

Networked Learning in an Open Innovation Environment: Background, Connotation, and Case Postprint

Authors: Rongbin Li, Wang Zheng

Date: 2023-10-08T00:00:00+00:00

Abstract

[Purpose/Significance] In the context of ongoing developments in information technology, it is necessary to re-examine traditional teaching methods and learning models to meet the demands of the new environment. This paper analyzes the evolution of the knowledge environment and knowledge management, discusses the connotation of networked learning, as well as its relationship with open innovation. [Method/Process] Through a review of classical literature and case studies, this paper introduces the key points regarding the evolution of knowledge management, networked learning, and open innovation, as well as how they should be implemented in organizations such as enterprises and universities. [Results/Conclusion] Networked learning connects people and information through networks; cMOOC embodies the requirements of networked learning and aligns with the objectives of open innovation. Future education, learning, and knowledge management activities need to better align with the dynamic nature of knowledge.

Full Text

1. Changing Background: From Traditional Resource Dependence to Knowledge-Based Advantage

A review of the global transformation of competitive advantages reveals that enterprises have comprehensively shifted from relying on resource-based advantages (such as capital, production facilities, equipment, labor, inventory, and transportation capacity) to depending on knowledge-based advantages (including intellectual property, patents, brands, goodwill, business intelligence, and organizational learning), thereby forming comprehensive knowledge value chains. This trend has become even more pronounced in the current international environment. The case of lithography machines illustrates this point: against a

backdrop of intensifying global competition, major nations are now deeply concerned with chip production, which represents the pinnacle of advanced manufacturing. It is well known that chip production requires enormous investment, with a critical piece of equipment being the lithography machine, which enables chip processing precision at the nanometer level—a technology that China previously lacked. Which country produces these lithography machines? Many might assume Dutch technology is the best, but lithography machines cannot truly be described as “Made in the Netherlands”; more accurately, they are products of the global knowledge value chain. This is because lithography machines integrate multiple cutting-edge technologies from different disciplines, fields, and countries, including optics, physics and chemistry, precision instrumentation, materials science, and precision engineering. These technologies originate from around the world and cannot possibly be fully mastered by a single company or nation, nor can they be rapidly cultivated in a short period. Consequently, how to acquire and integrate this knowledge becomes critically important for a country, region, or enterprise.

In this context, enterprises, universities, and even individuals must reflect on whether traditional educational methods and learning approaches remain appropriate. This reflection leads directly to the central theme of this paper: networked learning. Many learning models in organizations and among individuals have failed to keep pace with external changes and developments in IT. In the era of big data, cloud computing, and artificial intelligence, new IT technologies have transformed the landscape of business and industry, opened doors to innovation from the commercial to the social sphere, and changed how people learn and innovate. But have learners themselves changed accordingly? Some might argue that the shift to online classes during the pandemic demonstrates IT utilization, but such use remains insufficient. Returning to a fundamental question—what should a university or school be? The most direct answer is “a place for learning.” This answer is both correct and incomplete. The most important function of a university or school should be to shape a learning community. The same principle applies to enterprises, which should also strive to create learning communities. Why do many enterprises fail to survive beyond 20 years? Because many entrepreneurs fail to recognize that an enterprise is not merely an organization that provides products or services, but a community of people that requires continuous learning. Both universities and enterprises need to be places where knowledge is created, transferred, organized, absorbed, reused, and shared—this is the true essence of knowledge management. As knowledge-intensive institutions, universities should place greater emphasis on knowledge management, yet when asked what knowledge management is, most university staff cannot provide an answer.

3. Networked Learning from a Knowledge Management Perspective

Networked learning is proposed as an alternative to traditional education and learning models. As previously noted, networked learning is not the same as “online learning” or “web-based learning,” nor is it equivalent to traditional E-learning. So what exactly is networked learning? Simply put, networked learning connects “people” and “information” through “networks” and develops and maintains these connections. The term “network” here carries multiple meanings: first, social networks (interpersonal connections), and second, technological networks such as the Internet, Intranet, and cloud computing.

