

New structures and spaces of learning: The systemic impact of connective knowledge, connectivism, and networked learning

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Abstract

Since Illich's 1970 vision of learning webs, society has moved progressively closer to a networked world where content and conversations are continually at our finger tips and instruction and learning are not centered on the educator. The last decade of technological innovation - mobile phones, social media, software agents - has created new opportunities for learners. Learners are capable of forming global learning networks, creating permeable classroom walls. While networks have altered much of society, teaching, and learning, systemic change has been minimal. This presentation will explore how potential systemic responses leverage the transformative potential of connective knowledge and networked learning.

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Exciting times lie ahead for educators as the oft-desired, but rarely-realized, dream of learner-centered education moves daily closer to reality. Driven by the development of social learning theory and the advancement of participatory web technologies, new opportunities are rapidly becoming apparent. Learning theories, such as constructivism, social constructivism, and more recently, connectivism (Siemens, 2005), form the theoretical shift from instructor or institution-controlled teaching to one of greater control by the learner.

The practical instantiation of this shift is found in new technologies that permit individuals greater control over the creation of content and interaction with others not confined by geographical boundaries. These tools are often classified as part of the read-write web, participatory technologies, or Web 2.0. Focusing solely on tools, however, overlooks the longer-term change evident in teaching and learning (or, more accurately, society as a whole).

Paul A. David (1990) suggested that the inability of organizations to absorb first-generation change is due to existing physical structure. In his analysis, the early developments of the dynamo (electrical generator) were delayed in adoption partly because of how physical factories were constructed. Factories were multi-story structures with central power source (e.g., steam powered). The entire factory was operated by a series of belts on each floor powered by the central shaft, which was driven by the central power source. As the electrical engine replaced the previous centralized engines, no significant structural changes were made. As McLuhan has stated, new tools are often adopted to do the work of the old. In many cases, it took in excess of 40 years for organizations to change the physical arrangement of institutions in response to the new affordances of the electrical engine. The electrical engine duplicated the task of existing technologies, much like video duplicated theatrical performances. Only, after a period of exploration, do we begin to understand how new tools require a reshaping of existing physical structures.

The field of education has been inundated with change during the last century. Some of changes were initially suggested to be transformative (such as television for instruction purposes). Yet, the promised revolution failed to appear as education continued to exist in primarily in a classroom environment. Information, and by extension, education, systems "may be seen as direct counterparts of the physical layouts and materials flow patterns of production and transportation systems" (David, 1990, p. 360). The limitation of physical classrooms and existing information structures in education play a similar role in delaying innovation as the centralized power source in multi-story buildings did during the adoption of electrical engines.

The long timeline of slow change

The history of humanity, from the perspective of our consideration of trends in educational technology, follows a long timeline of slow change. In particular, almost all technological advancements related to information and communication have influenced three dimensions:

1. Our ability to create and share information and content
2. Our ability to connect and dialogue with others, a progressive minimization of the tyranny of space and time
3. Our ability to experience a simulated reality

As indicated in Figure 1, a progressive diminishment of barriers to the creation of content and information has occurred since the development of language and symbols to reflect ideas and concepts. This timeline has enabled anyone with access to an internet connection to create and share information. The barriers of expense and technical expertise - such as printing presses - are now lowered to the ease of creating a blog or podcast. The ability for easy creation carries challenges of validating information accuracy and determining quality, but those are future challenges; implementation

challenges arising from new tools are a secondary consideration to initially defining affordances. Authority and validation can be developed as the new media unfolds.

