Lifelong learning and systems: A post-Fordist analysis

Patricia McGee
The University of Texas at San Antonio
San Antonio, TX USA
patricia.mcgee@utsa.edu

Marybeth Green
The University of Texas at San Antonio
San Antonio, TX USA
marybeth.green@utsa.edu

Abstract

Learning/Course Management Systems (L/CMS) have become an instructional backbone for online instruction. Yet over the course of their inception as a management framework, our knowledge of learning theory had advanced tremendously, resulting in what the authors feel is an antiquated instructional system. This study analyzes five most used L/CMS in K-20 education within a post-Fordist framework that analyzes current capacities of systems to support current learning theory. Findings indicate that L/CMS are largely lacking in effective instructional functions.

Keywords: Virtual learning environment, managed learning environment, CMS, learning management system, learning platform, Learning Content Management System (L/CMS), etc.

Introduction

The proliferation of learning/course management systems (L/CMS) over the past decade has occurred in multiple sectors: K-12, higher education, government and the business workplace. Distributed learning systems originated within a Fordist framework (uniform, mass produced and delivered) and transitioned to a neo-Fordist model in the late 20th century with more customization and innovation (Edwards, 1995). System design and delivery mechanisms have been historically unique across sectors, targeting a specific audience. However, the needs of the learners and the learning intentions of the organization are similar across sectors, but there has been little market overlaps among L/CMS, although this appears to be changing. Therefore in the lifetime of a learner, there is an implicit expectation that a new system will be learned and used to support educational and then workplace learning. The authors argue that with the advent of Web 2.0 applications and the open knowledge paradigm (Norris, Lafrere, & Mason, 2003), the notion of "system" as a framework for learning is now inadequate in a post-Fordist world that provides for flexible processes, dynamic innovation, and authority of content by the user. A survey of learning professionals ranking the top tools for learning (Centre for Learning & Performance Technologies, 2007) reveals that only one CMS is *perceived* to meet the requirements for authentic learning: Moodle™. However, perception and applied theory can be at odds. This study analyzes the use of primary L/CMS used in secondary and higher education to (a) examine the functional differences between systems and (b) analyze the implicit learning designs situated in functional and interface designs. This formative analysis provides an insight into how current systems do or not reflect a post-Fordist perspective that we believe is situated in current learning theory. From this the authors illustrate how future technological frameworks can be conceived to address learning across the life of the learner.

An often-missing component in the decision to implement distributed learning is an evaluation of effectiveness research to determine if the selected technology has the ability to address institutional

goals and concerns. The literature in this area looks at "satisfaction" in a way that does not always address actual learning outcomes. Overall there exists a lack of empirical studies showing that the use of instructional technology actually improves learning (Arbaugh, 2002; Buckley, 2002; McClelland, 2001; McGorry, 2003; Neal, 1998). Studies conclude that the full potential of instructional technology is reached only by a full transformation of the learning process, faculty development, and institutional systems (Buckley, 2002; Jamieson, Fisher, Gilding, Taylor, & Trevitt, 2000; Moore, 2002). The research on the effectiveness of distributed learning programs indicates several areas of concern: problems with student-instructor communication, lack of socialization both with the instructor and other students, student engagement and interaction, innovation in teaching, and technical difficulties or support (McGorry, 2003; Salisbury, Pearson, Miller, & Marett, 2002). Finally, the instructor's actual technological expertise (Lea, Clayton, Draude, & Barlow, 2001; Webster & Hackley, 1997) along with their inability to overcome interaction problems (Berger, 1999) has been found to be important both in an instructor's decisions to adopt instructional technology and in students' satisfaction and learning outcomes. These findings are at odds with return on investment (ROI) arguments that distributed education can serve large populations without denigrating effectiveness, a trend seen in higher education.

Technology has shifted the nature of traditional learning and training by removing the learner from contexts, such as school and workplace through Internet-facilitated learning. Three primary models have conceptualized distributed learning: web-enhanced classroom, hybrid/blended, and 100% online (NCAT). However, these models focus on *delivery* of instruction and don't address the *learning* designs that can be offered through distributed learning. Taylor's framework (2001) describes the shift in distributed learning from linear and print-based to flexible and modular/digital based:

- The "correspondence model" relies on print-based resources.
- The "multimedia model" provides learning resources through a variety of media including print.
- The "tele-learning model" incorporates modes of presentation of materials to include audio or video-conferencing and broadcast TV or radio.
- The "flexible learning model" requires that students engage in interactive, online computer-mediated resources and activities.
- The "intelligent flexible learning model" is the next generation model in which the learner accesses learning processes and resources through portals.

