Library e-learning spaces

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Abstract

This paper analyzes the state of learning spaces as they impact library education. Specifically, it reviews the literature about current trends in designing learning environments that facilitate e-learning. The report also lists cited examples of good practice in contemporary university library e-learning spaces.

Introduction

Space impacts teaching and learning, whether that space is explicitly considered or not (Strange & Banning, 2001). Indeed, educator John Dewey stated back in 1933 that "whether we permit chance environments to do the work, or whether we design environments for the purpose makes a great difference" (p. 22), asserting that educational settings are better served by specificity rather than serendipity. In his meta-analysis of environmental impact on human behavior, Moos (1986) determined that "the arrangement of environments is perhaps the most powerful technique we have for influencing human behavior" (p. 4).

Traditionally, education has thought of learning space in terms of formal education: classrooms and lectures halls that fostered one-way communication. However, today's administrators are realizing the impact of informal, social learning and the spaces wherein that occurs: cafeterias, halls, even parking lots (Jamieson, 2003; Johnson & Lomas, 2005). Be it in the classroom or in the parking lot, during office hours or during a weekend poetry event, learning occurs and is shaped by the environment.

Lombardi (2005) asserts that post-secondary campuses offer prospective students an experience of education. They "promote themselves, first and foremost, as *places with people* [author's emphasis]. The physical campus sets up the enabling conditions for a complex social ecology to emerge over time" (p. 1). Similarly, professional work settings exemplify complex social structures that impact induction into the field.

With the advent of the Internet, and more specifically Web 2.0, the world of library education has changed dramatically. Although millions of students, especially the millennial generation, engage in social networking, those connections largely consist of personal connections. Paradoxically, these online environments can inhibit social learning, particularly older students, who can feel isolated and alienated from their peers and supervisors when learning and working online.

Certainly it makes sense to examine and plan learning spaces purposefully in order to optimize library learning experiences.

Background

With the incorporation of digital technology, the definition of learning spaces has changed. Increasingly, the space in which learning occurs has broadened to include virtual space as well as physical space. Indeed, several scholars focus entirely on virtual learning spaces (e.g., Bayne, 2004; Sheremetov & Nunez, 1999; Stauss, 2002).

Definitions

Brown (2005) defines learning spaces as spaces that encompass the full range of places in which learning occurs, from real to virtual, from classroom to chat room (p. 12.4). Nevertheless, at this point, no single definition captures all of the nuances of technology-impacted learning spaces.

The notion of space versus place deserves consideration. Goodyear (2002) asserts that "space is abstract, but place is concrete and real" (p. 7). Harrison and Dourish (1996) contended that "space" is a three-dimensional environment, while "place" has temporal properties and a social meaning; it is a "space which is *invested with understandings* of behavioral appropriateness, cultural expectations, and so forth." They posit the analogy of a "house" versus a "home." Therefore, in the discussion below, the concept of e-learning spaces has as one of its objectives, the intent of enabling the CTE community to create a sense of place within these intentional virtual surroundings.

Kolb and Kolb (2005), leading researchers in the area of experiential learning, expound on the importance of situated learning theory, and use the term "microsystem" to describe immediate environments (e.g., classroom or course online environment) and "mesosystem" to describe other concurrent settings in their lives (e.g., cafeterias or corporate digital identity).

Marmot (2005) suggests the terminology of "learning complexes", whereby different types of learning correspond to different types of learning spaces. Depending on the tasks (reflecting, conversing, doing), learning spaces may consist of:

- group teaching/learning
- simulated environment
- immersive environment
- peer-to-peer and social learning
- learning cluster
- individual learning spaces
- external spaces.

Moreover, these learning spaces might well be located contiguous to each other in order to maximize their impact. Indeed, this issue of proximity of spatial zones points out the social implications of the use of physical space, or proxemics (Strange & Banning, 2001, p. 21).

Underlying Theories and Principles

Current literature about learning spaces refer to built education: "architectural embodiments of educational philosophies" (Monahan, 2002); "layout, location and arrangement of space" as it impacts behavior (Strange & Banning, 2002, p. 15); how spaces impact teaching and learning; may apply to the intentional design and use of space as a teaching/learning environment. They also contrast the terms "formal learning" (curriculum-based, which is often classroom-based intentional opportunities for learning) and "informal learning" (serendipitous human interaction that involves learning).

Cannon's 1988 extensive synthesis of research on the impact of the environment on learning provides a starting point for learning space discussion. Basically, contemporary design of learning spaces builds upon an educational philosophy of active and social learning. This approach starts with the student learner, examines desired outcomes, and plans the physical conditions for an optimum learning environment. Keeping in mind instruction and learning style variances, learning spaces are designed to provide differentiated areas and grouping arrangements. In addition, items within these environments should support modification and customization to reflect users' interests and needs.

