Learning and Knowing in Networks: Changing roles for Educators and Designers

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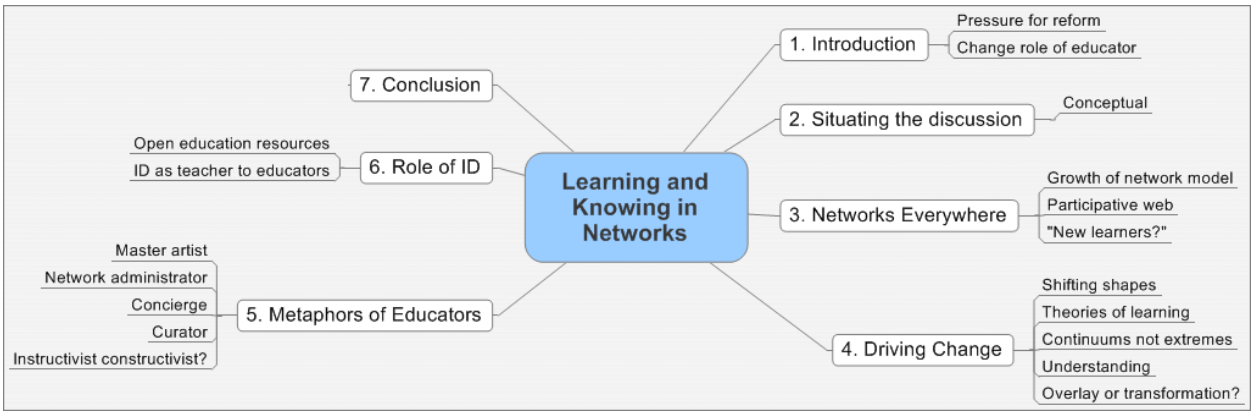
Abstract

Current developments with technology and social software are significantly altering: (a) how learners access information and knowledge, and (b) how learners dialogue with the instructor and each other. Both of these domains (access and interaction) have previously been largely under the control of the teacher or instructor. Classroom walls are increasingly permeable. Google Scholar, Scopus, and open access journals offer increased access to academic resources; an extension to more informal approaches such as regular internet search and Wikipedia. Social software (blogs, wikis, social bookmarking, instant messaging, Skype, Ning) provide opportunities for learners to create, dialogue about, and disseminate information. But what becomes of the teacher? How do the practices of the educator change in networked environments, where information is readily accessible? How do we design learning when learners may adopt multiple paths and approaches to content and curriculum? How can we achieve centralized learning aims in decentralized environments? This paper will explore the shifting role of educators in networked learning, with particular emphasis on curatorial, atelier, concierge, and networked roles of educators, in order to assist learners in forming diverse personal learning networks for deep understanding of complex fields.



Introduction

Concern runs high about the ability of today's education system to meet the growing challenges of global competition. National Science Foundation (Hill, Rapoport, Lehming, & Bell, 2007) details the decline of the absolute number of science and engineering articles by American-based authors—though the global shift to collaboration across geographical boundaries is acknowledged (p. 24). Fear mongering and buzzwords meet in the National Academy of Sciences' publication of *Is America Falling of the Flat Earth?* (Augustine, 2007). The blame for diminished global competitiveness falls at the feet of educators (both secondary and post-secondary). A recent report (National Center on Education and the Economy, 2007) states "that our education and training systems were built for another era" (p. 8). Others (Jenkins, Healey, & Zetter, 2007) suggest a reformulation of universities is required to address issues of "supercomplexity" (p. 12). Dede, Korte, Nelson, Valdez, and Ward (2005) place a similar emphasis on education as one of "two keystones of advancing prosperity and quality of life" (p. 55)—the other being investment in information technologies.

The call for academic reform, driven by growing fears of lack of competitiveness and innovation in a global economy, has reached an almost fevered pitch. Peter Schrag (2007) suggests a key problem is American society's illogical perception of expecting "schools to solve every cultural and economic problem" (p. 44). For most, the teacher, lecturer, instructor, and professor take a central position in the ongoing discussion on "how to fix education," but as detailed by The Association of Universities and Colleges of Canada (2007), rising expectations of faculty are met with limits "on the extent to which faculty can cope with these amplified pressures" (p. 30). In order to address the expectation of education's role in fostering innovation and preparing learners for tomorrow, we are forced us to reconsider the roles of faculty members.