These models reflect the shift in learning theory that has paralleled quickly evolving technological systems that support distributed learning, as well as the Fordist perspectives that have evolved over the past century.

Fordism, neo-Fordism, Post-Fordism

It is the authors' contention that current L/CMS have been conceptualized, designed, and utilized at the enterprise level to reflect late 20th and early 21st century models of industrialization that can be compared to similar thinking about teaching and learning. As current learning theory indicates a need for pedagogical approaches that support individualized, constructive learning so are the frameworks of distance education shifting from centralized one-size-fits all productions of learning to personalized and customized learning experiences, so has learning theory.

Simonson, Smaldino, Albright, and Zvacek (2003) put forth that although there is no consensus that distance education in the 21st century is appropriately framed within a production model, there is evidence that this a viable and accurate interpretation. Derived from economic and industrial sociology, the three Fordist models have been used to explain and describe how distance education has come to be designed and delivered. Simonson, et al, note that there was much debate about the industrialization of distance education in the mid-1990's (see Zanoni & Janssens, 2005) that has seemingly quieted in this century.

Fordism suggests a "fully centralized, single-mode, national distance education provider, gaining greater economies of scale by offering courses to a mass market, thereby justifying a greater investment in more expensive course materials" (Simonson, et al, 2003, p. 49). Such an approach is characterized by a high degree of administrative control and a clear division of work as the system is successful due to the efficient reproduction of each area of teaching and learning. Organizations that deliver the same instruction via identical modalities to varied audiences fit this model characterized by uniformity, consistency, and separation of instructional design from the instructor. Thus mass produced courses are

handed over to the teacher who then acts only as a presenter. This model has worked well for the military and large corporate training where the values of uniformity and consistency are critical to the mission and goals of the organization. This is the TV dinner view of distance education.

Neo-Fordism differs from Fordism in that it allows " much higher levels of flexibility and diversity, and by combining low volumes with high levels of product and process innovation" (Simonson, et al, 2003, p. 49). Neo-Fordism still relies on mass production in a centralized approach with specific divisions of production and labor. Organizations that provide centralized mechanisms of delivery and curriculum fit this approach while allowing localized control at some level, be it administrative, managerial, or instructive. This model has worked well for for-profit producers and delivers of distance education where consistency is important, but uniformity is less important that meeting specific needs – disciplinary, geographic, professional, etc. This is the cafeteria view of distance education.

It is important to note that both Fordism and neo-Fordism focus on mass production and limit control and input from those who are actually engaged in teaching and learning. Post-Fordism involves "high levels of product innovation, process variability, and labor responsibility" (p. 50), thereby focusing on a skilled pool of workers working within a decentralized community operating to adapt and adjust to the needs of the learner. This approach is probably most represented in institutional or individual efforts of a department or program where oversight is minimal and revisions and alternatives can readily applied given the small populations served. This reflects the corner bistro model of distance education.

The three perspectives indicate a continuum of teacher vs. learner-centered instructional experiences as noted in Figure 1.

Figure 1. Learning Designs in Distributed Learning Systems (Diaz & McGee, 2005)

• Rote • Memorization • Habitualization • Routinization			• Deeper learning • Transferability • Relevance/applicability • Guided Discovery
Linear	Branched	Hyper-content	Learner-centered
Single user			*Multiple users*
• High re-usability • ID design • Instructor/trainer as designer/ director			• Low reusability • Emergent design • Instructor/trainer as facilitator/resource
Knowledge Sharing			Knowledge Generation
Technological determinism			Technological relativism

The focus of this study is on a system**.** Although post-Fordism suggests that systems are not a complete solution to distributed learning, and indeed there is evidence that user-centric tools are more appropriate supports for distributed learning, the L/CMS is now the primary mechanism for delivery of instruction. Given these three perspectives, we can ask the following question about L/CMS: How do the top five L/CMS used in secondary and higher education reflect current learning theory that is situated in Fordist models of course delivery?