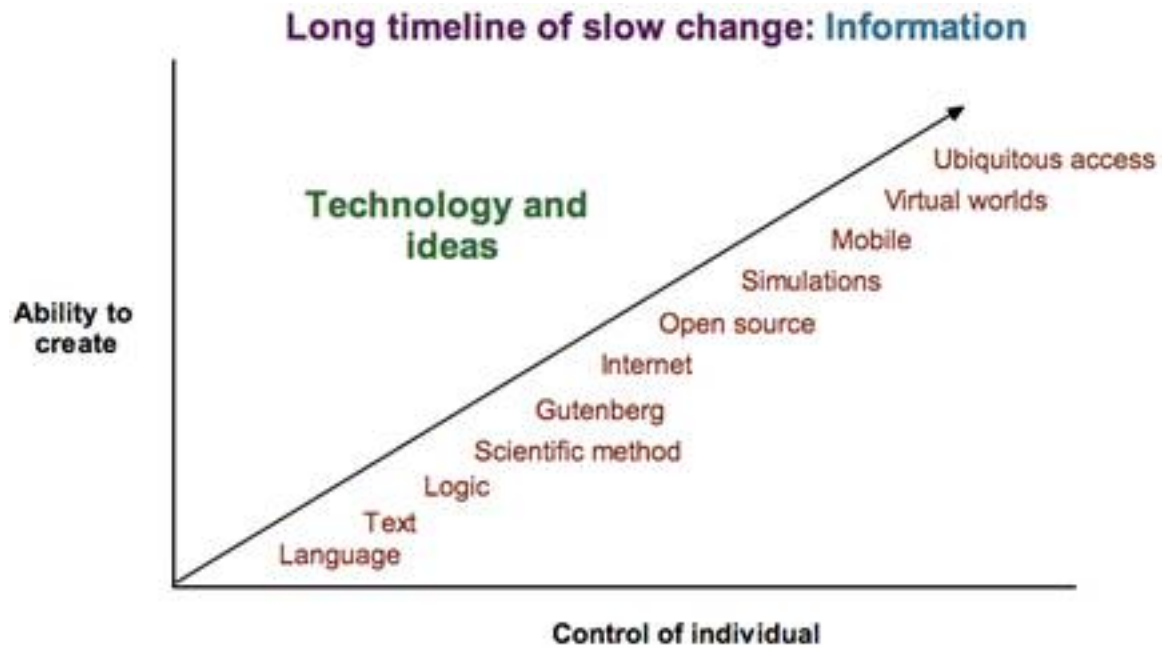


Figure 1: Long timeline of slow change. Adapted from Fischer and Konomi (2007) ^[1]

A parallel shift to increased ease of content creation is the ability for conversations to occur, in both real and delayed time, on a global level. Through tools such as mobile phones, Skype ^[2], video conferencing, instant message, and microblogging tools such as

Twitter ^[3], conversations are no longer confined by space and time. For many individuals, the reduced cost of information communication technologies reduces the economic barrier of participating in global conversations.

A third critical trend influencing education centers on the developments of technology. While technology is the undercurrent that has influenced much of the development in society and our ability to communicate, share, and create content, technology creates a different dimension not fully reflected in those advancements. Technological developments permit individuals to experience events previously unattainable due to cost and access. For example, the training of pilots or medical personnel is now increasingly mediated through technology. Haptic devices contribute real tactile

feedback to users during the completion of tasks. Virtual worlds like Second Life ^[4] enable participants to interact in new environments and in simulated relationships,

while online games such as World of Warcraft ^[5] can contribute to the development of collaboration skills.

Challenges to traditional education

Knowledge fluidity

Knowledge - the core product and source of engagement in education - has become increasingly fluid (Downes, 2006; Siemens, 2006). The world of expert, clearly-defined, and well-organized knowledge formed by ancient philosophers and deciphered by subsequent thinkers, has today given way to continual flux. Kress and Pachler (2007) have stated,

What we have here is a transition from a stable, settled world of knowledge produced by authority/authors, to a world of instability, flux, of knowledge produced by the individual. (p. 207)

This view of knowledge is controversial and challenged by individuals finding the shift from expert to amateur knowledge producers unsettling (Gorman, 2007; Keen, 2007). Yet, it seems intuitive in a world where technology and scientific research advances daily, inundating members of society with a continual flow of data and information on which to build new conceptions of knowledge. The view of experts as sole providers and evaluators of information seems untenable when change is so rapid.

Competition

Compounding the challenges of coping with rapidly developing and fluid knowledge is the assault traditional education by the development of alternative modes of teaching and learning. Three institutional forms that place pressure for educational reform include:

- Border-less education - such as is evident by global universities like Open University (UK) and Athabasca University (Canada)
- Private for-profit - as defined by organizations such as University of Phoenix and Laureate Education
- Corporate universities - such as Defense Acquisition University. (Scott, 2002, pp. 4 - 5)

Continually developing knowledge and growing competition from non-traditional sections seriously call into question the ability of education to continue to meet its major responsibility: "to arm every single person for the vital combat of lucidity" (Morin, 1999, p. 12). This era of complexity, or as defined by Barnett (2004) - supercomplexity - requires a transition from an epistemological to an ontological emphasis. The development of specific skills and mindsets becomes as critical as, or even more so, than the possession of existing knowledge. The ability to continue to learn and develop new

knowledge replaces the importance of existing knowledge, or, what is known today is less important than the capacity to continue to know more. The development of a certain type of person with certain mindsets exceeds the importance of being in possession of a particular type of knowledge - *becoming* in contrast with *knowing*.

Anatomy of change

How does change impact institutions? Numerous theorists have advanced opinions on adoption of innovation and systemic views of change. Some, have offered models of innovation diffusion (Christensen 1997; Rogers, 1995), providing insight into how a new idea or concept ripples through an organization, society, or system. Senge et al. (1999) took a broader systemic view in analyzing how numerous elements - such as change barriers, time, and resources - interact to impact the success and failure of new initiatives.