Situating the Discussion

This paper is intended to foster discussion on the role of an educator in a world increasingly defined by networked structure. While the body of research builds in how networks function and how information flows in networks, the attention given to the specific roles of educator and instructional designer has not received much attention. As such, thoughts expressed here are best seen at the conceptual level of this simple taxonomy:

1. Conceptualization—exploration of theories, ideas, concepts, brainstorming, and questioning the boundaries of what currently exists.
2. Experimentation—narrowing the focus of the outcomes of the conceptual stage, the formation of a research focus, and the active experimentation and evaluation of different ideas and approaches.
3. Implementation—broad scale adoption based on previous two levels, emphasizing the understanding gained through experimentation.

Our focus here is on the conceptual level, with the intent of exploring how many of the most significant changes within society today might influence or change the role of educators and, as a consequence, the role of instructional designers. In order for ideas to move to implementation, active research is obviously required to evaluate the value of the concepts presented here.

Networks Everywhere....

The popularization of the World Wide Web as a medium for commerce, communication, information sharing, and education has raised the profile of networks as a means of human organization. Research from fields as diverse as sociology (Granovetter, 1973; Watts, 2003; Wellman, 1999), physics (Barabási, 2002), economics (Beinhocker, 2006), information and knowledge (Benkler, 2006), and organizational effectiveness (Stephenson, 2002) suggest that networks fundamentally alter the hierarchical structure found in many traditional institutions. Academic journals reflect exponential growth in focus on complex networks in sociology (Borgatti & Foster, 2003), as well as mathematics, physics, chemistry, and other fields (Scharnhorst, 2003). Numerous universities and corporations now support research centres focused on evaluating the nature and impact of networks (Value Network Clusters, 2008). The growth of interest in, and research on, networks as organizational models for all aspects of society is significant.

The development of the participative Web (Organization for Economic Co-operation and Development [OECD], 2007) adds a practical framework to the communication and content creation opportunities of networks that have captured the interest of many academics. When the tools to produce information are readily available to any member of society, the question of “who is an expert” may yield entirely different responses than in more hierarchical, structured eras. Consider, for example, Google’s growth as a tool for seeking information. Is an expert, in the eyes of a searcher using Google, someone with an established record of research and contributions to a field, or is an expert the person who appears on the first few pages of a web search?

Concerns of authority and trust are not yet fully understood. What is increasingly common, however, is the use of participative technologies for communication and collaboration. The tools under the umbrella of the participative Web include blogs, wikis, podcasts, social bookmarking, YouTube, and virtual worlds (such as SecondLife). When used primarily for social means (i.e., staying in touch with friends or collaborating on a project), few would argue their effectiveness. Yet, as has been evidenced through the development of Wikipedia, when participative tools are used to duplicate the academic functions of peer review and formal publication, the authority and authenticity of the resulting information is potentially suspect.

Recent reports and national surveys highlight the need to rethink formal education's methods and tools, in order to increase its relevance in society (Canadian Council on Learning, 2006, p. iv) and foster greater levels of student engagement (National Survey of Student Engagement, 2007). For example, OECD (2007), EDUCAUSE Center for Applied Research (Salaway & Borreson Caruso, 2007), Boase, Horrigan, Wellman, and Rainie (2006), and Dutton and Helsper (2007) report increased adoption of mobile phones, social bookmarking, computers, Internet connectivity, and Internet access for teaching and learning. Similarly, learners use an array of tools to socialize, gather information, collaborate, and play (New Media Consortium, 2007). They use learning technologies in surprisingly sophisticated ways for "finding and synthesizing information and integrating across multiple sources of data" (Conole, de Laat, Dillon, & Darby, 2006, p. 5).