Learning Theory and distributed technology: Secondary education

The coupling of two trends in secondary education is creating new learning environments for millennial learners. First, the development of networked information communication technologies has enabled the emergence of distributed learning or "virtual high schools." Second, instructional design in these programs tends to emphasize constructivist philosophies where students take charge of their learning and construct their understanding of content. Proponents of distributed learning argue that online

pedagogies should be grounded in constructivist perspectives (Bonk & Cunningham, 1998; Jonassen, 2000).

Although online distance education has been more prevalent in higher education and business, virtual learning environments are emerging as an option in secondary education. Two dozen states have already created state-run virtual high schools (Tucker, 2007). Nationwide, approximately 700,000 students were enrolled in virtual schooling in the 2005-2006 school year (Picciano & Seaman, 2007). Moreover, new high school graduation requirements in Michigan mandate the class of 2011 to complete an online learning experience as part of graduation requirements (Moser, 2006).

Constructivism is a theoretical framework that has gained standing in secondary education in the late 20th century (Flynn, 2004; Westerberg, 2007; Foote, Vermette, & Battaglia, 2001). Cambre and Hawkes (2004) assert that constructivism creates a shift in instructional design from "standardization to customization" (p. 50). According to Adams and Burns (1999),

> ...constructivism is characterized by the following principles: (a) learners bring their personal prior knowledge and experiences to the learning situation; (b) learning is internally controlled and mediated; (c) tools, resources, experiences, and contexts help in the construction of knowledge in multiple ways; (d) learning occurs through a process of accommodation and assimilation when old mental models are challenged to create new ones; (e) learning is an active and reflective process; and (f) social interaction provides multiple perspectives to create knowledge. Key components of constructivist-compatible online learning environments include: a) active learning, b) authentic instructional tasks, c)collaboration among students, and d) diverse and multiple learning formats (Partlow & Gibbs, 2003).

The evolution of course management systems over time has resulted in systems with the capacity to create dynamic online learning communities in secondary education based on constructivist learning theories. Although constructivism is based on a broad range of theory, the emphasis is on the learner actively building knowledge and meaning from their experiences. Doolittle (1999) posits eight principles of constructivist pedagogy necessary for learners to constructing knowledge in online education:

1. Learning should take place in authentic and real-world environments
2. Learning should involve social negotiation and mediation.
3. Content and skills should be made relevant to the learner.
4. Content and skills should be understood within the framework of the learner's prior knowledge.
5. Students should be assessed formatively, serving to inform future learning experiences.
6. Students should be encouraged to become self-regulatory, self-mediated, and self-aware.
7. Teachers serve primarily as guides and facilitators of learning, not instructors.
8. Teachers should provide for and encourage multiple perspectives and representations of content.

Doolittle's analysis of these principles in online contexts concludes that it is not is not whether or not the potential for implementing constructivism in online education exists, but rather, whether or not the potential will be actualized. Table 1 illustrates how constructivist principles apply to L/CMS and Fordist perspectives.

Learning Theory and distributed technology: Higher education

In the 21st century our ability to anytime access information and people allows us to learn informally without traditional structures (Lankshear & Knobel, 2003). We have seen changes in tools, ways of thinking about knowledge, the learner, and how we view learning and knowing. Technology also allows us to locate, save, locate again, and share information in ways that have not previously been possible (Rennie & Mason, 2004). Given that we can learn when we want or need, in ways that are most comfortable and suitable, we find that learning is increasingly initiated and organized by the learner through discovery and self-construction. Many have argued that how the system is designed influences how the system is used (Johnson, 2000; Kersten, Kersten, & Rakowski, 2002). Ullman and Rabinowitz