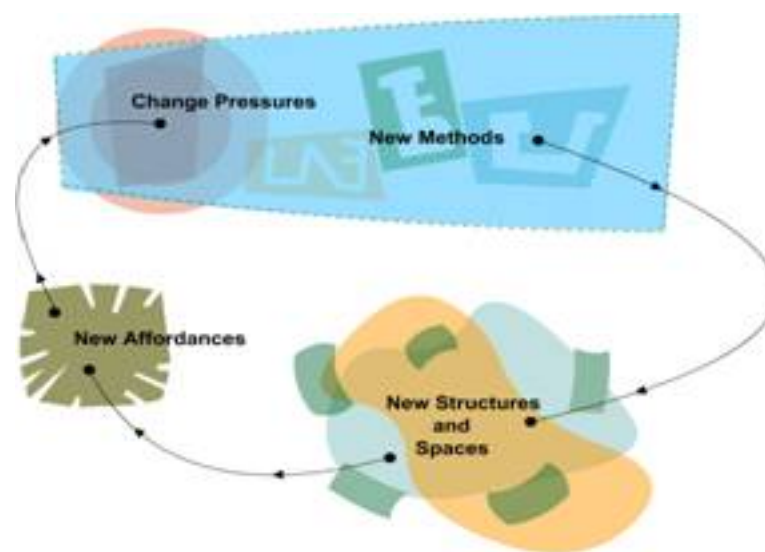


Figure 2: Systemic change

A view of change is required that moves beyond Christensen's (1997), Moore's (1999), and Senge et al.'s (1999) models and begins to address the impact of trends and innovations on the spaces and structures of learning. In academic settings, new innovations arise through small pockets of research, experimentation, and new approaches developed in response to observations of change pressures (see Figure 2). New trends drive innovation when educators, school systems, and research groups begin to adopt new approaches for learning. These methods are at times seen as innovations in curricula and at times as pedagogic innovations.

Yet, in spite of small-scale innovation, new methods typically do not result in new spaces and structures of learning. As noted by David (1990), new innovations are adopted in the context of existing physical spaces. Changes of a more significant and profound nature need to be enacted at a system-wide level. The adoptions of blogs and wikis in classrooms, or use of Second Life and other virtual worlds, or the use of social networks to connect learners with peers around the world, still occur largely within a classroom

context. To truly harness the transformative potential of new technologies, change at a systemic level is required.

When applied to the academic sector, dialogue about changing learning spaces and structures suggests a fundamental rethinking of classrooms, courses, and programs is needed. Given the opportunities of technology to extend access to content, experts, and peer learners, does an existing classroom model still make sense? Do one-instructor classrooms need to give way to more diverse approaches of many instructors and many peer learners? How should curriculum be developed? How much structure needs to be applied to this type of model in the development of curricula and in the planning of instruction? Does instructional design similarly need to be rethought?

Once spaces and structures of learning have been reconsidered, new affordances arise (see Figure 2). New affordances then generate new change pressures, and the cycle continues. Much like the dynamo gave way to an entirely new design of manufacturing, replacing multi-story factories with a central power source with the single-story factory leading to assembly-line manufacturing, global classrooms, shared curricula, complex problem solving through collaboration, and new relationships between educational institutions and society are all possible as systems change.

Let us turn our attention now to exploring how change itself is experienced in terms of catalyst and push-back factors (see Figure 3). The catalyst-resistance model can be seen as a way of understanding the vicissitudes of change that can, at times, leave academics and leaders disoriented. Consider, for example, a period of tumultuous change in the late 18th century in Europe. Social pressures were building that resulted in the eventual eruption of political reorganization. In France, the complex interactions of economics, political pressures, and changing philosophical perspectives of government served to catalyze the movement to overthrow the monarchy. Interestingly, even at this stage, the intent of the revolutionaries was not to abolish the monarchy, but rather to reorganize its role in society. The initial success of the revolution gave way, in early 19th century, to a period of uncertainty. At times, it appeared the revolutionary causes were lost as monarchy again asserted itself. After a series of advances and setbacks, ranging for the better part of a century, a model of sustained change and innovation emerged.

Historical accounts of enormous upheaval might prove instructive for educators. The *dance of change* between catalyst and counter pressures, leading ultimately to new affordances, can be difficult. A smoother or more rapid experience in the restructuring of education can hardly be expected. Large systems do not react and change due to small change pressures. Once change has developed to a point of potentially altering the existing system, significant resistance can be expected.