Research on learning spaces addresses physical attributes of space, psychological factors, and cognition. These variables often apply to e-learning environments, particularly in terms of visual aspects and kinesthetics. Specific learning theories that address e-learning spaces follow.

- Environmental psychology notes that different tasks and learning styles call for different environments (e.g., noise distracts older people and introverts more than it does younger folks and extroverts) (Weinstein, 1979). On a website, noise may be translated into the "busy-ness" of the page, so that a cluttered and disorganized layout distracts the learner. The learning environment also has symbolic importance, in that messiness may connote devaluation (Weinstein, 1979); in that respect, the learner may consider a poorly designed e-learning space – and the content therein -- as less reputable.
- Social constructivist philosophy posits that environments, especially those in close proximity, can stimulate the senses (e.g., attractive visuals, unexpected architectural features), encourage interaction (e.g., group furniture, open spaces), and provide opportunities for practice (e.g., labs, studios) improve learning (Lombardi, 2005; Oblinger, 2005). MIT researchers Turkle and Papert (1990) found that the medium of the campus inspired learning, with ready availability of people and resources fostering creative reassembly of complex thought.
- Situated learning theory asserts that learning occurs in a community of practice, and that learning space can refer to both physical places and the learner's mental constructs of their experiences within the social environment (Lave & Wenger, 1991; Lombardi, 2005).
- Vygotsky's activity theory of social cognition (1978) conceives learning as a transaction between an individual and the social environment.
- Kolb's related experiential learning theory (2005) contends that learners navigates through – and interacts with -- a learning space, based on their position within the

learning cycle (i.e., experiencing, reflecting, thinking, acting). Kolb also asserts that different academic fields interact with the environment differently (e.g., science labs versus philosophical discourse), which matches the learning style preferences of different individuals. Therefore, to improve learning, faculty should examine the learning space in order to optimize learners' interaction with that space: in terms of the affective, perceptual, cognitive and behavioral aspects of learning. Specific recommendations include: providing physical space for conversational learning (e.g., circular seating); making space for developing expertise (e.g., labs); providing space for action and reflection (e.g., display areas); making space for thinking and feeling (e.g., carrels, seating nooks); providing space for learners to take charge of their own learning (e.g., tackable walls); connecting different types or configurations of learning spaces in order to facilitate the flow of learning.

The field of psychology that most directly addresses interactive e-learning spaces is human factors psychology, which focuses on the interface between humans and a digital resource Sanders & McCormick, 1993).

Models

Chan, et al. (2001) posit four space of learning models: future classroom, community-based, structural knowledge, and project-based learning. They further posit a two-dimensional learning space grid: time (synchronous and asynchronous) versus location (same versus different). While traditional learning exists in real time in one location, learning spaces can cross time and space as students connect in disperse ways. For example, instructional rooms should incorporate electronic collaborative tools to foster team learning. Furthermore, learning can extend beyond classrooms because of technology. It should be noted that virtual interaction (e.g., Second Life) does not replace face-to-face interaction because the former is an artificial environment; therefore, it is important to figure out how to blend physical and digital worlds. For example, instructional rooms can embed technological systems/servers for interaction, and students can bring their personal digital devices to hook up to the central system and participate actively together (Milne, 2007).

Scott-Webber (2004) identified five distinct types of environments to support knowledge sharing, which can be applied to library settings:

- environments for delivering knowledge (e.g., library instructional classrooms)
- environments for applying knowledge (e.g., library tutoring centers)
- environments for creating knowledge (e.g., library production areas)
- environments for communicating knowledge (e.g., library presentation areas)
- environments for decision making (e.g., library conference rooms).

Strange and Benning (2002) mentions four themes in assessing the interaction between humans and their environment: how physical space facilitates or impedes behavior, how collective socialization impacts environments, how organizational factors impact environments, how social factors impact perception.

Features

Oblinger (2006) synthesizes many of the key features of effective learning spaces:

- *flexibility* for quick reconfiguration to meet changing educational task needs, and amenable for student customization
- *decentralization* so that learning flows from classroom to corridors and eating spaces, so that students can co-construct knowledge, so that learning and living commingle

- *ergonomic comfort* (both young and older bodies are becoming more "substantial"; at least some furniture should be adjustable
- *stimulating to the senses* such as engaging visuals, varied levels, unexpected areas or pathways, a sense of nature (e.g., organic shapes, texture, greenery, reflective surfaces)
- *ubiquitous technology* to support access to active, social learning: e.g., wifi, plug-and-play; frequent outlets, "smart" classrooms with presentation and online conferencing capabilities, 24/7 presence.