Table 1 Secondary Education: Constructivism

Constructivist Principle	Description	Application in L/CMS	Fordist
1. Learning should take place in real world environments	L/CMS must provide "complex, culturally relevant, ill-structured domains within which the user can operate and "live" (Doolittle, 1999, p.	Simulations, role play, manipulation of real world data. Team work areas that replicate authentic places with ICT, storage, sharing and exchange, note taking	Post Fordist
2. Learning should involve social negotiation and mediation.	Learners and instructors interact, react, and reflect upon there actions, thinking, decisions, and positions.	Asynchronous and synchronous communication tools: chat, discussion, IM, blogs, wikis, whiteboards, etc.; peer critique and annotation functions	Post Fordist
3. Content and skills should be made relevant to the learner	L/CMS makes "vast amounts of very diverse information, knowledge, and skills available to the learner….learner is able to self-select a relevant topic, process, or skill (Doolittle, 1999)	L/CMS should support the teacher in providing multiple paths for the learner to take. Functions that provide choices in assignment products, intelligent agent that remember choices and progress.	Post Fordist
4. Content and skills should be understood within the framework of the learner's prior knowledge.	L/CMS probes student understanding of topic at the beginning of instruction and adapts presentation of content and skills to student understandings.	Intelligent agent that responds to choices, decisions, and previous interactions; pre-post test attached to assignments.	Post Fordist
5. Students should be assessed formatively.	Periodic, learner and instructor initiated assessments and benchmarks.	"Self-check" quizzes that assess students during various parts of instruction and inform student about progress.	Post Fordist Neo-Fordism
6. Students should be encouraged to become self regulatory, self-mediated, and self-aware.	Students know where they are in accomplishing established learning outcomes.	Learner can evaluate their work in relation to others through anonymous reporting of class progress by individual; timelines and deadlines countdown and appear in multiple areas.	Post Fordist
7. Teachers serve primarily as guides and facilitators of learning not instructors.	Learners make decisions and control their environment with an ability to go beyond or in a different direction than a prescribed path.	Alter interface, bookmark, annotate, create new knowledge objects. Self-pacing, open entry open exit modules; intelligent agents remind, prod, and support	Post Fordist
8. Teachers should provide for and encourage multiple perspectives and representations of content.	Focus on diverse perspectives and ways of interacting in the world.	Guest accounts,	Post Fordist

(2004) argue that systems have been designed to supplement or manage instruction and that this structures use.

Siemens (2004) proposes a new theory of learning that is specific to the information age. He stipulates that chaos has become a norm for the 21st century adult worker and learner – making sense of the volumes of information available requires reliable and connected networks that assist us in determining patterns of the information that often overwhelms us. Through self-organized networks, Siemens puts forth, the 21st century learner allows us to question, explore, validate, and construct knowledge in new ways. In this way the learner can better determine what is important and what is unimportant. The principles of connectivism and their application in L/CMS are illustrated in Table 2.

Table 2 Higher Education: Connectivism

Connectivist Principle	Application in L/CMS	Fordist
1. Learning and knowledge rests in diversity of opinions.	Open discussion, peer critique, self-critique, learner generation of products, publication internal and external to system.	Neo-Fordism Post-Fordism
2. Learning is a process of connecting specialized nodes or information sources.	Learner-generated interactions (discussion, chat, whiteboard, etc), learner-centered social network/resources/community.	Post-Fordism
3. Learning may reside in non-human appliances.	Learner and instructor linkage to external personal services (e.g. blog, wiki, social network, photos, video, etc.); ePortfolio	Fordism Neo-Fordism Post-Fordism
4. Capacity to know more is more critical than what is currently known.	Self-evaluation and critique; developmental assessment (e.g. against standards, prior learning, etc.); ePortfolio	Neo-Fordism Post-Fordism
5. Nurturing and maintaining connections is needed to facilitate continual learning.	Email can be controlled through the L/CMS; voice mail; VOIP; assignment notes and annotations; assessment feedback;	Fordism Neo-Fordism Post-Fordism
6. Ability to see connections between fields, ideas, and concepts is a core skill.	Visual mapping; bookmarking; instructor and learner self-customization of content; learner generated glossary; learner generated objects	Neo-Fordism Post-Fordism
7. Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.	Expert evaluation; learner publication of objects external to system;	Post-Fordism

Decision-making is in itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision. Therefore, a connectivist approach to learning design must rely on internal and external corroboration and verification, two conditions problematic within current L/CMS that 'close the door' to outsiders and deny access once the course concludes.