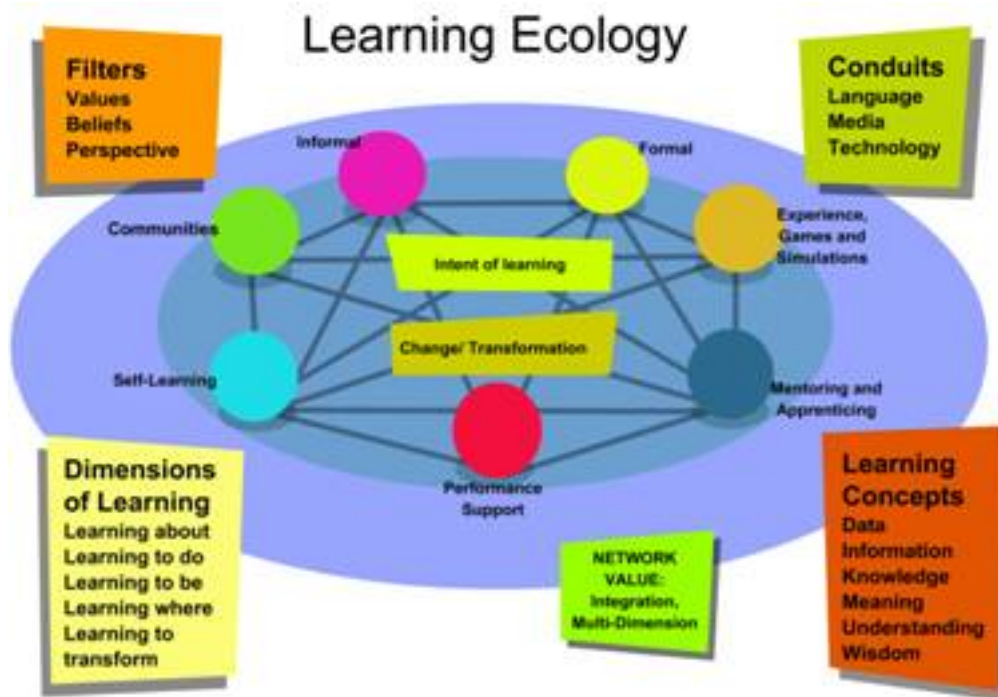


Figure 4: Limitless dimensions of learning

Three important concepts have been posited that will form the foundation for reconsidering the spaces and structures of education: (a) long-term trends influencing information creation, interaction, and technological change; (b) the nature of systemic change; and (c) the multi-faceted, dimension-less nature of learning. Consideration can now be given to a creative exploration of what educational structures might look like if created on the premises presented thus far.

Spaces and structures of learning

Spaces are themselves agents for change. Changed spaces will change practice (JISC, 2006, Slide #30).

Many of the assumptions that influence current school design are challenged when learners and educators have the ability to form global learning networks outside of the realm of traditional education. As we create "space and place, we create ourselves" (Cannatella, 2007, p. 632). Our ability to learn, grow, and adapt to change pressures is directly linked to the nature of our learning environments. Oblinger (2006) addressed the link between space design and opportunities for learning:

Space - whether physical or virtual - can have an impact on learning. It can bring people together; it can encourage exploration, collaboration, and discussion. Or, space can carry an unspoken message of silence and disconnectedness. More and more we see the power of built pedagogy (the ability of space to define how one teaches) in colleges and universities. (para 1)

Arguably, traditional education is defined by two elements of organization: bounded classrooms and hierarchical organization of information and content. Aside, however,

from the cosmetic changes of rearranging furniture, classrooms are the staple of education. The very design of the environment reflects - or is a "carrier of patterns of previous reasoning" (Pea, 1993, p. 53) - the primacy of the educator and the role of the learners as receptive agents. Of all the aspects of education, this is the first, and likely most difficult, physical instantiation of world views that needs to be questioned. As Morin (1999) stated, the silo-model of education creates specialization without broad scale comprehension.

Secondly, a hierarchical mindset exists with regard to educational content. This view is best seen in the classification schemes of individuals such as Aristotle and Linnaeus. Regrettably, a classification mindset is applied to curricula itself. While we can mark clear distinctions between elements in chemistry or species in biology, the nature of learning resists such clear demarcations. The multi-faceted aspects of learning - the criticality of context, the importance of social interaction and negotiation, the need for active "doing" - are all of such nebulous character that they fail to avail themselves to classification. Unfortunately, this fundamental flaw is often not noted as instructional designers seek to structure content and interaction into hierarchical structures.

Recent work by educators such as Grainne Conole (2008) has offered an alternative to highly-structured approaches by adopting a cloud metaphor during the instructional design process. Sites such as CloudWorks ^[6] adopt a soft structured approach to sharing learning materials, creating spaces for educators to share pedagogical innovations.

Moving away from hierarchy and classrooms

The limitations of hierarchy in capturing interconnectedness of information and the failure of classrooms to reflect technological developments permitting multi-perspective interactions and networked learning establish a need for different metaphors to guide learning design. Metaphors of *learning ecology* and *learning network* are suggested as encapsulating the needed shifts.