A knowledge management perspective helps us better understand the essence of networked learning. The world-renowned management consulting firm Andersen Consulting once provided a very simple formula [1-2], as shown in Figure 1 [Figure 1: see original paper]: $K = (P + I)^S$, where K represents Knowledge, P represents People, I represents Information, and S represents Share. As illustrated in Figure 1, the greater the number of people (P) and information (I), and the higher the exponent of sharing (S), the more fully knowledge activities are promoted. The power of networks lies in increasing the rate of sharing, and with each generation of network technology updates, this promoting effect grows exponentially.

This formula remains influential in the field of knowledge management. Regarding knowledge management, there have been questions and debates, such as whether “knowledge management is outdated” or whether it has already permeated our daily practices. To address these questions, we must review the evolution of knowledge management. The concept of knowledge management was formally proposed in the mid-1990s, initially emphasizing IT applications and tools to capture, organize, store, retrieve, share, and reuse knowledge—primarily explicit knowledge. This stage can be called “first-generation knowledge management.” Subsequently, Professor Ikujiro Nonaka from Japan published the highly influential book *The Knowledge-Creating Company* [3], which drew attention to the “people” dimension—this became the core of “second-generation knowledge management.” The book introduced the famous SECI model, distinguishing between explicit and tacit knowledge and their transformation processes within organizations. From this, people came to understand that the fundamental function of an enterprise is to create knowledge; only with knowledge can there be new products and services, enabling companies to achieve sustainability.

By reviewing these two developmental stages of knowledge management, we can address whether it has become “outdated.” The author believes there is no such thing as “outdated,” but rather that knowledge management should be deepened according to the different needs of different eras. Recall that in the 19th century, some physicists declared “physics is dead,” believing there were no new problems to solve. But is that the reality? Shakespeare wrote, “A rose by any other name would smell as sweet,” suggesting that names are

not what matters. Whether we call knowledge management by that name is not the most important thing; what matters is recognizing that knowledge is constantly dynamic and evolving, and therefore knowledge management must also keep pace with the times. The third stage of knowledge management—“third-generation knowledge management”—is what we need to explore, and networked learning is likely one of its key components.

Returning to the concept of networked learning, relevant knowledge management theories can help us better understand the meaning of “network.” In Nonaka’s knowledge management theory [3], the process of sharing and creating knowledge requires a “space.” This “space” is difficult to explain; in Japanese it is called “Ba,” in English it can be called “Field,” and in Chinese it can be interpreted as “field” or “domain.” Nonaka refined his theory of “Ba” in subsequent works. Our knowledge activities primarily rely on three types of spaces: physical space (Physical Ba), mental space (Mental Ba), and virtual space (Virtual Ba). This virtual space is what we now call digital space (Digital Space), including platforms like Weibo, wiki, and QQ. The “network” in networked learning exists simultaneously across and extends through these three spaces.

4. The Core of Networked Learning: Connectivist Learning

Even when using technologies like E-learning or MOOCs (Massive Open Online Courses), we may still not achieve true networked learning if our learning activities remain in traditional models characterized by top-down-driven, passive behavioral learning that requires external motivation. While this top-down model had its rationality and utility for a time, its effectiveness is insufficient in the new environment.

Taking MOOCs as an example, there are many well-known platforms domestically and internationally, some of which offer interactive features such as videos and discussion forums. However, a large portion of MOOC courses still follow traditional formats, similar to E-learning, providing online learning materials primarily through one-way dissemination. In fact, the earliest MOOC courses were not like this; learning did not involve simply viewing materials online but rather aggregating various experts and learners in a space filled with interaction and discussion, where knowledge was innovated through dialogue. This aligns more closely with the improved version of MOOCs called “cMOOCs,” where the “c” stands for Connectivist. Through networks, participants in learning can number in the thousands or tens of thousands, interacting with each other in a network-based connectivist learning model that better reflects the core spirit of networked learning.