Method

Given the lack of study of system functionality and learning design, this study utilizes a descriptive method. We argue that L/CMS offer the same type of fluid, observable, and hidden learning experiences as can occur in a classroom. Rather than examine the phenomenology of the instructor and learner experiences in specific L/CMS delivered classes, we focus on the system as designed to support teaching and learning. The very focus on 'management' in the name reflects a conscious and purposeful framework of learning. We draw on conceptual frameworks to analyze the system and in doing so declare the lens through we view these systems. We encourage others to take other lenses and replicate our work, to better understand the varied designs, implementations, and experiences enacted through L/CMS.

First, we determine the nature of an L/CMS that relate directly to teaching and learning. In general, L/CMS have been seen to have three high level functions: authoring, community, and data management, see Table 3.

Table 3: CMS Functions and learning principles (from Ullman & Rabinowitz, 2004)

	Instructor Actions	**Learner Actions**	**Learning principle**	**Fordist connection**
Authoring/ Publishing	Create new content; link to content, resources; create tests and quizzes	Read information; access course resources; complete assessments	Learner construction and generation	Learners have access to identical information and instructions
Virtual community	Present information, chat, IM, whiteboard, discussion	Review and discuss information	Interaction, facilitation, feedback	Learners are directed and managed by instructor with possible modifications
Data Management	Grades; registration list	Access grades; access course	Assigned roles, Inform learner of progress	Instructor is in charge

However, these features don't directly address teaching and learning and therefore the authors adopted interpretations of pedagogical features articulated by the National Learning Infrastructure Initiative (NLII). In 2003 NLII conducted a focus session that resulted in seven clearly articulated features of L/CMS that relate to teaching and learning. The NLII took these features and constituted a Next Generation Course Management System Workgroup from which an analysis of CMS features that support learning was produced. We use these functions to frame our analysis of L/CMS because of they were vetted through consensus of experts keeping teaching and learning in the forefront.

This study focuses on learning theory; therefore, we are less interested in the high level abilities of CMS functions but rather the affordances that are possible in a system that provide both instructor and learning options, control, and variations on their actions within a CMS. Therefore, the authors each drew upon their respective principles of learning derived from constructivism and connectivism and the NLII functional analysis to articulate a observational tool that articulates technology-mediated conditions best suited to support learning according to learner ability within the following categories:

- Actively control functions and manage their own and group generated content.
- Construct knowledge individually or with others through interaction, production, organization of information, and critical review.

- Interact with others (peers, instructor, and external individuals) in multiple ways.
- Observe and review records of assessment, historical records, and feedback from others (both peer and instructor).
- Share information, materials, production, and identity.
- Access course materials and expert knowledge as needed and desired.

The 35 items were all observable and situated in learner action through system functions so that little was left up to the observer's interpretation. For example one item was "learners can set up/initiative discussion, edit, share, delete, and compile discussions" and "Content can be accessed from other technology (phone, PDA, Chumby™, etc.)." Each item was rated according to evidence of support for a learning principle on a scale of one (strongly disagree) to five (strongly agree). Results were coded to identify patterns of principles, and patterns of systems. Additional, total scores were generated to reveal the highest scoring system.

Through publications (edutools™; Jaschik, 2007; Wicks & Hitchcock, 2007; Wyles, 2004), evaluation system (EduTools), and L/CMS subscription information (e.g., Angel™, Blackboard™, Desire2Learn™, eClassroom™, Educator™, Moodle™, Sakai™, UCompass™, WebCT™), five L/CMS were identified as the most prominently utilized systems in K-20 education. These include: Angel™, Blackboard™, Educator™, Moodle™, and WebCT™. Collectively the authors have used all but Angel™ and Educator™. The authors were able to login to course shells to 'observe' and record their findings. A decision was made not to consider plug-ins or add-ons that might expand capacity to limit the complexity of the analysis. The L/CMS was considered to be a basic classroom that could be enhanced but just as brick and mortar classrooms, might often not be. The authors also intentionally did not visit active courses – it was intended that the focus was on the system and not the instructional designs or user actions.

Once the researchers had analyzed all L/CMS, they compared scores and revisited disagreements of more than one degree. Once agreement was reached, totals were tallied and patterns across systems were analyzed and described.

