Investigating Knowledge Environment for E-Learning

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Abstract: *This paper investigates the development of societal knowledge, knowledge-based network, knowledge building and knowledge engineering in e- learning. This study discusses the knowledge based networks and the relational society, the relationship between knowledge engineering, knowledge services and knowledge building. In Higher Education, There are challenges to develop knowledge needed to leverage their skills effectively. Researchers begin to focus on the relationship between knowledge management and social media to improve e-learning in higher education. The outcome of this study has attempted to bring understanding of knowledge environment for e-learning. It has been shown that knowledge engineering is moving towards ubiquitous knowledge acquisition and representation. The services for knowledge are hardly confined to simple knowledge management in order to form smart and personalized knowledge. Finally, the outcome has provided a picture of changes that implies a development of e-learning outcomes.*

Keywords: *e-learning, Knowledge Building, Knowledge environment, knowledge management, e-learning outcomes.*

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1. Introduction

With the rapid development of internet and communication technology, e-learning is becoming popular. E-learning is a delivery of learning materials to anyone, at anyplace, and anytime. Learning is a process that results in changes of skill. Knowledge is information, experience and skills. Knowledge building process is creating new knowledge then makes it available to be used by other people [10, 5]. Collective knowledge is created through learners' discussion. Networks become important in the social construction of communities that learn where societies are depending on it. Knowledge engineering process helps in extracting human knowledge and representing with computer processed form. "Learn, think and become" is a slogan for universities in satisfied democratic countries. The makes knowledge gap between developed and developing countries increases [4].

A main challenge is to create a learning environment that achieves higher cognitive and motivational demands to the learners [6]. Education plays a major role in development of each of learner culture and social capitals. Governments focus on establishing productive e-learning solutions and e-learning participation in higher education [4]. Learning management system becomes very agreeable in the field of e-learning [9]. Improving innovation and creativity and enhancing the quality of learning process outcomes are a major area of interest [4]. This study discusses important knowledge topics to bring understanding of knowledge environment in e-learning and to raise capabilities of using learning materials.

2. Knowledge-Based Networks and the Relational Society

The term network allocates a social relationship between persons which can be collective in institutions, communities or societies.

- Knowledge Networks: Social Knowledge Networks are networks which are created by relationships between people. The concern is not only on social information like who knows what but also on who knows. Members in this network discover each other through their own knowledge like comments, questions and answers [4]. One of the most important examples is New York Times knowledge network which allow is all about learners and teachers come together and understand more issues discover how these topics impact their lives. As it covers various academic subjects and customize workshops to inspire and stimulate the learner recognition [17]. Another example is the knowledge network into action for health and social care NHS education for Scotland which provides wealth information and resources for Scottish health managers and professionals [12].
- Networks of Practice or Communities of Practices (CoPs): are groups of expert people, who share their professional knowledge, ideas and practices in a common domain or topic. Companies and public organizations tend to the implementation of CoPs for benefiting knowledge and improving the experience and knowledge of their utilization [7]. CoPs are responsible for knowledge spread and staffing over a wide network to create new

knowledge. This kind of e-learning approach provides a combination of new types of knowledge to create members permanence. This network is used in many organizations that allow employees to exchange and share tips, skills across the network. National Association of Agricultural Educators Communities of Practice is another application of CoPs where anyone who is interested in agricultural education can share ideas and resources [16]. Also Xerox is from the early organizations which uses CoPs and create the Eureka project. Other famous organizations are Apple, Intel and IBM.

- E-Knowledge Cities/Zones: large scales knowledge systems for building knowledge repositories so they can withdraw elements of creativity to grow up in challenging times. Knowledge cities are taking a leading role by their history, experience and level of development. All these specify the way their members use knowledge to build their infrastructure, their institutions and their future. Knowledge cities are building knowledge repositories of information so they can catch creative ideas to utilize and prosper in challenging times. In a knowledge-based urban community, people communicate to form knowledge-based networks to achieve goals, cultivate innovation and respond to rapidly changing conditions [4]. Arab cities are having their own building technological isolated projects to promote the same concept of knowledge cities like Egypt smart village, Dubai's internet city. While Oracle knowledge zone can guide learners in detailed information on how to develop, sell, and implement Oracle solutions [19].