Yet even though learners embrace technology and institutions are experimenting with potential responses, there exist concerns that they (the learners) do not possess the skills to compete in a global economy (Augustine, 2007, pp. 25–26). Skills needed for tomorrow's society have been detailed by the American Library Association (2000) as information literacy skills, that is, the ability to work with and function in high-volume information environments. Henry Jenkins (2006) suggests that the requisite new skills go beyond managing information and include forming networks and collaborating (p. 6). Partnership for 21st Century Skills (2004) focuses on developing similar skills at the K-12 level.

Students entering higher education today, researchers note, possess a different view of technology due to lifelong immersion in a digital, media-rich, and networked world. These learners are often described as millennials (Oblinger & Oblinger, 2004). Millennial learners, due to their digital lifestyles (Dede, 2005), have expectations of education as a participative, engaging, and active environment. In order to meet the needs and expectations of these learners, Oblinger and Oblinger and Dede suggest that educators adopt tools and approaches to teaching and learning that reflect the experiences and communication

habits of millennials. These tools include blogs, wikis, social networking, podcasts, online video, and virtual worlds.

A growing disconnect in the tools and methods of classroom activity and those of youth culture and larger society is evident. Lenhart, Madden, Rankin, Macgill, and Smith (2007) report that 93% of teenagers are online and that their Internet use is growing (p. 2). The National School Boards Association (2007) reports that 96% of students have used social technology, with 71% reporting weekly use of social networking tools. Even in formal learning, students use communication technologies extensively to support their learning activities (Conole et al., 2006, p. 48). EDUCAUSE Center for Applied Research's research indicates undergraduate learners spend an average of 18 hours per week in online activities (Salaway & Borreson Caruso, 2007, p. 40). The growing prominence of networked technologies for formal and informal learning suggests substantial pressures for education institutions to adapt their models to better suit the interests and digital literacy skills of a growing percentage of the learner population[1].

The rapid growth of knowledge and information adds increasing complexity to the growth of technology in learning. A number of studies (Friedlander, 2003; Gantz et al., 2007; University of California at Berkeley, 2003) indicate information growth is exceeding the capacity of both people and organizations to manage and make sense of the abundance. Boyack (2004), for instance, states that increased information growth has led to dilution and set in motion the requirement for new ways of sifting and managing information (p. 5192). While reports vary dramatically about the pace global information growth, individuals and organizations alike are faced with the challenge of staying informed in climates of extreme change. The change pressures within society (millennial learners, information growth, advancing technologies) are increasingly being confronted within education, suggesting the need for research on tools and required educational approaches in order to meet learners' needs.

Driving Change

The 2006 Spellings Report offers a critique of current directions in higher education: "the sector's past attainments have led our nation [US] to unwarranted complacency about its future" (p. ix). The report suggests students are adopting a "cafeteria" approach to education, taking courses from numerous

[1] While current literature defines digital skills based on age (i.e. natives vs. Immigrant language), research needs to be conducted to explore if the use of network technologies is as clearly demarcated by age as is commonly assumed.

institutions (p. xi). To date, post secondary institutions "have not embraced opportunities for innovation, from new methods of teaching and content delivery to technological advances to meeting the increased demand for lifelong learning" (p. 16). Nevertheless, the emerging "new landscape" requires institutions to innovate in order to continue to serve learners (p. xi).

Criticism of education's perceived failing fall largely on its structure. For instance, the National Center on Education and Economy (2007) articulates the unease around educational innovation when it asserts that "the core problem is that our education and training systems were built for another era" (p. 8). The National Leadership Council for Liberal Education & America's Promise (2007) recognizes "the dizzying pace of change and the unabated prospects for social and environmental disruption" (p. 23) and emphasizes the need "to align teaching and learning with the realities of the new global century" (p. 19). Others contend that education's roots as "factory-school model" (Toffler & Toffler, 2006, p. 359) are no longer capable of meeting the needs of today's society. Bill Gates, former Microsoft CEO, more bluntly declares that "high schools—even when they're working [exactly] as designed—cannot teach all our kids what they need to know today" ("Summit," 2005, ¶ 8). The calls for educational reform appeal to systemic change—from hierarchical control to flexible and adaptive networked models.