Findings

Two systems were foremost in supporting both constructivst and connectivist theoretical learning frameworks: Angel™ and Educator™. Both systems scored highest in giving the learner a degree of control of what they experienced in the L/CMS; providing opportunities for learners to connect with each other through communication and interaction functions; giving the learner access a variety of content types, and allowing for learner contributions to group processes and organizations. These two systems were the only ones not used by either author. It is possible that the authors may have a bias toward the L/CMS hat they have used, knowing more deeply the limitations of the systems with which they are most familiar. However, both authors were unaware of some features of the systems with which they had experience and therefore we believe that bias was limited.

General limitations

All systems scored low on items related to peer critique, individual reflection of progress over time (e.g., as document in collected work with feedback as in an electronic portfolio. Angel™ was the exception), expert review or participation, peer critique or review, performance directed learning paths, automated response to performance, and integration of external learning resources (such as Second Life™ or other Web 2.0 applications). None of the systems except Angel™ offered a function that would allow learners to make their work publicly available. None offered a mechanism to allow former students back into a course (an administrative decision) or a function that would attribute intellectual property or meta-tagging of learner productions. It is possible of course to add these components into a system, but, given the basic system, none were built to accommodate these functions.

General support for learning principles

All systems had multiple interactive communication functions, some more than others including chat, discussion, and whiteboard. Educator™ included more advanced capabilities such as IM, virtual office hours and who's online. All systems offered some form of content repository through which files could be

stored, published within the L/CMS, and for some, shared with others. Only Educator™ offered a form of branching paths for learners based on their performance. Although this ability can be programmed into the other systems, it is not a basic component. Cognitive supports such as book marking and note-taking were also limited or missing. All offered a variety of assessment tools that provided the instructor an opportunity to integrate assessment but except for Educator™ that offers practice assessments and directs the learner to content after they have completed an assessment.

Discussion and Conclusions

For the most part, all of the L/CMS represent neo- and post-Fordist frameworks of education. Their progress may reflect their history and originations:

- Angel™ – Conceptualized by Ali Jafari at Indiana University-Purdue University Indianapolis (IUPUI) and offered as OnCourse, as an institutional CMS, and then it was released by the newly formed CyberLearning Labs, Inc. in July 2000 and subsequently renamed ANGEL Learning.
- Blackboard™ – Founded in 1997, it offered its first software package to Cornell University in 1998. The company began by producing consulting services to the IMS Global Learning Consortium.
- Educator™ – Conceptualized by Ed Mansouri at Florida State University, Educator™ was first released in 1999.
- Moodle™ – Designed by Martin Dougiamas while he was at Curtain University, it was first released in 2002 and supported through an active users and designer group who are committed to improving this open source system.
- WebCT™ – Conceptualized in the mid-1990s by Murray W. Goldberg at the University of British Columbia from which the company was formed and the system released in 1996-1997.

All of the systems were 'born' in the late 20th century when traditions of Fordism were starting to fade and constructivist pedagogical practices were beginning to be situated in K-20 instructional practices. However the pre-cursors of the L/CMS were web pages and discussion boards, a poor model for constructive and connected learning. As we continue to move towards increasingly open, seamless, mobile, social, and transparent learning, L/CMS as systems are hard pressed to change the very architecture that has contributed to the remarkable transformation of online courses are offered – all in a 10 year period. Web 2.0 applications are serving as a further irritant particularly as the sophistication of graphic user interface designs that far out distance the seemingly archaic interfaces of the L/CMS. Additionally, the user-centeredness of Web 2.0 applications is so compelling, that it is difficult to foresee how administrator and instructor-driven L/CMS can afford truly support effective and efficient learning designs that can compete with the allure of these tools. It is lazy for the authors to suggest that L/CMS should drive their functions from a learning principle directive because as an institutional mainstay they have solved many organizational and infrastructure challenges that cannot be overlooked. More to the point it may be that L/CMS companies look to the innovative companies who want and do design add-ons that sometimes are and certainly can support the learning theory that is so amiss in most systems. Is this a symbiotic market generator that may or may not nurture more and improved learning.