G. Siemens, in his work *Connectivism: A Learning Theory for the Digital Age* [4], articulated the key points of connectivist learning: (1) Learning is no longer an individual activity but a process of connecting specialized knowledge nodes and information sources. (2) Individual storage of knowledge is limited; dynamic knowledge can exist outside ourselves (for example, within an organization or

database). To illustrate these points, consider a fundamental question: How do we define knowledge? Although there are thousands of interpretations, one explanation aligns particularly well with connectivist learning: “Knowledge is the inter-connection between different concepts.” These connections are complex and dynamic; different people may form different connections, leading to different cognitions, definitions, and actions. From this perspective, knowledge in traditional libraries is static because the links between knowledge pieces are fixed. For instance, a book defines the relationship between Concept A and Concept B in a linear, printed format that cannot be easily changed. However, viewing knowledge through a “connectivist” lens reveals that knowledge is dynamic and linked. Therefore, G. Siemens also emphasizes that learning is a linking activity—not entirely dependent on memory or memorizing processes and rules. Knowledge differs from information and data; it is not entirely an objective object or artifact. (3) Learning channels are more important than learning content itself. For example, merely finding materials in a library does not mean acquiring knowledge, whereas discussing, debating, and exchanging ideas with group members helps one understand how much knowledge they truly possess. (4) Consequently, we can understand that learning capacity is more important than knowledge possession. (5) Connectivist learning integrates multiple theoretical principles including chaos theory, network theory, complexity theory, and self-organization, making it a theory worthy of significant attention.

5. Networked Learning in the Open Innovation Environment

The core of networked learning is not the network itself but connectivist learning within the network. Whether through strong or weak connections, the ultimate goal of connectivist learning is knowledge innovation. Innovation is not the same as invention; it can involve process innovation, market innovation, product innovation, or business model innovation—the most valuable being business model innovation. The Knowledge Management and Innovation Research Centre at the author’s institution hosts a biennial Asia-Pacific conference on knowledge management and innovation and organizes the “Most Innovative Knowledge Enterprise” award in mainland China and Hong Kong. Previously called MAKE (Most Admired Knowledge Enterprise Award), it was later renamed MIKE (Most Innovative Knowledge Enterprise), reflecting how innovation has become imperative for organizational development.

Open innovation, first proposed by Harvard Professor H. W. Chesbrough in 2003, represents a new form of innovation. Its main premise is that an organization can simultaneously utilize both internal and external knowledge to develop new products and services [5]. As vast amounts of data, information, and applications are distributed across cloud networks, unprecedented opportunities for innovation have been created. Moreover, enterprises can no longer innovate through “behind closed doors” approaches; even the most advanced R&D departments cannot possibly possess all global knowledge because knowledge

is infinite. Many renowned companies now embrace open innovation. For example, a well-known American household consumer brand marks its products with “Not Invented Here”—indicating that it extensively adopts crowd-sourcing models to gather diverse opinions and ideas from public channels.

The common ground between open innovation and networked learning lies in “openness, interaction, and learning.” Connecting the two creates tremendous synergy. The cMOOC described earlier represents this combination, as shown in Figure 2 [Figure 2: see original paper].

6.1 Case Study: Personal Learning Environment and Network (PLE&N)

The author’s institution, Hong Kong Polytechnic University, was among the first to offer a master’s program in knowledge management, with many courses delivered online 15 years ago before transitioning to a hybrid model combining online and face-to-face instruction. The most frequently used tool in this environment is PLE&N (Personal Learning Environment & Network).