3. Knowledge Building in On-Line Environments

Knowledge building refers to a process of creating, modifying and improving thoughts for the community. Knowledge engineering is simulating human intelligence and developing human knowledge using computer. What differentiate knowledge building from traditional learning is that traditional learning focuses on how an individual earn knowledge while knowledge building pays concern on learner learning and collective knowledge.

As sharing knowledge leads to innovation and growth, A Knowledge Forum is emerging which is a tool for knowledge building where any number of individuals and groups can share information, participate discussion and build networks of new ideas in electronic group [15]. Knowledge building international project is a knowledge building project between schools in several regions of the world including Québec, the United States, Hong Kong and Catalonia. It was performed in which it takes responsibility for learners' research and learning (including generating questions, discussing ideas, evaluating information and monitoring their progress), while the teacher acts as a guide and facilitator for the learning process [14].

3.1. Knowledge Engineering and Knowledge Building in E-Learning

Knowledge engineering is aimed to dig and extract human knowledge and to represent this knowledge with certain form which can be subject to computer processing so that computers can possess certain intelligence as shown in Figure 1. The knowledge engineering is a discipline that includes human intelligence and human knowledge. It uses computers to simulate human intelligence to develop human knowledge [4]. In the knowledge building approach to education, the focus shifts to the creation and development of collective knowledge and to interactive learning from individual learning [3].

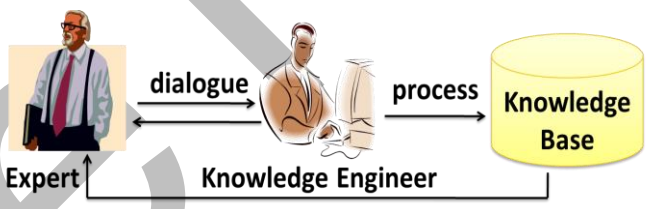

Figure 1. Knowledge Engineering.

3.2. The Relationship between Knowledge Engineering and Knowledge Building

Knowledge engineering as key means of knowledge building in e-learning is influenced by artificial intelligence, database technology, mathematical logic, cognitive science, psychology moving towards intelligent. The relationship between knowledge engineering and knowledge building is illustrated in three factors of knowledge engineering: knowledge acquisition, knowledge representation and knowledge application and management:

3.2.1. Knowledge acquisition

Everyone in the knowledge network can act as an expert to accept knowledge, use knowledge, distribute knowledge and create knowledge, which completely demonstrates universality of knowledge acquisition. In the knowledge engineering domain, Knowledge acquisition includes distributed searching and data mining. Knowledge engineers are responsible for extracting knowledge and representing the knowledge in proper patterns while knowledge acquisition institutions in the expert system are responsible for transferring knowledge into internal forms which can be stored in computers and putting them into knowledge base [4].

3.2.2. Knowledge representation

In today's world, there is a virtual explosion in the amount of data available. Knowledge representation is critical in order to choose through this data and make sense of it [2]. Knowledge representation is to depict knowledge into certain data structures. It breaks down into two types which are declarative knowledge and procedural knowledge. Declarative knowledge representation refers to processing separately knowledge representation and knowledge application. Procedural knowledge representation is to combine knowledge representation and knowledge application [4]. One of the key roles of knowledge representation is bringing making knowledge explicit.

3.2.3. Knowledge Application and Management

The application and management in the knowledge engineering is used in distinct specified knowledge applications including reasoning, searching, knowledge management and maintenance, matching and identifying [4]. The knowledge management is a concept that can be used for creating knowledge repositories, improving knowledge access and sharing knowledge of individuals or groups [9, 18]. Knowledge management is responsible for creation, generation, representation, storage, transfer, transformation, application and protecting of organizational knowledge [8]. Knowledge engineering aimed at realizing the order and organization of knowledge. It pays more attention to practical engineering operations of knowledge, through convenient exchange of information and skills between systems and external world [4].

3.3. Knowledge Services and Knowledge Building in E-Learning

Knowledge service is an iterative process of knowledge acquisition, knowledge absorption, knowledge innovation and knowledge application, adjusting and optimizing knowledge service products and solution plans in the research process. It concern the combination of knowledge service experts, research groups, information resources and computer technologies along with the combination of various theories of information, knowledge and human experience.