Since the Internet has gained prominence, members of society have different interactions with each other (based on social, networked technologies) and with information (based on blogs, wikis, podcasts, and user-generated content). The difficulty for educators involves using the tools and manner of dialogue and communication most comfortable to learners today, while developing new skills in learners (American Library Association, 2000; Jenkins, 2006; Partnership for 21st Century Skills, 2004) and continuing to function as the traditional change agent, transforming both learner and society. Through the use of tools and technologies familiar to learners, educators may be able to foster high levels of learner engagement required for effective learning (National Survey of Student Engagement, 2007, pp. 7-8).

In addition to discussion about using the tools most familiar to learners (i.e. participative Web), the core content of education is under scrutiny as well. Harvard University's (2007) new curricular emphasis for skills and mindsets required of learners: civic engagement, responsiveness to change, conceptualization of learner are product of and participants in tradition, and ethical dimensions of actions, reflects the challenges of traditional institutions in adjusting teaching content emphasis, while retaining a transformative influence.

Shifting Shapes: From Hierarchies to Networks

Networks, as models of organizing education, are part of a larger "general shift, beginning in the second half of the 20th century, away from individualist, essentialist, and atomistic explanations to more relational, contextual, and systemic understandings" (Borgatti & Foster, 2003). Baumeister (2005) states that "networking is having an impact on all aspects of university life" (Networking section, ¶ 7). Networks, while generally associated with the development of the Internet, have long served a vital role in the management of and functioning in complex information environments (Wright, 2007, p. 9). Viewing networks as structural models for education and learning is certainly not new. Already in 1970, Ivan Illich suggested learning webs, so "we can provide the learner with new links to the world instead of continuing to funnel all educational programs through the teacher" (p. 73).

Theories of Learning

As theories of learning share many attributes and new ones build progressively on previous ones, any consideration of learning requires a review of existing theories. Driscoll (2000, pp. 14–17) categorizes learning into three broad epistemological frameworks:

- Objectivism states that reality is external and objective, and that knowledge is gained through experiences.
- Pragmatism states that reality is provisional, and knowledge is negotiated through experience and thinking.
- Interpretivism states that reality is internal, and knowledge is constructed.

These epistemologies in turn form the foundation of the most common theories of learning:

1. *Behaviourism*, which asserts that learning is a "black box" activity, in that we do not know what occurs inside the learner, focuses its efforts on managing external, observable behaviours, and finds much of its existence in objectivism.
2. *Cognitivism*, which spans a continuum from learning as information processing (a computer model) at one end, to learning as reasoning and thinking on the other, finds much of its identity in pragmatism.

3. *Constructivism*, which covers a broad spectrum of research overlapping with cognitivism, contends that learning involves each individual learner making sense and constructing knowledge within his or her own context; it finds its foundation in interpretivism.

To the three-fold view of epistemology, Stephen Downes (2006) adds a fourth: the view of knowledge as composed of connections and networked entities. The concept of emergent, connected, and adaptive knowledge provides the epistemological framework for connectivism (Siemens, 2005) as a learning theory. Connectivism posits that knowledge is distributed across networks and the act of learning is largely one of forming a diverse network of connections and recognizing attendant patterns (Siemens, 2006). As Cronon (1998) states, "More than anything else, being an educated person means being able to see connections so as to be able to make sense of the world and act within it in creative ways" (¶ 14).

Mergel's (1998) emphasis on Ertmer's and Newby's "five definitive questions … to distinguish learning theory" (Distinguishing One Learning section, ¶ 1) provides a framework to organize the above cited theories:

1. How does learning occur?
2. What factors influence learning?
3. What is the role of memory?
4. How does transfer occur?
5. What types of learning are best explained by this theory? (¶ 2)

Table 1 indicates how different theories of learning relate based on Ermer's and Newby's questions.

