Maps: flat, relief, projected, electric, globe (celestial or terrestrial)
9. Microscopes
10. Microprojectors, reading machines; microfilms, microphotographs, microprint
11. Stereoscopes; hand, binocular, televiewers; stereographs, disc for televiewers
12. Flat pictures; photographs, prints, postcards, positive transparencies
13. Still pictures projectors and projected-opaque, filmslides, slides (glass, cellophane, ceramic, etc.)
14. Sound filmslides projectors; sound filmslides
15. Motion pictures projectors and projected: silent films, sound films
16. Sound recorders: transcriptions
17. Phonographs; disc, wire; recordings
18. Talking books
19. Radios, loudspeakers, public address systems, intercommunicating systems
20. Television

Figure 2. Gwladys Spencer's list of AV materials.

Taking our cue from Dewey's diagram, we might represent some of Gwladys Spencer's vision as in Figure 3. Here, the activity spaces include dramatics, investigations, trips, and working with objects, just some of the activities implied by her list. Just as Dewey proposes, she emphasizes opportunities for learners to act in and on the world. Even the presentational media on her list seem to be conceived in a manner quite different from today's emphasis on using PowerPoint to convey course content. The posters, charts, and pictures are there because they are important media in the world, and much can be learned by investigating them, not because they are a convenient way for instructors to organize their notes in easily digestible chunks.

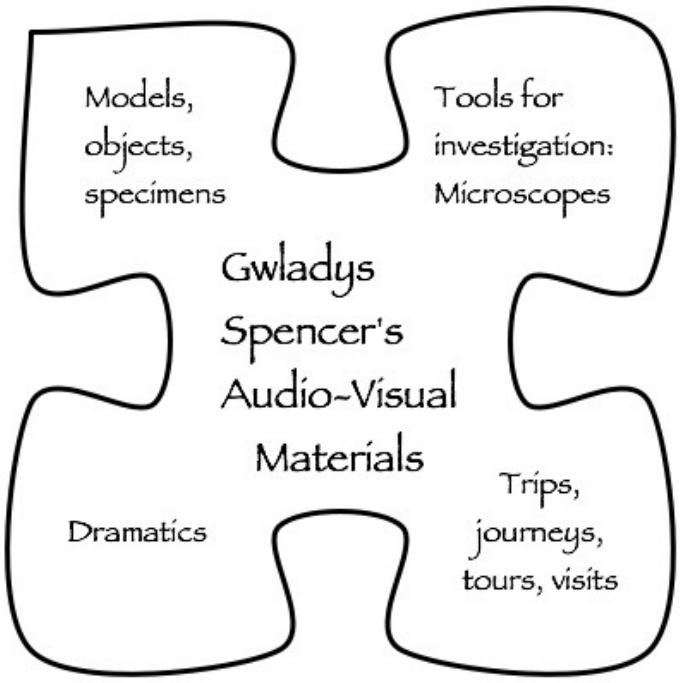

Figure 3. Gwladys Spencer's view of A-V materials.

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Aside from the details of which tools she had available, the list shows that Spencer had a broad view of how libraries could support learning and, more important, a vision of what learning could be. Today, we are excited about multimedia in education. But what we often mean is simply that a computer display can show students moving pictures with sound. Interactivity is an important additional component. But our vision of what that multimedia really means for learning needs to go beyond the technical features of the display to consider what students can do and how they can extract meaning from their own experiences. Spencer saw that there were many tools and media that could enhance learning. She drew from traditional as well as emerging technologies to lay out a spectrum of possibilities for teaching and learning. Her list suggests an openness to diverse ways of learning and, moreover, a view of learners as active constructors of meaning. In so doing, she shows that ubiquitous learning depends more upon our pedagogy than on our technology.

Is Ubiquitous Computing Sufficient for Ubiquitous Learning?

In recent work, the vision of ubiquitous learning has been linked closely to an array of new information and communication technologies. No longer confined within large metal boxes or even tied to the wall with wires, these technologies have become portable, wearable, and distributed. They are embedded in dishwashers, cameras, and medical monitors, and make possible smart cars, roads, houses, and offices. As ubiquitous computing has become more and more part of our everyday reality, ideas related to ubiquitous learning have likewise become more prevalent.

If you walk across a college campus today you will see students plugged into their ipods and cell phones, with laptops in the backpacks and maybe PDAs as well. They appear oblivious to the natural world around them, to the point of endangering their lives crossing the street. Always multitasking, they connect with friends through social network sites, live through online games and immersive environments, capture events with digital cameras, and write about their most intimate experiences and thoughts in their blogs. Watching them learn through Google and YouTube, finding their way with GPS, and maintaining social relations through constant electronic connections, it is difficult to escape the thought that new forms of living and learning have already arrived.

Even if we don't embrace all that is new here, it seems imperative to engage with it to some extent if we are to understand literacy in the information age (Bruce, 2003, Coiro, Knobel, Lankshear, & Leu, in press). It also appears that a kind of ubiquitous learning has arrived without any intention or forethought; the technologies alone have made it happen. There is no doubt that new forms of learning are already happening through social networking, online videos sites, and environmental sensors.

Are these technologies sufficient, or do we still need the vision of a Gwladys Spencer? A recent study addresses this question in the context of a university course, Plants, Pathogens, People, which uses a rich array of both new and old information and communication technologies (D'Arcy, Eastburn, & Bruce, in press). The authors began with an attempt to identify which of these technologies were most effective at promoting engaged and connected learning. They were especially interested in fostering connections between the university classroom and life outside, as well as learning that integrates laboratory work, scientific theories, history, and public policy. They introduced new media, such as podcasts, which seemed to be salient in the students' lives. In short, they sought to make the college classroom more conducive to ubiquitous learning.