An ecology, for our purposes here, can be viewed as an environment that *fosters and supports* the formation of communities and networks (Siemens, 2003). In the current educational context, a classroom is an ecology. A classroom permits the emergences of certain learning tasks and behaviors, and by its design, discourages others. Most critically, a classroom is a physically-bounded space that, again, by its design, suggests a certain view of learning. Learning is seen as bounded, structured, managed by a single expert (the teacher), and occurring within the confines of a small group of peers. In contrast, the internet can be seen as an ecology of learning with different affordances. For example, the internet, with its emphasis on openness and diversity, challenges the classroom conception of authority and expertise. The structured approach of information filtered in advance, by the educator, and presented in a fairly coherent form defines classrooms. In contrast, the internet is a hub of creative chaos. Educationally, the

challenge is one of defining the type of ecology that will permit the formation of the broadest array of networks and communities to address the desired learning tasks and outcomes. The concern is not with structure itself, but rather with the assumption that structure is required across all spaces of learning.

If ecologies are the spaces of learning, then networks are the structures of learning. Networks do not occur in a vacuum. They arise in a space that both supports and confines their creation. The last decade has generated much thought on networks. A range of researchers from physics, mathematics, and sociology (Barabasi, 2002; Watts, 2003; Wellman, 1999) have explored the nature of networks and how they are a central component in all aspects of society, biology, and physics. The centrality of networks as an organizing scheme is also reflected in education, teaching, and learning (Siemens, 2006) under the concept of connectivism. Connectivism is essentially the assertion that knowledge is networked and distributed, and the act of learning is the creation and navigation of networks. The distributed nature of knowledge and the growing complexification of all aspects of society require increased utilization of technology to assist our ability to stay current, manage information abundance, and solve highly complex problems.

A pedagogy of participation

In spite of forces of significant advancements in learning theory emphasizing greater involvement and engagement of learners and development of technologies that enable greater interaction socially, the impact on teaching and learning has been limited. Davidovitch (2007) suggested, "The call for a new pedagogy to accompany new instructional technologies, however, has largely remained unanswered."

The slow pace at which educational institutions have reacted to technological developments through the creation of new pedagogies can be traced to the physical structures of existing classrooms. Where technologies - such as learning management systems - duplicate the structure of a classroom, little innovation is seen. Where technologies, such as those under the umbrella of the read/write web or Web 2.0, create a new space and manner of interaction, significant innovation can be seen, as well as ongoing calls for structural reforms (Barnett, 2004; Downes, 2008; Organization for Economic Co-operation and Development [OECD], 2007a; Siemens, 2008).

These calls, however, are not new. Theorists and activists such as Freire (1970) and Illich (1970) have advocated for structural changes to educational systems. Freire called for reform based on the changing power structures in society, arguing that a pedagogy of oppression formed much of the existing system. Illich found his motivation for systemic reform in the growing costs of education and the inability of the existing system to scale and meet new challenges. Current calls for reform are founded in trends of technology, globalization, advances in learning theory, and complex systems view of education. The reform calls of Illich and Freire were restricted by lack of technological foundations to enact reforms. The reform calls of today are limited by lack of effort assigned to date on

conceptualizing innovative and creative uses of existing participatory technologies.

Researchers and institutions are beginning to address these inefficiencies through discussion of participatory pedagogies (Askins, 2008; Collis & Moonen, 2008). A participatory pedagogy is one that does not fully define all curricular needs in advance of interacting with learners. Learners are able to contribute to existing curricula. The organizational work of faculty members does not comprise the entirety of the course content and does not consist of the sole perspective used to filter content. Multiple perspectives, opinions, and active creation on the part of learners all contribute to the final content of the learner experience. This participatory emphasis is reflective of current ongoing trends with online content creation (OECD, 2007b) and with collective approaches to participatory sensemaking (De Jaegher & Di Paolo, 2007). Activities of learning, interpreting the meaning of trends, and creation of new resources can all be achieved through participatory approaches.

Conceiving a new view of teaching, learning, and research

On the uncertainty of future outcomes

Multiple interacting elements occurring on tension fault lines, such as open versus closed systems, expertise versus amateur content creation, networks and ecologies versus hierarchies and bounded classroom structures, create a climate where it becomes difficult to accurately explore or consider future directions. For example, progressively rigid intellectual property laws or increased emphasis on learning outcomes tied to suspect cause-effect views of teaching would substantially alter future directions. The difficulty of determining future directions for education is amplified due to numerous unsettled points of conflict within educational ideologies. While challenging, creating possible future scenarios is an important exercise in raising the importance of evaluating the future impact of trends.

What follows is a discussion of how education might develop over the next decade.

The following discussion is best seen as an attempt to provide a possible scenario that addresses potentiality inherent in new technologies, while preserving the needs of multiple stakeholders in the education system. In a sense, it's an attempt to create an educational system that recognizes the fluidity of learning and knowledge, the dynamic social interactions occurring through the learning process, and the affordances of new education landscapes.