Table 1. Learning Theories

Property	Behaviourism	Cognitivism	Constructivism	Connectivism
How learning occurs	Black box—observable behaviour main focus	Structured, computational	Social, meaning created by each learner (personal)	Distributed within a network, social, technologically enhanced, recognizing and interpreting patterns
Influencing factors	Nature of reward, punishment, stimuli	Existing schema, previous experiences	Engagement, participation, social, cultural	Diversity of network, strength of ties
Role of memory	Memory is the hardwiring of repeated experiences—where reward and punishment are most influential	Encoding, storage, retrieval	Prior knowledge remixed to current context	Adaptive patterns, representative of current state, existing in networks
How transfer occurs	Stimulus, response	Duplicating knowledge constructs of "knower"	Socialization	Connecting to (adding) nodes
Types of learning best explained	Task-based learning	Reasoning, clear objectives, problem solving	Social, vague ("ill defined")	Complex learning, rapid changing core, diverse knowledge sources

The notion of a "new" theory for learning based on network structures, complex changing environments, and distributed cognition has drawn criticism. Pløn Verhagen (2006), in his critique of connectivism, specifically argues for the ineffectiveness of a theory based on "unsubstantiated philosophising" (¶ 14). Bill Kerr (2007) postulates that connectivism is an unnecessary theory, for in his

opinion, existing theories satisfactorily address the needs of learning in today's technologically, connected age. Curtis Bonk (personal communication, September 11, 2007) questions whether connectivism is best seen as a learning theory in the traditional sense—"psycholog[ical] learning theory lineage"—or belongs in a sociological, or anthropological, conception of learning. Yet despite detractors, proponents of connectivism, and more generally networked learning, are exploring a model of learning that reflects the network-like structure evident in online interactions—as evidenced by University of Manitoba's 2007 Online Connectivism Conference attendance and discussion, as well as the multiple conferences and research centres focused on networked learning previously discussed.

Continuums, not Extremes

The changing role of educators in classrooms has been emphasized by numerous theorists and activists, including Dewey (1997), Freire (1970), and Illich (1970). These and other advocates of problem-based, discovery and cooperative approaches to learning suggest traditional lecture-based learning is ineffective. Papert (1991), for instance, in developing his theory of constructionism, emphasized the need for action and construction in learning. Like-minded theorists emphasize a transition from instructor control to learner control of classroom and learning activity, an educational shift that Papert (n.d.) framed as a move from instructionism to constructionism[2], that is, from teaching to learning. De Jaegher and Di Paolo (2007) promote a concept of *participatory sense-making* where individuals inform and are informed by interaction within new domains, allowing each to exceed their own limitations. Osberg and Biesta (2008) take a slightly different stance with *emergent curriculum* suggesting that meaning is "not something one can ever 'have'" (p. 13) and even subjectivity itself is tied to emergence.

A recent paper by Kirschner, Sweller, and Clark (2006), questioning the tenets of constructivist and problem-based learning, highlights the unsettledness of the debate on instructor versus learner control in learning activities. They argue that the constructivist views of learning are accurate, but the "instructional approaches suggested by constructivists" are not necessarily effective (p. 78). Of particular concern for the authors of the paper is the degree of instructor (or expert) presence during the learning process. They assert that minimal guidance is not as effective as guided instruction, due to different approaches evident in how experts function (epistemology) in a domain and how learners best learn (pedagogy). In 1987, the Harvard-Smithsonian Center for Astrophysics revealed a lack of

[2] While a difference exists between constructivism as defined by Piaget and constructionism as expressed by Papert, the balance of the paper will focus largely ignore those differences and use the slightly less cumbersome terms "instructivist" and "constructivist".

understanding of basic science concepts—such as the reason for changing seasons—in university graduates. Learners, according to their research, often "labour under misconceptions". Without the direct intervention of an expert, learners create their own "private universe" to explain complex phenomena, such as the changing seasons and cycles of the moon.