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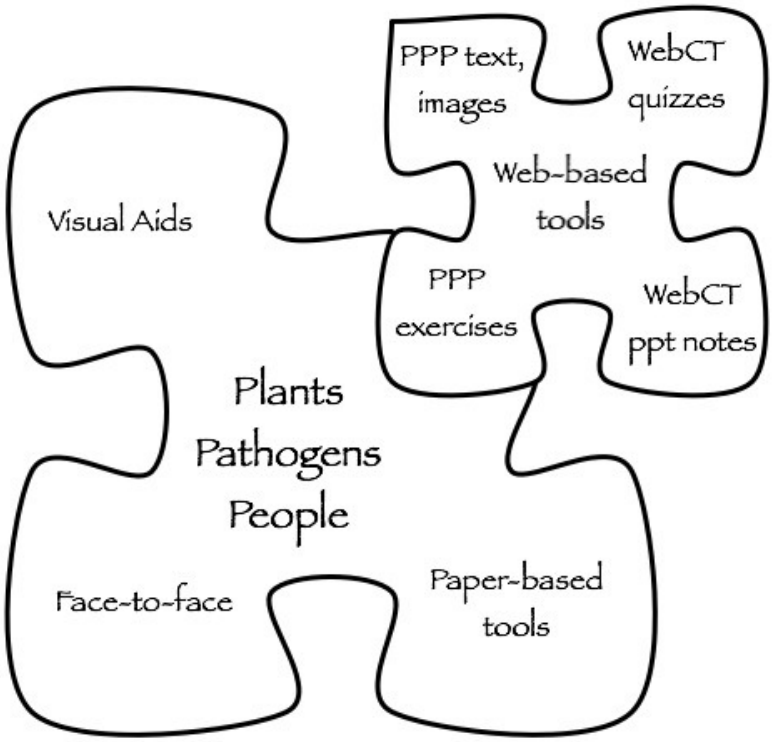

Figure 4. Some of the 19 media used in the Plants, Pathogens, People course, with the web-based tools expanded.

The major result of the study was that across diverse learning styles, majors, and genders, many of these media were deemed to be useful for all learners. Moreover, the usefulness of a particular medium depended much more on how it fit with others, how it related to course content, how the instructors used it, and other contextual factors than it did to any intrinsic media properties. Overall, the findings suggest there is no ideal instructional medium, nor even specific media being best for particular students. It is true that there are differences according to student learning style or instructor teaching style, but the overriding message is the need to consider the entire learning ecology (Cross, 2007; Bruce, 2008, in press; Bruce & Hogan, 1998; Nardi & O'Day, 1999).

A similar message comes through the work of Barbara Ganley (EdTechTalk, 2006; Ganley, 2007). Building on her students' experiences with new media and social software, she works with them to create a blog community, which connects within the classroom and reaches beyond it to people and experiences around the world. It is noteworthy that Ganley devotes two weeks at the beginning of each class to develop a shared vision of learning, community, and technologies. As with the study described above, the technologies alone are far from sufficient. Instead, we need to think about the histories of learners, how technologies serve in relation to changing learning needs, and how diverse resources can be used in a concerted way. Technologies need to be re-created in line with a vision of ubiquitous learning if they are to achieve that goal (Bruce & Rubin, 1993).

Conclusion

As with many versions of hyphenated learning–active learning, engaged learning, situated learning–it is tempting to strip away the modifier, ubiquitous. Learning is an aspect of living not of place. We have always been able to learn in diverse settings other than the formal classroom, and often in a more pleasant, memorable, and useful way. Nevertheless, ubiquitous learning serves to remind us of the need to continually re-examine how learning occurs and to attend to the affordances of new technologies.

The examples here reinforce the value of ubiquitous learning and suggest ways that various technologies may support it. They also remind us to situate technologies in a larger context, and to see them organically (Haythornthwaite, et al., 2007). Arguing that it is time to move from the teaching machine metaphor to Dewey's idea of tools, Wiburg writes,

> An expanded concept of instructional design that includes the purpose of education, the need to teach the person as well as the content, and the importance of the social context of learning is required before we can implement computer-based collaborative learning for the children in our schools. (Wiburg, 1995)

The array of technologies that we might group under ubiquitous computing can help implement an expanded concept of not just instructional design, but of learning in all its contexts and forms. Yet we must maintain a critical stance. Speaking in 1984, but with an enlarged relevance today, Ursula Franklin says,

> In the powerful trends of the new industrial revolution, people have to adapt to the work, habits, and values of the machines. People are generally regarded as the sources of problems, while devices are considered as means to solutions...The elimination of some of these social settings [a consequence of redesigning activities of production] also eliminates the opportunities of developing those human skills that are fundamentally different from the skills of machines: abilities such as listening, interpreting, instructing, and working out to mutually acceptable accommodations. But it is the skills, more than anything else, that the global village needs. (Franklin, 2006, p. 214)

Our vision of ubiquitous learning must maintain at its core a concept of those fundamental human skills. We feel that ubiquitous computing technologies help us solve problems, create/access knowledge, and build community. We feel that they do it in a way that links work, family and friends, learning, and life. But the very seamlessness of these technologies is seductive. Ellul's concept of the technological milieu is still a propos: "Every technique makes a fundamental appeal to the unconscious." (1964 p. 403). We need to ensure that employing new technologies enhances rather than diminishes our capacity to develop as whole human beings.

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