THE CASE FOR E-LEARNING SPACES

Particularly as society and technology have changed, libraries need to change how they use space and provide service. Otherwise, libraries risk being disconnected from their users and less equipped to prepare today's population for their current and future needs. In studying university learning spaces, Savin-Baden (2007) contends that:

- the re-creation of learning spaces is vital for the academic community,
- disregard for designed learning spaces can fragment academic identities, and
- learning spaces need to be valued and possibly redefined in order to regain and maintain the intellectual health of academe.

Student Needs

Current students are more diverse than ever in terms of ethnicity, age, backgrounds, experiences, and expectations. Traditional-age students are digital natives, social learners, experiential- and participatory-oriented, and multi-taskers. Increasingly, most students work at least part-time, and all have responsibilities outside of the school site, so their time is limited. In addition, they may study at any time, day or night, so services need to be offered 24/7; certainly 9-5 Monday-Friday is not a viable default time frame. In terms of e-space, students want access: to peers, experts, hands-on experience, and technology.

Based on student and social realities, as well as research on effective education, e-learning spaces need to foster student engagement and active learning. Benchmarks and indicators include: student interaction with peers outside class time on readings and assignments; student interaction with faculty outside class time about coursework, research and other activities.

Today's students often think that creating content is more important to learning than just consuming content, an attitude supported by current learning theory.. Web mashups are a particularly engaging way to combine two entities into an original synthesis, for example; likewise, comparing and linking data sets can lead to new ways of thinking about related information. Therefore, learning spaces need to include production areas and tools (Milne, 2007).

Community Focus

One of the main reasons for re-conceptualizing space is community-building. Increasingly, the notion of a community of learners and practitioners drives education and the business world; research finds that students learn best in community (p. 3). The underlying principle is that members with common values and values can reflect upon their knowledge and improve their performance and impact by building upon each other's expertise. Tacit knowledge becomes explicit as the group accesses and shares that knowledge – and acts upon

it. This learning model minimizes the lecturn sage role, and promotes multiple perspectives; thus, physical space, coupled with virtual space, needs to facilitate such community-based knowledge. Physical features that foster technology-enhanced community-based learning include:

- communication surfaces (e.g., portable SmartBoards, PowerWalls, wonder wall (http://wonderwall.msu.edu), tackable/writable walls)
- joint physical and virtual work space and project area

It should be noted that physical and virtual communities of practice are likely to have different learning experiences. Librarians need to reconcile these differences with the intent of converging these learning spaces; instructional design incorporating technology can offer successful solutions.

Technology Trends

Technology as it is manifested in society poses several trends: social networking, increasing bandwidth—and content that fills that bandwidth, growth of personal/mobile digital devices, continued digital divide, miniaturization.

In libraries, technology plays a key role, both in terms of providing resources as well as integrating personal technology devices. Learning spaces also acknowledge the importance of virtual space, and try to meld the virtual and the physical. Trends in incorporating technology into library learning spaces include:

- ubiquitous wifi
- technology tools for group work and collaboration
- discipline-specific technology tools (Oblinger, 2006).

It should be noted that, while technology can enrich the library education experience, in itself it can distract from learning. With the instructor at the front of the class, students may well be tempted to play Solitaire or check their email on laptops. Students who are not tech-savvy may feel frustrated if they are required to sue a sophisticated online application without instructor support. The issue is not physical space, per se, but rather a teaching concern. Nevertheless, library educators need to pay attention to technology's presence in physical space as they design engaging learning experiences. For instance, email might be incorporated as a collaborative tool in class. In that respect, social networking can foster on-task participation, and reinforces the concept of the student as a contributor to the knowledge base.

REQUIREMENTS FOR CREATING E-LEARNING SPACES

In the final analysis, e-learning spaces should align with and reinforce the library education vision and mission. Oblinger (2006) mentions the following trends in learning space design for higher education, which can be particularized for library educators:

- interconnecting individual and group spaces, formal and informal learning spaces
- clustering informal and formal spaces such as cyber cafes or labs near instructional rooms and reference services to form a kind of intellectual neighborhood
- locating librarian offices near classrooms
- considering passageways as learning spaces in themselves
- encouraging cross-disciplinary interaction and innovation
- insert space for experimentation
- displaying creative work to stimulate originality.

In terms of planning learning spaces, broad-based input and ownership have become accepted practice. Input may be done through photo and web surveys, not just committee

meetings. User councils can be composed of a cross-section of stakeholders (e.g., students, faculty, academic affairs, IT) (Oblinger, 2006).

Specific Spaces

What might constitute an effective physical space for facilitating e-learning? North Carolina developed learning space technology standards, with an emphasis on classroom technology (http://www.ncsu.edu/classtech/standards). In addition, these standards concentrate on faculty functions rather than specific technologies or spaces. Thus they can be applied for any learning space.