The key question, however, is whether learning best occurs through minimal guidance or guided instruction. Sugata Mitra (2007) conducted an experiment in India (now commonly known as the "hole-in-the-wall"), in which he placed a computer with an Internet connection in a wall facing a ghetto. Within days children aged 6-12, with minimal education and limited understanding of English, were able to browse the Web and perform other tasks—such as drawing—on the computer. The self-taught, minimally-guided nature of the experiment led Mitra to conclude that children do not require direct instruction to acquire basic computer literacy skills. Research by Darken and Sibert (1996) on "wayfinding" (¶ 1) explores a similar theme of learner-in-control approach to learning; they examined how participants in large virtual worlds orient themselves in their environments in order to accomplish certain tasks or arrive at certain locations. With wayfinding, environmental cues assist learners and participants in effectively achieving objectives. Whether self-initiated and self-directed, as in Mitra's research, or aided by advance consideration through design, as in Darken and Sibert's, it is clear that many learning objectives can be achieved without direct guidance. In other instances, as evidenced by the *private universe* created by learners not fully aware of all factors involved in complex phenomenon, an educator is required to clarify misconceptions.

Understanding

The rapid decentralization and distribution of most of society's channels of communication—newspapers, television, radio, and, more recently, and academic publishing (Brown, Griffiths, & Rascoff, 2007), raises concerns of how learners are to make sense of information in a field that is fragmented and distributed, rather than well organized and coherent (such as a traditional textbook). Morin (1999) states that the "major responsibility of education is to arm every single person for the vital combat for lucidity" (p. 12). Freedom for learners to compile and contribute to resources may not contribute to depth of understanding, but the current situation of organized, structured, and bounded education suffers an equally severe problem:

> Complex global realities are shattered, the human is dislocated and redistributed. The biological dimension, including the brain, is enclosed in biological departments; the psychological, social,

> religious, and economic dimensions are separated from each other and relegated to social science departments; the subjective, existential, poetic qualities are restricted to the literature and poetry departments. And philosophy, which by nature is a reflection on all human problems, becomes a self-enclosed realm. (Morin, p. 16)

The blending of formal and informal, structured and unstructured, expert and amateur, is a vital task for educators—not simply to perpetuate existing models of education or to pursue activist agendas, but to prepare learners for active engagement in a world not defined by structured cause-effect relationships, but by one that emerges through "manifold interactions among constitutive elements" (Mason, 2008, p. 49).

Overlaying or Transformation?

Paul David (1990) details how the innovation and effectiveness of new technologies were hampered in factories due to the challenges of "overlaying one technical system upon a pre-existing stratum" (p.357). Many productivity and systemic improvements of newer technologies were not realized due to the existing factory design. For example, most factories were built as multi-story structures to permit line shafts and belts to be used for production, with the central power source located in the basement or first floor. A main shaft extended from the basement to higher floors. The entire elaborate structure of shafts and belts powered the facility. However, small snags or a broken belt could force the entire system to halt. The physical structure—the building—was created based on this centralized shaft. As electricity grew in prominent use, it could not be optimally deployed, as it was used initially to power the existing main shaft – new technology in the service of previous constraints. Innovation and economics eventually decoupled the factory from a group drive to an individual drive. Factories could then be redesigned as single-story structures, resulting in cost savings and increased productivity (p. 358).

Education faces an equally frustrating challenge of overlaying new opportunities on top of limitations that no longer exist. Physical classrooms and campuses are designed with the assumption of a central instructor or teacher "powering" the learning experience. The previous limitations of geography still influence teaching and learning today. While it is no longer necessary to require a one instructor to 30 (or sometimes many more) students relationship, the design of classrooms and university continues to perpetuate this model. Ongoing development of communication technologies (email, Skype, instant messaging) and digitization of curricular resources creates new opportunities for learners. Learning can

now be increasingly "autonomous and self-directed" (Annand, 2007, ¶ 2). Shifting control of the parameters of conversation and access to learning materials from educator to learner would influences the roles of each.

Metaphors of Educators

The role of the educator and the process of instruction have been under pressure to change for over a century (Egan, 2002, p. 38[3]). While camps often clash over principles of guided instruction versus minimal guidance, or instructivism versus constructivism, the nuanced and complex nature of learning suggests each approach may have value in different contexts. As participative tools grow in popularity, the autonomy of learners and their control over access to information continues to increase. Several educators have put forward models of educator and learner roles and interaction in a technologically-enabled era; these include John Seely Brown's (2006) notion of studio or atelier learning, Clarence Fisher's (n.d.) notion of educator as network administrator, Curtis Bonk's (2007) notion of educator as concierge, and my own notion of educator as curator.