We began this study by arguing that there is a disconnect between L/CMS across the life of the learner. However, we conclude that the disconnect is between the institutional market and what we know about teaching and learning. We are stuck in the era of the TV-dinner approach to distributed learning; the cafeteria and bistro approaches are slow to be supported by current systems. Perhaps it is the need for companies to re-think their mission and purpose in higher education, and for clients to carefully examine for what purposes, through what instructional designs, and resulting in what outcomes these systems are used. It is not really an issue of vendor +client relations. As we have discovered, these more prominently used systems for the most part require active and informed instructional designers to make what happens inside the system work. Institutions must invest in understanding, supporting, and accounting for the quality and rigor of learning that should not be sacrificed for a one-stop course in a box solution.

References

Adams, S., & Burns, M. (1999). *Connecting student learning and technology*. Austin, TX: Southwest Educational Development Laboratory.

Arbaugh, J. (2002). Managing the on-line classroom-a study of technological and behavioral characteristics of Web-based MBA courses. *Journal of High Technology Management Research,* 13(2), 203-223.

Berger, N. (1999). Pioneering experiences in distance learning: Lessons learned. *Journal of Management Education, 23* (6), 684-690.

Bonk, C. J., & Cunningham, D. J. (1998). Searching for learner-centered, constructivist, and sociocultural components of collaborative educational learning tools. In C. J. Bonk & K. S. King (Eds.), *Electronic collaborators: Learner-centered technologies for literacy, apprenticeship, and discourse* (pp. 25-50). Mahwah, NJ: Erlbaum.

Buckley, D. (2002, January/February). In pursuit of the learning paradigm: Coupling faculty transformation and institutional change. EDUCAUSE Review, 37(1), 28-38. Retrieved October 25, 2004, from http://www.educause.edu/ir/library/pdf/erm0202.pdf

Cambre, M., & Hawkes, M. (2004). *Toys, tools & teachers the challenges of technology.* Lanham, Md: ScarecrowEducation.

Centre for Learning & Performance Technologies. (2007). http://www.c4lpt.co.uk/recommended/top100.html

Diaz, V., & McGee, P. (2005). Managing knowledge: Learning objects and digital repositories in higher education. In Metcalfe, A. (Ed.) *Knowledge Management and Higher Education: A Critical Analysis.* IDEA Group Publishing.

Doolittle, P. E. (1999). *Constructivism and Online Education*. Retrieved December 12, 2007 from http://edpsychserver.ed.vt.edu/workshops/tohe1999/pedagogy.html.

Dutch, M.,& Muddiman, D. (2000) Information and communication technologies, the public library and social exclusion, in D. Muddiman (Ed) *Open to All? : the Public Library and Social Exclusion*, chapter 15, Vol.3, pp. 106-127. London: Resource: The Council for Museums, Archives and Libraries.

Edwards R. (1995). Different discourses, discourses of difference: Globalisation, distance education and open learning. *Distance Education, 16* (2), 241-255.

Flynn, P. (2004). *Applying standards-based constructivism a two-step guide for motivating elementary students.* Larchmont, NY: Eye On Education.

Foote, C. J., Vermette, P. J., & Battaglia, C. (2001). *Constructivist strategies meeting standards and engaging adolescent minds.* Larchmont, N.Y.: Eye on Education

Jamieson, P., Fisher, K., Gilding, T., Taylor, P., & Trevitt, A. C. F. (2000). Place and space in the design of new learning environments. *HERDSA (Higher Education Research and Development), 19* (2), 221-237.

Jaschik, S. (2007). Shakingup the market. *Inside Higher Ed.*retrieved December 17, 2007 from http://insidehighered.com/news/2007/05/15/ecollege.

Johnson, (2000). *GUI bloopers: Don'ts and do's for software developers and Wed designers*. Morgan Kaufmann..

Jonassen, D.H. (2000). *Computers as mindtools for schools: Engaging critical thinking* (2nd Ed.). Upper Saddle River: Merrill.

Kersten, G. E., Kersten, M. A., and Rakowski, W. M. (2002). Software and culture: Beyond the internationalization of the interface. *Journal of Global Information Management, 10* (4), 86-101. Retrieved on April 10, 2004 from http://interneg.org/interneg/research/papers/2001/01.html.

Lankshear, C. & Knobel, M. (2003). Do we have your attention? New literacies, digital, technologies and the education of adolescents. In D. Alvermann (Ed.), *New literacies and digital*

technologies: A focus on adolescent learners. New York: Peter Lang.