Traditional large-scale lectures have many limitations: the instructor-dominated behavioral learning model is relatively passive; classroom time is limited; learning is restricted to a single semester; students hesitate to ask questions; there is excessive focus on theoretical explanation at the expense of practical case studies; and student interaction is very low, often failing to achieve learning and knowledge innovation objectives. In fact, Japanese scholars long ago proposed the concept of collaborative learning, grouping students from elementary school onward to sit together, ask questions after listening to the teacher, and have knowledgeable students explain to those who don’t understand, thereby deepening their own comprehension. Group interaction represents a very basic, elementary form of networked learning—simple yet highly effective.

Figure 3 [Figure 3: see original paper] illustrates a PLE&N example containing multiple elements. After class, students can discuss with teachers, classmates, and even experts, friends, and entrepreneurs outside the classroom, making their interactions very strong. PLE&N provides many different interactive tools, including numerous open-source software applications and specialized platforms.

6.2 Case Study: MOOC Learning Environment and Network (MLEN)

This case comes from another project by the author, focusing on how to learn and innovate within MOOC environments and networks. In fact, learning and innovation processes are inseparable; traditional learning models require students to follow prescribed steps before being permitted to innovate. While we do not advocate for forced acceleration, learning and innovation can be synchronized. Figure 4 [Figure 4: see original paper] shows the author’s research proposal for MLEN (MOOC Learning Environment and Network). When this proposal was first developed, network conditions in many places were not as advanced as

today, where video conferencing is free; at that time, remote video communication was relatively expensive. In this proposal, if a course is offered on a MOOC platform, it can provide diverse materials and multiple tools online while integrating social software. The platform can also offer an Expertise Locator to support learners, enable collaborative learning on network platforms, and facilitate crowd-sourcing where questions are posted with rewards for good answers, or where enterprises can publish research topics. Once topics are identified, groups can form around problems for discussion. In fact, some overseas platforms specialize in supporting doctoral students—experienced researchers know that the most difficult part of a doctoral dissertation is formulating the research question; once the question is set, half the battle is won. Yet often we discover midway that the question was wrong or the method inappropriate, forcing us to start over. Therefore, obtaining a good question through such platforms is crucial. There are also platforms like Wiki University abroad, where different people are assembled to discuss research questions or even doctoral dissertation topics, evaluating whether the question is appropriate or what methods should be used, thereby facilitating continuous discussion and learning.

7. The Future of Networked Learning: From Wikipedia Model to Wiki University Model

What distinguishes Wikipedia from the aforementioned Wiki University? Wikipedia represents an important treasure trove of human knowledge. Although users can participate in writing and dynamically modify content after publication, it remains relatively fixed—once written, content becomes “gospel,” essentially a digitized encyclopedia where knowledge becomes relatively “solidified” once encoded, no longer fresh and alive. Wiki University, by contrast, is a platform and knowledge community for creating knowledge, integrating diverse materials, supporting group discussions, and hosting various activities. It is far more dynamic, capable of linking different knowledge pieces. Traditional libraries may also evolve in this direction. The future of networked learning requires exploring how to manage dynamic knowledge and how to fully connect it with knowledge innovation.

References

- [1] Chen Baicun. Knowledge Management: Correct Concepts and Enterprise Practice [M]. Nanjing: Nanjing University Press, 2007.
- [2] Liang Linhai, Sun Junhua. Knowledge Management [M]. Beijing: Peking University Press.
- [3] Nonaka I. The knowledge-creating company: how Japanese companies create the dynamics of innovation[M]. New York: Oxford University Press, 1995.
- [4] Siemens G. Connectivism: a learning theory for the digital age[J/OL]. International journal of instructional technology and distance learning, 2005, 2(1): 3-

10. https://jotamac.typepad.com/jotamacs_{weblog}/files/Connectivism.pdf.

[5] Chesbrough H W. Open innovation: the new imperative for creating and profiting from technology[M]. Boston: Harvard Business School Press, 2003.

Author Contribution Statement: Li Rongbin: Responsible for paper design and specific content, revised the paper; Wang Zheng: Responsible for paper writing and revision.

Note: Figure translations are in progress. See original paper for figures.

Source: ChinaXiv — Machine translation. Verify with original.