Reacting to emerging trends, however, also requires reflection on the role educational institutions play in society. Universities are an important countering-balancing influence in the power structure of society. It is vital for society that a space exists for free and innovative thought outside the direct control of governments, corporations, or religious institutions. While the spaces and structures of education need to be rethought, the initial noble role of universities in society remains vital.

Questions shaping future directions

Adopting a different framework for education requires answering some critical questions. For example:

- What would be the role of the educator? How would we teach
- What would be the role of the learner?
 - Wayfinding, self-directe
- How would curriculum be created? Shared?
- How would research be conducted?
- What would be the role of the university in society?
- What would education "look like"?How would we mark? Accredit?

New roles for learners and educators

Traditional classrooms provide a particular shape to the learner-educator relationship. When a transition is made to networked models of learning, learners are able to form relationships with peers and experts from around the world. Content is not filtered according to the ideology of one professor. Instead, academic resources from different institutions and educators are utilized. The development of open educational resources,

as evidenced by MIT's OpenCourseWare [7] and similar initiatives, provides learners with a far richer pool of resources on which to draw. A fluid network of relationships, as detailed in Figure 5, presents new learning experiences not found in a traditional model. Multiple perspectives and voices replace singular views of content and interaction.

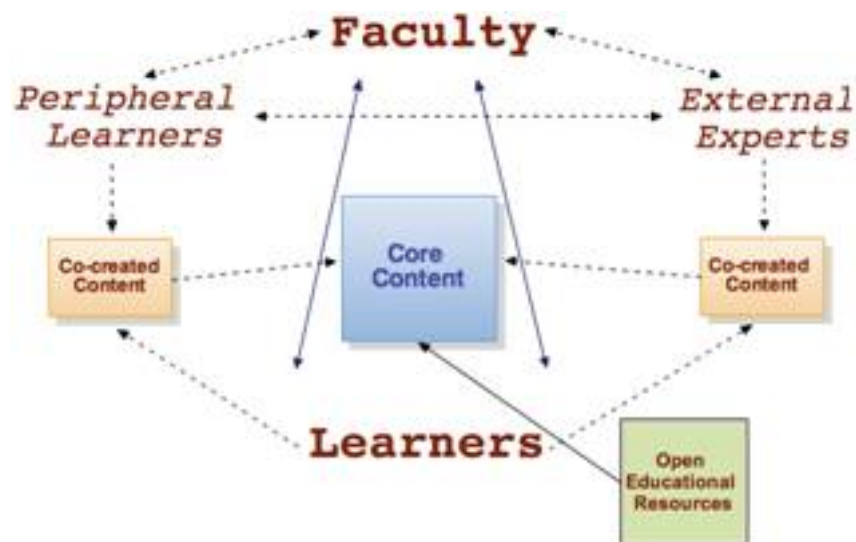


Figure 5: New relationships for learning

Enlarging accreditation

Accreditation is a vital service universities provide to learners, government, society, and employers. Accreditation is a value statement. When a university grants a degree, it is a statement of achievement, an indication that the learner has sufficiently engaged with the

knowledge of a domain to be worthy of a particular designation. Aspects of accreditation are obviously flawed. Universities sometimes graduate learners who have not been prepared to engage in the reality of real-life work, or universities sometimes overlook individual genius in evaluating a discipline by its history, rather than the innovations that may bring the discipline in new directions. Taken as a whole, however, the model of accreditation is at the heart of a university's role in society.

The coupling of teaching and accreditation, however, is a link that is showing indications of weakening. Figure 4 expressed the limitless dimensions of learning. As far as value statements are concerned, there is no reason to assume primacy of formal education in deriving competence. It could well be argued that universities better serve their role of accreditation or value statements on sufficiency of learning when they look beyond formal classrooms. Models like prior learning assessment and recognition (CICIC, 2008) can be utilized in evaluating out-of-class learning. A broad, holistic, accreditation approach is one where the whole person is considered in determining competence. Enlarging the university's current conception of accreditation is an important step forward that ensures universities continue to hold a central role in the knowledge process. Teaching and learning, on the other hand, can exist outside of classroom environments and rely on multiple learning opportunities evident in our distributed information culture.

What might this model look like?

The cycle of systemic change, as presented in Figures 2 and 3, spans decades, not years. Figure 6 suggests a model of what the learning process might look like in the future. The learner begins by accessing a search resource that permits her to search for educational content and material. The content is not prepackaged as we might expect in courses. Rather, it's fragmented and largely de-contextualized. The experience of learning is one of the learner availing herself to an expert to provide guidance - the search resource searches both people and content. Or, if the learner has some familiarity with the field, she can begin to self-explore and self-regulate her own learning according to existing standards and outcomes defined by different academic fields. These standards (which really is the wrong word, I mean something more like "minimum knowledge, skills, and abilities to be considered competent in a field") will be freely available from universities, schools, public learning centers, or apprentice boards.