Educator as Master Artist

John Seely Brown (2006) draws inspiration for his atelier model of learning from artists and architects, and describes learning as "enculturation into a practice" (p. 4). An art studio is generally an open space where students create their paintings, sculptures, and other art forms in full view of fellow artists. The "master" is then able to observe the activities of all students and can draw attention to innovative approaches. Students are not limited to learning based solely on the expertise of the instructor. The activities of all students can serve to guide, direct, and influence the work of each individual. Blogs are particularly amenable to the atelier view of learning. For example, a class on creative writing, in which students posts their work in their own blog, permits the educator to highlight and comment on exceptional instances of writing. Students are able to read each other's work and gain insight from both instructor and fellow students. Expertise is still present; not to direct learners to an intended target, but to inform and offer perspective shifts based on the work of *the masters* from generations past as well as emerging forms of art (or architecture).

[3] Egan critiques the history of progressive education emphasizing Spencer, Dewey, and Piaget as leading advocates calling for reform of how in-class instruction occurs, particularly at the secondary level. Egan is referenced here as providing a historical account of the long-cycle of change pressure for educational reform. His critical views are acknowledged here for context, but the intent is not to interact with his main thesis.

Educator as Network Administrator

Clarence Fisher (n.d.), blogger and classroom teacher, suggests a model of "teacher as network administrator" (p. 1):

> Just as our mind is a continuously evolving set of connections between concepts, so our students and their learning can become placed at the centre of a personal learning network which they construct with our help for their maximum benefit. Helping students to gain the skills they require to construct these networks for learning, evaluate their effectiveness, and work within a fluid structure is a massive change in how the business of classrooms is usually structured. (p. 1)

In Fisher's model, a primary task of the educator is to assist learners in forming connections and creating learning networks. These learning networks should assist learners in developing competence to meet the objectives or outcomes of a particular course. As learners encounter new information sources, the educator encourages them to critically evaluate the source's suitability as part of a holistic and diversified learning network. Gaps in the learning network are addressed by both learner (self-directed by active participation in the network and through self-reflection) and educator (through evaluating, with the learner, the nature and quality of the learning network [external] and how key concepts are related and understood [conceptual]).

Educator as Concierge

Curtis Bonk (2007) presents the educator as a concierge directing learners to resources or learning opportunities that they may not be aware of. He states,

> We need to push students into the many learning possibilities that are ripe for them now. Concierges sometimes show you things you did not know were available or possible. Teachers as concierges can do the same things. We need to have quick access to such resources, of course, but as this occurs increasingly around the planet, so too will we sense a shift from prescribed learning checkboxes toward more learner designed programs of study. Now the Web of Learning offers this chance to explore and allow teachers to be their tour guides. (¶ 6)

The concierge serves to provide a form of "soft" guidance—at times incorporating traditional lectures and, in other instances, permitting learners to explore on their own.

Educator as Curator

Like Bonk (2007), I suggest that educators must assume dual roles: as experts with advanced knowledge of a domain and guides who foster and encourage learner exploration. Educators create learning resources that expose learners to the critical ideas, concepts, and papers within a field. I am convinced that

> a curatorial teacher acknowledges the autonomy of learners, yet understands the frustration of exploring unknown territories without a map. A curator is an expert learner. Instead of dispensing knowledge, he creates spaces in which knowledge can be created, explored, and connected. While curators understand their field very well, they don't adhere to traditional in-class teacher-centric power structures. A curator balances the freedom of individual learners with the thoughtful interpretation of the subject being explored. While learners are free to explore, they encounter displays, concepts, and artifacts representative of the discipline. Their freedom to explore is unbounded. But when they engage with subject matter, the key concepts of a discipline are transparently reflected through the curatorial actions of the teacher. (Siemens, 2007, ¶ 9)

The Instructivist/Constructivist?