Lea, L., Clayton, M., Draude, B., & Barlow, S. (2001). The impact of technology on teaching and learning. *EDUCAUSE Quarterly*, 24(2), 69-70.

McClelland, R. J. (2001). Web-based administrative supports for university students. *The International Journal of Education Management, 15* (6) 2001, 292-302.

McGorry, S. Y. (2003). Measuring quality in online programs. *The Internet and Higher Education, 6* (2), 159 – 177.

Moore, G. (2002). A Personal View: Distance Education, Development and the Problem of Culture in the Information Age. In Reddy, V. and S. Manjulika (Eds.) *Towards Virtualization: Open and Distance Learning*. (633-640). New Delhi, India: Kogan Page.

Marlowe, B. A., & Page, M. L. (1998). *Creating and sustaining the constructivist classroom.* Thousand Oaks, Calif: Corwin Press.

Moser, K. (2006, March 30). Online courses aren't just for home-schoolers anymore. *Christian Science Monitor*, p. 14.

National Center for Academic Transformation (NCAT). See http://www.center.rpi.edu/.

Neal, E. (June 1998). Does using technology in instruction enhance learning? or, The artless state of comparative research.. *The Technology Source*. Retrieved from http://technologysource.org/?view=article&id=86.

Norris, D., Mason, J., & Lefrere, P. (2003). *A revolution in the sharing of knowledge: Transforming e-Knowledge.* Ann Arbor, Michigan: Society for College and University Planning.

Partlow, K. M., & Gibbs, W. J. (2003). Indicators of constructivist principles in Internet based courses. *Journal of Computing in Higher Education, 14* (2), 68-97.

Picciano, A. G. & Seaman J. (2007). *K–12 online learning: A survey of U.S. school district administrators*. Needham, Mass: The Sloan Consortium.

Rennie, F., & Mason, R. (2004). *The connecticon: Learning for the connected generation*. Greenwich, Conn.: Information Age Publishing.

Salisbury, D., Pearson, R., Miller, D. & Marett, K. (2002). The limits of information: A cautionary tale about one course delivery experience in the distance education environment. *e-Service Journal, 1* (2) 65-81.

Taylor, J. C. (2001). Fifth generation distance education. *Higher Education Series, 40.* Retrieved June 15, 2004 from http:// www.dest.gov.au/highered/hes/hes40/hes40.pdf

Siemens, G. (2004). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning.* Retrieved on June 23, 2007, from http://www.itdl.org/Journal/Jan_05/article01.htm

Simonson, M., Smaldino, S., Albright, M., & Zvacek, S. (2003). Teaching and learning at a distance: Foundations of distance education (2nd Ed.). Upper Saddle River, NJ: Prentice Hall,

Smith, R., & Marx, L. (1994). *Does technology drive history? The dilemma of technological determinism*. Massachusetts: MIT Press.

Tucker, B. (2007). Laboratories of reform: Virtual high schools and innovation in public education [Monograph]. *Education Sector Reports.* Retrieved March 25, 2008, from http://www.educationsector.org/usr_doc/Virtual_Schools.pdf

Ullman, C. & Rabinowitz, M. (2004). Course management systems and the reinvention of instruction.

T.H.E. Journal. Retrieved December 16, 2007 from http://thejournal.com/articles/17014.

Webster, J. & Hackley, P. (1997). Teaching effectiveness in technology mediated distance learning. A*cademy of Management Journal, 40* (6), 1282-1309.

Westerberg, T. (2007). *Creating the high schools of our choice.* Larchmont, NY: Eye on Education.

Wicks, M., & Hitchcock, T. (2007, November 4). *Transforming learning management systems into effective learning environments*. Preconference session presented at Virtual School Symposium, Louisville, Kentucky.

Wyles, R. (2004). Shortlisting of learning management system software. Open Source-Learning Environment and Community Platform Project.

Zanoni, P., & Janssens, M. (2005). Diversity management as identity regulation in the Post-Fordist productive space. In S. Clegg & M. Kornberger (Eds.) *Space, Organizations and Management Theory,* 92-112. Copenhagen: Liber & Copenhagen Business School Press.

Manuscript received 15 Sep 2007; revision received 14 May 2008.