Each part of the library serves distinct functions that should be considered when designing e-learning spaces overall:

- entrances: establish the sense of the library and engage the visitor via touch-screen information kiosks and plasma/LCD screens, immediate service centers, displays of student work
- instructional spaces: support a range of purposes, offer classroom clusters with adjacent social spaces
- learning centers: space is self-regulating in terms of activity/behavior (e.g., nooks by windows, carrels among library stacks)
- social spaces: increase student motivation and participation by providing food areas, wifi, common areas for both students and faculty (JISC Development Group, 2006)

Technology Issues

Technology plays a central role in design and specification requirements for both physical and virtual learning spaces. Regardless of the learning space, technical requirements must be addressed: terminal/workstation requirements, system platform configurations, electrical demands, network hardware, Internet connectivity issues, and administrative software. With the incorporation of social networking, another layer of considerations are required: cross-device sharing, parallel awareness, group archiving, as well as groupware in general. Additional security and privacy measures (including issues of remote access) also need to be taken with Web 2.0 incorporation. Emerging e-learning area devices include teaching walls, convergent technologies, peripheral accessories and room-scale peripherals, transparent information-capture systems, spaces with memory (e.g., interactive memory wall), IP network videoconferencing, embedded-system versions of operating platform, learning space systems, software middleware infrastructure, and pervasive computing infrastructure (Milne, 2007). 24/7 technology support, in both physical and online environments, need to be calculated as part of planning and implementation endeavors.

Even computer labs can be modified to meet a greater variety of learning needs, particularly in terms of social interactivity. Seating can be more flexible. More open spaces can be allocated for laptop and other mobile device use. Large screen systems with circular work areas can support group projects. Glass-enclosed tech conference spaces can ensure privacy while maintaining supervision. Production and project areas can be used for one-time and ongoing team endeavors.

Assessment

Assessment of e-learning spaces should be an ongoing process, but is often overlooked. Several factors need to be addressed in assessment endeavors:

- determining the focus: cost analysis, facilities management, impact on teaching and/or learning (from individual or institutional level), interaction between people, human-physical space interaction, digital space (e.g. web hosting, servers to support document storage and delivery)
- identifying the spaces to assess: classrooms, labs, public buildings, open areas
- determining usage: formal vs. informal learning, physical vs. virtual use, frequency and timing of usage, demographics of users—and non-users,

E-LEARNING SPACE APPLICATIONS

The chief educational function that has embraced the concept of intentional, redesigned learning space is the library, which is increasingly labelled an "information commons" or "learning commons." Because libraries cross curricular lines, and promote student-directed learning, these spaces serve as models for needs-based, flexible learning spaces that support e-learning. Some of the salient features include:

- differentiated spaces for individual and group work, some with presentation/projection capabilities; some classrooms may also be available
- mix of office- and leisure-style furniture (including bean bags and diner booths), much of which may be moved
- pervasive technology, including hundreds of computers with a variety of software programs, wifi capability, large-screen dynamic display/signage, multimedia consumption and production areas
- service centers: reference, technology, writing, thesis/research assistance, instructional design, faculty development
- food and supply areas
- recreation/entertainment venues

Librarians often bridge physical and virtual space through 24/7 digital reference service, web tutorials, online repositories of learning objects, and links to coursework. Further findings about library commons may be found in Henning's 2005 report (http://jhenning.law.uvic.ca/final_report.html).

Exemplar University Learning Spaces

The following universities lead in e-learning space innovations and best practice. For each site a web page of explanation and key features are noted.

Duke University Perkins Library: http://cit.duke.edu/news/flex_space.html
Mixed use facility optimizes university community commingling, blends sheltered and open spaces using lighting structural angles,

Eckerd College Armacost Library: http://www.eckerd.edu/librarydedication/
Integration of physical and digital resources, incorporation of outdoor spaces

Murdoch University Information Commons: http://wwwlib.murdoch.edu.au/
Integrated services, variety of computers in different configurations (e.g., counter style, classroom, study group mode), 24/7 area

Northwestern University Information Commons:
http://www.library.northwestern.edu/ic/
First stop to library, mall-group project rooms, presentation areas, info booths

Oxford Brookes University Blended Learning Landscape:
http://www.brookes.ac.uk/publications/bejlt/volume1issue3/perspective/francis_raftery.html

Blended physical-virtual environment to optimize access to learning content, communication, collaboration, and assessment; blend classroom learning and campus student support services
University of Georgia Student Learning Center: http://www.slc.uga.edu/
Classrooms connect with the library, digital media lab, coffee shop

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