All four models, then, share a common attribute of blending the concept of educator expertise with learner construction. Key attributes of instructivist and constructivist education are addressed in the focus on connection forming in learning. Whether seen as master artist, network administrator, concierge, or curator, the established expertise of the educator plays an active role in informing and evaluating the activities of learners. Educational institutions face a challenge of reframing their interactions with learners. As detailed previously, rapid information growth, increased learner control of information creation and dissemination, and the growing reliance on network models to address complex changes in society are trends that continue to impact much of society.

The ongoing growth of the Internet for teaching and learning will likely continue to raise networks as a prominent means of representing knowledge and the learning process. The growth of networks is beginning to, and will continue to, force a reconsideration of pedagogy[4]. Many traditional universities,

[4] Pedagogy is used here in its broadest conceptualization—the act of teaching regardless of age. While Malcolm Knowles' use of the term andragogy has value for adult educators, pedagogy is presented here in its more common use among educators.

such as University of Manitoba's Faculty of Education and Athabasca University's Master of Distance Education program, now offer courses focused on Internet or Net Pedagogy. The examples listed here will best serve their purpose if they magnify the potential nature of education in the current climate of changes. de Laat (2006) highlights the current paucity of understanding: "More systematic research in the role and perceived role of the teacher in networked learning environments would be desirable" (p. 174). Until this research is conducted, metaphors, as suggested above, which approximate or suggest potential roles may serve well as interim guidelines.

Role of Instructional Designers

Open Education

The prominence of many open education projects—MIT's OCW, OpenLearn, Open Yale, Johns Hopkins OCW, and others—has the capacity to change education globally. OpenCourseWare Consortium (n.d.) lists over 100 collaborating members with each committing to putting a minimum of 10 courses online. Other initiatives, such as: (a) iTunes U initiatives by Berkeley, Duke, Stanford, and Yale, (b) recorded conference presentations (conferences within a discipline often record keynote presentations or general sites, such as TedTalks providing world renowned presenters); (c) YouTube recordings (such as the Stanford Prison Experiment); (d) TeacherTube; (e) open access journals; and, additionally, (f) Wikiversity, Curriki, and WikiEducator, offer curriculum and educational resources creating a climate where content is readily accessible. Information is distributed, but accessible.

What Becomes of the Instructional Designer?

The previous consideration of metaphors of educators was largely conceptual. While equally conceptual, the roles of instructional designers flow from changes to teaching and learning. Availability of open education resources, increased complexity of technology choices, and ongoing dialogue on different pedagogical models all place substantial pressure on the educator. It is not realistic to expect subject matter experts to be well-versed in different technologies, pedagogies, and open content sources. The critical role of the instructional designer is to be an educator to educators. The four metaphors provided above are equally valid for instructional designers as they work with faculty, designers, and technical staff.

Translating the numerous open education resource sites, communication tools, collaborative content filtering and creation options, and learning networks into language understood by educators form the

core tasks of instructional designers. The numerous activities of traditional instructional design (context evaluation, content sequencing, fostering interaction, etc.) will continue to be important, but additional emphasis will need to be placed on addressing knowledge as existing in networks and learning as developing and forming diverse, multi-faceted networks.

Conclusion

Networks have altered much of society, enabling access to content, experts, and global connections with fellow learners. While expectations rise of education's central role in preparing learners capable of innovating society's capacity to compete on a global scale, uncertainties exist. Before education can lead in meeting challenges requested by society, it must first rethink and reconsider its view of learning and knowledge, as well as its approach to teaching.

When knowledge is seen as existing in networks, and learning as forming and navigating these networks, many existing aspects of academia are subject to change. First, teachers interact with learners and content in a different manner. The internet has caused a power shift in classrooms, as learners now have greater access information, experts, and peer learners. Secondly, instructional designers, due to the developing complexity of tools and availability of open education resources, play an educational role of directing educators to tools and resources. These two foundational changes, while presented here as a conceptual discussion and in need of additional experimentation and evaluation, may serve as levers for broader changes within the academy.

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