Different learners have different needs. Some prefer a high degree of social interaction, while others prefer a more individual approach. For those who desire to learn in structured cohort manner, learning plans and scheduled start dates for groups are available at the university providing accreditation. These learners can then pursue a structured pathway through the knowledge of a discipline with social connections to other learners. Structured pathways can be developed by faculty, learning mentors, or institutions. The motivation of peer-contact and schedule of learning activities and events may provide critical support to ensure learners do not drop out of their learning

path. Learners who are more comfortable with self-regulation are free to explore subject matter and content in as flexible an approach as they desire. Regardless of the structured nature of learning paths, learners are able to provide ongoing feedback and rating on learning mentors and learning content. Existing services like Diigo ^[8], Amazon ^[9], Digg ^[10], and StumbleUpon ^[11] provide a glimpse of what a rating system might look like.

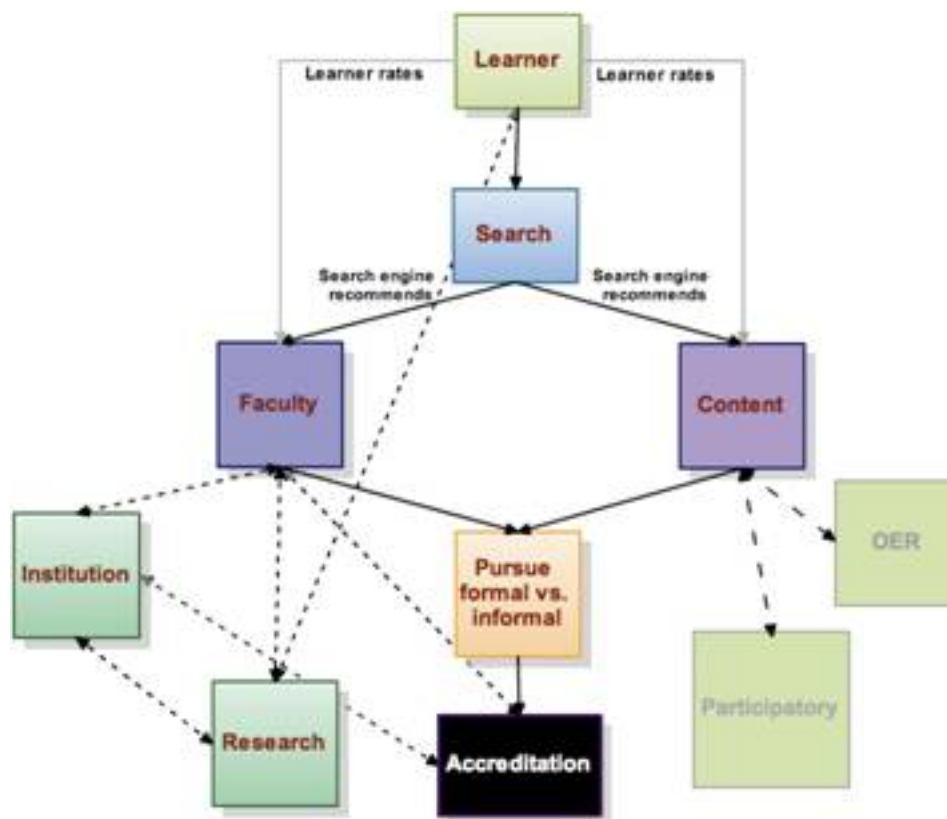


Figure 6: Process of learning and accreditation

What becomes of the university?

Universities still play many of their traditional roles in society (see Figures 6 & 7). As discussed, accreditation continues to be vital. The change is one of extending teaching and learning to the network, rather than retaining it under the classroom model. A university becomes a *connection forming* organization, brokering relationships, providing opportunities for research, and continuing to serve as a critical, but neutral, place of discovery and advancement of knowledge.

Obvious questions arise as to the ongoing role of scholarship, research, and publication. Research, especially in a knowledge age, becomes more, not less, important. While it's difficult to see the outcome of a bold task, such as conceiving education to be limitless and outside of the exclusivity of a university's domain, the traditional research functions of a university need not change significantly. For many learners, the university provides an additional role of "brokering" relationships between learners (consider physical meetups ^[12] hosted on university property), connecting learners with faculty, and

allowing learners to participate in research activities (see Figure 7)

