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Application of Virtual Communities in Knowledge Management Systems

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Abstract

With the rapid growth of information technologies, our economic society and life are changing significantly in this digital age. The digital revolution in our world is spurring on facilities, hardware, software, services, and capital investment. In order to keep competitive advantage in the times of digital economy, more and more countries and enterprises pay more and more attention to the development and application of information technologies to help collect and diffuse the knowledge. The virtual community is one of the most powerful tools. A virtual community can build an interactive learning environment for people. This helps the development of knowledge management and e-learning. In this study, the concept for developing and constructing a virtual learning community will be investigated.

Keywords: virtual community, distance learning, knowledge management, e-learning

Introduction

As we enter the 21st century, we experience one of the most important changes in our lives - the move to a digital age. Due to the recent rapid advances in information and communication technologies, our society changes rapidly. With the rapid growth of information technologies, a new era, the digital age, has arrived. They make more and more innovative products and electronic/digital services possible. The digital revolution is happening much more quickly. Our economic society and life are changing significantly in this digital age. The digital revolution in our world is spurring on facilities, hardware, software, services, and capital investment. Vice President of USA, Albert Gore Jr. has said : "*We are on the verge of a revolution that is just as profound as the change in the economy that came with the industrial revolution. Soon electronic networks will allow people to transcend the barriers of time and distance and take advantage of global markets and business opportunities not even imaginable today, opening up a new world of economic possibility and progress.*"(Turban et al. 2000) In order to keep competitive advantage in the digital age, many countries and enterprises pay much attention to the development and the application of information technologies.

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According to the characteristics of the development of the digital revolution, the Internet, innovation and internationalization are three major trends in the digital age. In the digital age, the Internet conducts a new business model - electronic business. The electronic business implies that business transactions are held by computer-mediated network. Internet provides a two-way communication channel to let enterprises fulfill the whole or part of traditional business activities. So far, many industries all over the world lavish much attention on the electronic business. Innovation is the only way for an enterprise to survive in the digital age. For high-technology industries, especially, much attention is paid on the development of innovative products or services. The success of an innovation depends not only on its technical qualities, but also on the process by which its basic ideas are communicated. Internationalization can help industries to gain more profit. With the advanced information and communication technologies, many companies can enter the global market in lower costs. Now people look every thing from global perspective rather than narrow regional or national boundaries. The faster and highly reliable means of communication and transportation have shrunk the world. The modern information society aided with the Internet has completely changed the international business concept. With this new concept of globalization, and open market economy, the industries all over the world started establishing their plants in this newly found international market. For the success of this new economic concept and in order to obtain maximum benefits from it, trained manpower is absolutely necessary.

In the digital age, how to use the Internet to help collect the global information and then diffuse the innovative knowledge effectively and efficiently is an important task for all enterprises and countries. We think that the virtual community is a powerful tool for this purpose. A virtual community can provide an interactive environment for learning. Therefore, this study will investigate the constructing concept for a virtual learning community.

Virtual Community

For decades, scientists have used the Internet to share data, collaborate on research, and exchange information. When the Internet was opened to business since 1991, millions of computer users all over the world have started to use the Internet and online services. The Internet is a growing platform on which many killer applications stand. The essential hardware and software on constructing the Internet infrastructure and supporting the Internet applications include fiber technology, compression tools, database management technology, powerful processor, ease-of-use operating system, software in navigating and communication, and so on. With continuous improvements of related technologies, organizations can build virtual communities easily with adequate tools while netizens get cheaper personal computers and peripherals connecting to the Internet and surf on the WWW (World Wide Web) more easily and interestingly.