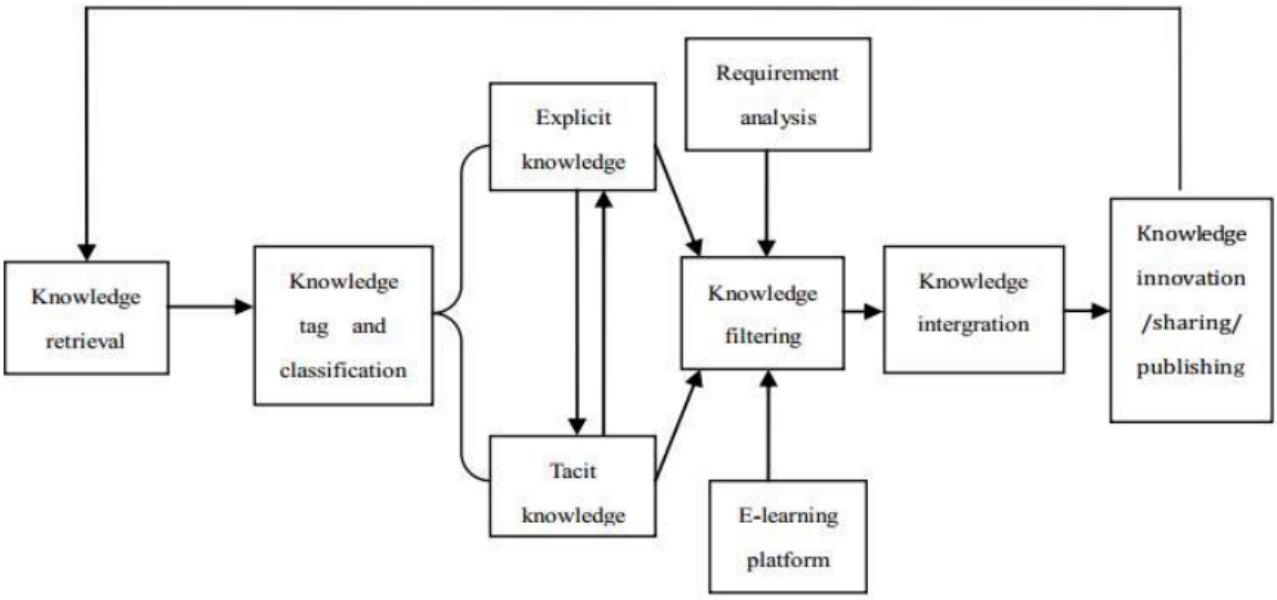

Figure2. Knowledge Services Model Based on the On-Line Knowledge Building [4].

The knowledge services model (Figure 2) for on-line knowledge building is developed as shown:

- Knowledge Retrieval: Information technology, artificial intelligence, cognitive science and linguistics and others various disciplines draws knowledge. Where, It serves as an advanced information retrieval means to fully represent and satisfy users' requirements extracting knowledge from media types (text, image, video, sound etc) and selecting accurately the result users required.
- Knowledge tag and classification: After searching, knowledge can be classified and tagged. Classification means to divide knowledge into explicit knowledge and tacit knowledge. Tagging is to pick up a series of key information which can be used by user searching the documents.
- The Platform for Knowledge Exchange: tacit knowledge transferring into explicit knowledge. After explicit knowledge and tacit knowledge being identified, a platform for knowledge exchange is provided to promote transferring from tacit knowledge into explicit knowledge.

- Knowledge Filtering: knowledge acquired should be filtered. The compatibility of knowledge should be taken into consideration. Then the target knowledge should be analysed. Then the quality of knowledge source should be assessed. Last, integration of knowledge application and user requirements should be analysed to satisfy user requirements and create value.
- Knowledge Integration: refers to a series of orderly and systematic activities including organizing, processing, revealing, controlling on knowledge objects employing certain organizing tools, methods and standards.
- Knowledge Innovation, Sharing, and Publishing: the knowledge is shared by members of organizations in the form of explicit knowledge. Each member can contribute to collective knowledge creating new knowledge in the formed knowledge building communities. In addition, knowledge sharing in the organization brings out knowledge innovation and growth [4].