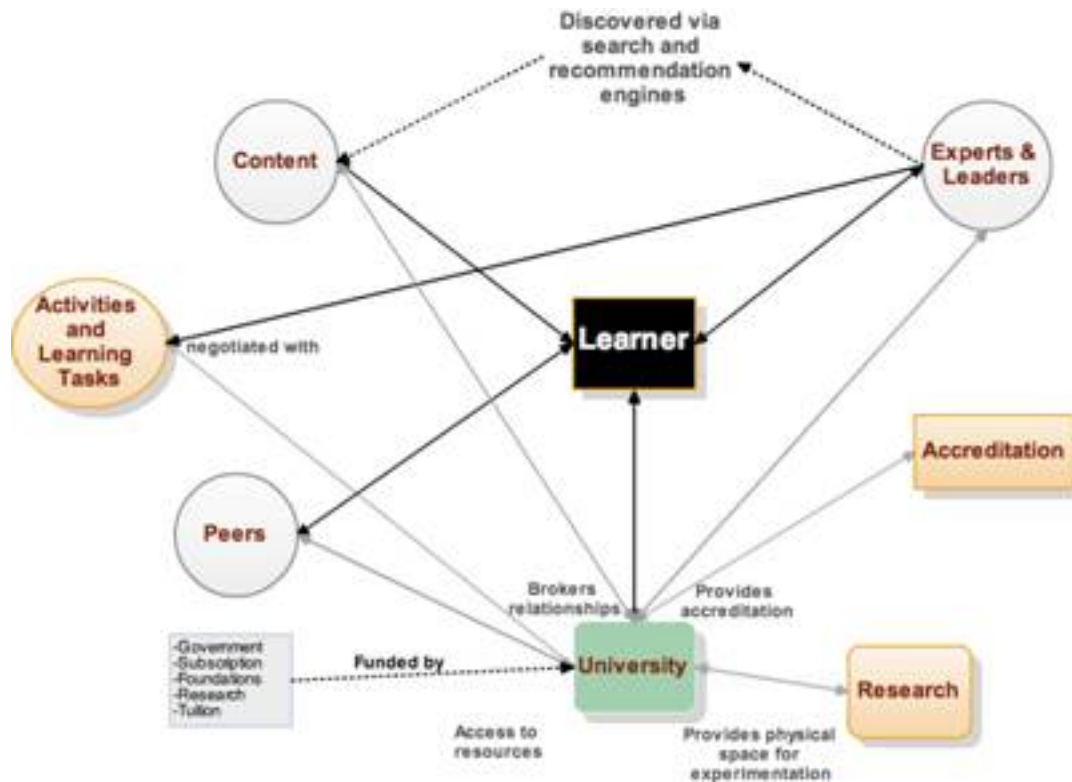


Figure 7: Limitless universities

Different educational needs and different levels of learner familiarity with subject matter will obviously influence the degree of personal choice needed. For example, a student who is new to a particular field of study may rely on her learning mentor to provide a structured path through existing content, or a learner in a medical field may need to take a certain sequence of courses to prepare for entry into a lab or simulation environment. After a period of time pursuing a more structured model, the learner may opt to pursue subject matter based on personal interests. The context of learning continually changes. A balance between learning interests (those the learner is personally motivated to pursue) and learning needs (those required to achieve a certain standing within a field such as medicine, dentistry, plumbing, carpentry, or similar field where structure is highly appraised) is negotiated on an individual basis.

How is revenue generated?

Numerous options exist for funding in a model of learning networks and ecologies. A primary approach is one that is currently prevalent in many countries: government funding. With learners engaged in learning activities in various forms (formal and informal), the funding model of universities relates to providing support for educators and institutions to conduct thorough and reliable assessment of learning leading to accreditation.

Secondary models include tuition fees in a variety of forms. Subscription fees to participate in certain communities, fees to engage the services of experts, or access fees

for content (though this is the least desirable point on which to build funding, as the development of open educational resources has largely negated this as a key financial value point). Foundations can serve also serve as an important funding sources.

Finally, and perhaps the model most likely to serve as a source of guidance, is the model of learning mentor (or coach or guide), where an individual who has been accredited by a university or similar agency has a standing, acknowledged reputation in a field. This model is one of fostering an entrepreneurial dimension of education. In this instance, entrepreneurial need not be equated with a market economy, but rather as a model to encourage the creative exploration of new opportunities to provide learning resources and guidance that may be perceived as valuable from the perspective of learners.

This approach does several things: first, it opens the world of educators beyond current narrow definitions. Retired teachers and professors, for example, can participate in the global learning commons. Learners from around the world and from the full socio-economic spectrum have the capacity to participate.

Concluding thoughts

Education is not an end in itself. Education will continue to develop as the central element in preparing individuals and societies to participate in the information and knowledge age. The critical challenges facing humanity are many. A highly connected and well educated populace appears to hold the greatest prospect for meeting these challenges.

Education is concerned with the *act of becoming*. As with classical Greek educational objectives, learning assists individuals in coming to understand the world, to contemplate worthy and significant ideas and concepts, or, as conceived in a liberal arts education, learning is the process of coming to understand the world broadly and from many perspectives in order to see one's role in advancing the needs related to ethics and humanity. While this need has been well-served by traditional education, the forces of technological change, new opportunities to create and share information, and increased ability for interact with peers globally require a new model based on networks and ecologies. The current age should be one of throwing open doors of learning to bring as many potential contributors to our future as possible.

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