One of the oldest virtual communities is the Well (http://www.well.com) which is launched by a group of high-tech enthusiasts located near San Francisco in 1985. Thousands of users have communicated with each other through the Well and developed strong personal relationships. What is the "virtual community"? The virtual community is also called "cybercommunity" or "electronic community". The virtual community can be defined as incontrovertible social cyberspace in which people still meet face-to-face, but under new definitions of both "meet" and "face". Virtual communities are formed by computer-mediated communication. They are passage points for collections of common beliefs and practices that unite people who are physical separated (Pliskin & Romm 1997). People are social animals, thus we all need sense of belonging and esteem no matter in the physical world or virtual cyberspace. The true promise of cyberspace is infinite

opportunities for human interests and activities to be shared. The cyberspace is predicated on knowledge and information, and on the common beliefs and practices of a society abstracted from physical space. The important element of members' relationship in a virtual community is the sharing and exchange of information.

As sociologists and philosophers have pointed all the time, human beings are social animals with needs that cannot be isolated from one another. An individual joins particular community because he or she expects to find them self-affirming and satisfying. Accordingly, this leads another sustainability of virtual community - active engagement. When community members actively engage with others and contribute to the common affairs, such as establish directions, goals, content, and context, a sense of community is established. Another appealing advantage of the virtual community is that it allows us to belong to thousands of communities at once, greatly multiplying our connections and enriching our lives. Virtual communities will supplement rather than supplant existing real communities. We do not need to forgo to other places or real-life communities and can enjoy more amusement online. In a virtual community, sharing common interests, goals, or needs filters unwanted information for members as well as provides more solid information with the engagement for the community.

Essences of the Virtual Community

The community is a prerequisite for the trust and interdependence that sustains personal relationships. No matter "real" or "virtual", communities can be defined with the following five elements (Benjamin, 1994):

(1) shared space
(2) shared values
(3) shared language
(4) shared experiences
(5) shared purpose

However, these five elements are prerequisites of a community, but do not guarantee the formation of a community. Two more critical elements, interaction and interdependence, should also be emphasized. Hagel III and Armstrong(1997) illustrated the explication about elements of a virtual community as followings:

(1) distinct focus
(2) capacity to integrate content and communication
(3) appreciation of member-generated content
(4) access to competing publishers and vendors
(5) commercial orientation

Types of the Virtual Community

The virtual community can be classified into the following four basic types (Armstrong and Hagel III, 1996) :

(1) communities of transaction:

This kind of virtual communities mainly facilitates the buying and selling of products or services. Members with specific needs for some product or service are encouraged to interact with others for further advice or exchanging experiences. Members may also be provoked interest for some kind product or service which has been discussed fervently in that community.

(2) communities of interest:

This kind of virtual communities brings together members interacting extensively with one another on specific topics. Interpersonal communication plays an important role in these communities.

(3) communities of fantasy:
This kind of virtual communities encourage members create new environments, personalities, or stories. The Internet has no limitation but one's imagination. Members can exercise their imagination and creativity as possible as they can.
(4) communities of relationship:
This kind of virtual communities encourage members to share their own feelings or real unendurable life experiences such as love, marriage, parents, or education.

Virtual Learning Community

The virtual community provides an interactive environment for people to share and exchange information and knowledge anywhere almost at any moment. Up to date, more and more virtual communities have been built. However, most of these virtual communities only focus on the development of B2C (Business to Customers), C2B (Customers to Business), or C2C (Customers to Customers) electronic commerce models. Actually, virtual communities can also provide an excellent learning environment to support the knowledge management.

In this age of knowledge-based economy, many enterprises start to emphasize the management of knowledge. Knowledge management is a conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into action in ways that will improve organizational performance. It is a complex process that must be supported by a strong foundation of enablers. The enablers for knowledge management are strategy and leadership, culture, measurement, and technology. Each of these must be designed and managed in alignment with other in support of the process. The process usually involves the stages of creating, identifying, collecting, organizing, sharing, adapting, and using (APQC 2000). The rapid growth of information and communication technologies promotes the development of knowledge management. The goal for knowledge management technology is to create a connected environment for knowledge exchange. Knowledge management technology must support the exchange and transformation of tacit and explicit knowledge. The processes of knowledge transformation and exchange involve knowledge sharing, knowledge capture, classification, and understanding (OVUM 2000).

According to the characteristics of virtual communities, we think that the virtual learning community is one of the most powerful tools to meet requirements of knowledge management. A virtual learning community can provide an open learning environment for people to share their knowledge and to learn the knowledge they want. The organization can also capture, classify and understand those knowledge posted in the virtual learning community. According to the OVUM model of the knowledge management architecture, a complete virtual learning community should provide the following four key functions (OVUM 2000):

(1) collaboration services which provide an environment for knowledge sharing
(2) discovery services which help users retrieve and analyze (understand) the information in the corporate memory
(3) the knowledge repository which provides the information-management functions for captured knowledge
(4) the knowledge map which provides a corporate schema for knowledge classification

To sum up, learning can be said to be the kernel of the knowledge management. The purpose of constructing a virtual learning community is to build an interactive environment for e-learning. Education, no matter in schools or in companies, will be the dominant factor

for individuals, organizations, or countries to survive in the digital age. Due to the Internet, e-learning will be a novel learning model in the education system. E-learning constructs a teaching platform which is put on the Internet. The major advantage of e-learning is that it makes the individual become the master of the learning system. In an e-learning system, everybody can decide what to learn, when to learn, and where to learn by oneself. Through the interactive learning structure, one can raise questions or solve problems anywhere at any moment. E-learning also provides multimedia contents to make learning more attractive. All of these requirements can be done in the virtual learning community.

Although virtual learning community can promote the development of e-learning, most of the communities are held in schools. Several schools all over the world begin to develop their virtual learning community. Distance learning is the major direction of development for most virtual learning community in schools. Thus, the following will illustrate the distance learning.

Distance Learning

The use of modern information and communication technologies and global information networks will greatly influence the way of work and life of people in the future information society. Teachers and schools play an important role in the all-side preparation of the younger generation for an information society and for the integration of new information technology into teaching plans of school. From the very developed nations to those emerging from the primary levels of agriculture and manufacturing, the use of information and communication technologies of all kinds is increasing as fast as the schools can install and implement campus wide information systems, workstations, and personal computers. More and more schools place much emphasis on the application of information technology to education. When the concept of the Internet is introduced into the learning system, we should consider the followings:

(1) How to form an learning system in which students and teachers can learn to consider information technology to be a useful tool for formation and reviewing their knowledge,
(2) How to build the framework for spreading experiences among students, teachers and people,
(3) How to manage the ability to get, sort and choose information to be the basic skills,
(4) How to face the tendency to change searching for information for knowledge from understanding the subject.

Although there are great differences worldwide as to how the Internet is being conceptualized and applied within the schools, several elements are generally accepted. These include multi-media, computing, communications, software standards, electronic publication, and common database. Learning is generally moving toward an information rich, student centered future in which learning can be conveniently extended beyond the school. According to our research results, many learning theories ask for personalized access to information, interactive simulation systems, providing material for learning at own speed, learning alone or in groups, and more personalized guidance through tutors. The Internet is a powerful tool to support the learning system to satisfy these requirements.

Because of providing a fast, efficient and easy way to access the information, the WWW provides a variety of information in the forms of database, pictures, movies, multimedia or interactive displays. More and more academic and research institutions or universities in the world construct their own web sites to demonstrate their educational goals, academic activities, excellent training programs, and their innovative and important research results. Through these web sites and the associated links with other web sites, people can easily obtain new information and knowledge they need, and learn how to solve their problems and

do their innovative works.

In the cyber world, people are able to communicate and exchange information anywhere almost at any moment. Huge amount of data can be transferred across computer systems only in a minute, and the data can be any kind of hypertext documents or the multimedia. The WWW is an internet-based hypermedia initiative for global information sharing and allows people to work together. In addition, the hypertext from many resources worldwide may use hyperlink to make an information network through the WWW. By one's finger tip, one is able to retrieve the information or to be educated. Accordingly, the WWW virtual library and the WWW virtual university through the Internet will come true.

Due to the great power of the Internet on the diffusion and exchange of information and knowledge, and personal computers are so popular for every person to possess, people nowadays are easy to surf on the Internet and get the information anywhere and at any moment. Therefore, the WWW is a very useful tool for e-learning purposes that it should be introduced to the students and teach them how to utilize it. According to our research results, most learning web sites consist at least one of the following four elements:

(1) educational programs,
(2) illustrative pictures and movie archives,
(3) teaching materials: texts, notes, and data of course study,
(4) interactive study materials.

Open and distance learning is the most popular application of the WWW to the educational system. Currently, distance learning is described as learning environment, student centered, offering course material or modules using modern information technology (Renwick 1995). Many schools begin to establish their distance learning environment. According to our investigation, the students appreciate the idea of the WWW material in general. But they would not learn directly from the WWW but rather print out at least parts of it and use it as a reference. What they really wanted were interactive tutorial and online testing. If the hypertext version is compared to the paper material, the main disadvantage of hypertext material is that reading a computerized version is not as comfortable as reading a paper version. As long as there is no device as easy to handle as paper and capable of displaying on-line information, many people will prefer course material on paper.

However, as already known, hypertext material can be established in a much more structured way, leading to a better overview. The reader can always choose to go deeper into a subject or to move on. This can build a student-centered learning environment and the students can learn at his own speed. Additionally, he can configure the pages according to his personal preferences of fonts or even colors. A further advantage is the possible integration of multi-media into hypertext. In many cases, a good animation gives a better explanation than single pictures and words. Other features like a full-text search are impossible in paper versions, making hypertext useful as reference guide. These results lead to new approaches. If hypertext material should be successful, it is not enough just to translate a paper version to the web page, but it is necessary to take advantage of the hypertext features as described above. Moreover, the other main attraction of the WWW is interactivity, leading us to the design of an interactive laboratory following the rules of open and distance learning concepts. Although the WWW can improve the learning system, the most important disadvantage of using WWW-based training software was the large investment of time at the beginning, which is typical for the setup of learning software. It might be only reasonable for large numbers of students or for more than one lecture whose content does not change too much over time. In developing the open and distance learning environment, the students have to be better trained how to use the online environment from beginning. It is better to offer parts of the lecture either face-to-face or online, but not both. The students found it confusing to have parts provided in both ways. The online support

resulted in better ratings at the final examination of the whole lecture. It is necessary to provide more off-line material and perhaps even off-line tests for those who cannot afford the online costs.

According to a recent survey of Web-based learning environment on http://www.ctt.bc.ca/landonline/previous/choices.html, a complete tool to establish a distance learning environment should include the following features:

1. Learner Tools:
(1) web browsing (including accessibility, bookmarks, multimedia, and security)
(2) asynchronous sharing (including e-mail, BBS file exchange, and newsgroups)
(3) synchronous sharing (including chat, whiteboard, application sharing, virtual space, group browsing, teleconferencing, and videoconferencing)
(4) students tools (including self-assessing, progress tracking, motivation building, and study skill building)
2. Instructor Tools:
(1) course tools (including course planning, course managing, rapid course revising, and course monitoring)
(2) lesson tools (including instructional designing, presenting information, and testing)
(3) data tools (including marking on-line, managing records, and analyzing and tracking)
(4) resource tools (including building knowledge, team building, and building motivation)
3. Technical Administration Tools:
(1) installation tools (including server, and client)
(2) system tools (including authorization tools, security tools, resource monitoring, remote access tools, and crash recovery tools)
(3) help desk tools (including student support tools, and instructor support tools)
4. Application Home URLs
5. Rater Evaluation Surveys:
(1) surveys processed

Conclusions

The end of the last millennium has been marked by the transition from industrial to information society. Methods and means of computer, automated control, use of information technology, and elements of artificial intelligence had already been employed in industrial society. In this millennium, during the transition to information and education society, new learning perspectives should open to these methods and means. The information society imposes a paradigm shift in learning and training. People in the digital age need to be trained and retrained to keep up with the pace of technological and social change. Traditional learning systems, based mainly on lectures and textbooks supplemented by workshops in disciplines that are only loosely coupled and which is completed when students leave school, cannot prepare them for solution of complex problems in interdisciplinary teams. Thus the construction of virtual learning community to promote the development of e-learning will be an important task for most organizations in the digital age.

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