4. E-Learning and Desired Learning Outcomes

Learning outcomes are associated with the learner being able to do a required task by the end of a defined period of time. As governments focus on more private participation in higher education and e-learning in particular, the quality of learning remains a major area of interest. These interests include creating constant learning and learner movability, improving the quality and efficiency of facilities and outcomes, and enhancing innovation and creativity at all levels of education and training. Knowledge becomes the key to economic, cultural growth and development. The knowledge gap between developed and developing countries is expanding causing less developed countries to become further marginalized socially, politically and economically [4]. Higher education, comprehending education, research and innovation 'knowledge triangle' is a key element in the knowledge-based economy and society [11].

4.1. Information Communication Technology (ICT) and Knowledge Capital

Education plays a major role in the creation and development of each of human, cultural, and social assets. The key question is how e-learning through ICT will be able to raise these assets to higher levels than traditional learning [4]. ICT is a source of information as it provides an opportunity to establish e-learning. ICT generate discussion across all impediments to look for opportunities for a common understanding and a better future [6].

Table1. Human, cultural, social capital mission of universities [4]

FORMS	DESCRIPTION	METRIC
HUMAN	Knowledge, skills and competences and other attributes embodied in individuals that are relevant to economic activity.	Traditional: Duration of schooling; level of educational and professional qualification. ICT Metric: would include constant engagement in ICT learning and knowledge environment
CULTURAL	Is a more academic notion, referring to the credentials and cultural assets embodied in individuals and their families. Used to explain the reproduction of social hierarchy – elite families and elite societies.	Traditional: Governance standards. Role of the governments in empowering societies and nation-building. ICT Metric: Use of ICT communication
SOCIAL	Capital that allows agents and institutions to be more effective in achieving common objectives. Usually deployed to explain a wide range of social phenomena, including general economic performance, levels of crime and disorder, immigrant employment and health trends. Generally understood as a property of groups rather than the property of individuals.	Traditional: Participation and engagement in civic roles, membership to voluntary associations, places of worship and political parties. ICT Metric: Developing social networks and moral lives.

4.2. Changes in the Academia

Changes will imply a development of key learning outcomes consistent with taxonomy of objectives in the cognitive domain: knowledge, comprehension, application, analysis, synthesis and evaluation as shown in Figure 3 [13]. Bloom's Taxonomy was presented in 1956 which considered as cognitive domain that deals with elements like remembering, memorize, comprehension, thinking, and evaluation [1].

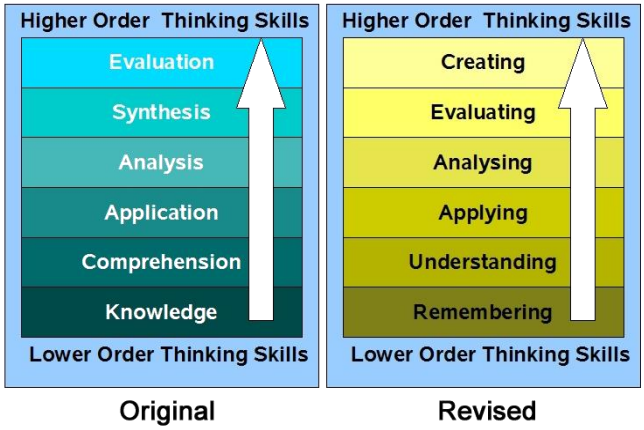

Figure3. Bloom's Digital Taxonomy[13].

- Knowledge means recalling terms and details without understanding the concept.
- Comprehension means that students summarize and describe main ideas in own words.
- Application means transferring learning to own life.
- Analysis means relating and breaking material into parts, describing patterns and relationships among parts.
- Synthesis means combining parts to form a unique solution to a problem.
- Evaluation means judging and expressing own opinion based on expressed criteria, ideas and methods [4].

4.3. Web 2.0 technologies and Bloom's Revised Taxonomy

The Revised Bloom's identifies these six levels: remembering, understanding, applying, analysing, evaluating, and creating. Figure 4, 5 and 6 shows Bloom's revised taxonomy in Web 2.0, iPad Applications and Windows applications respectively. A study was made among 257 MBA students at Varna Free University. While 70% of respondents believe that their investment in Web 2.0 technologies is valuable. It is used to find new information, connect with colleagues, and keep track of interesting people or topics [20]. See Table 2.

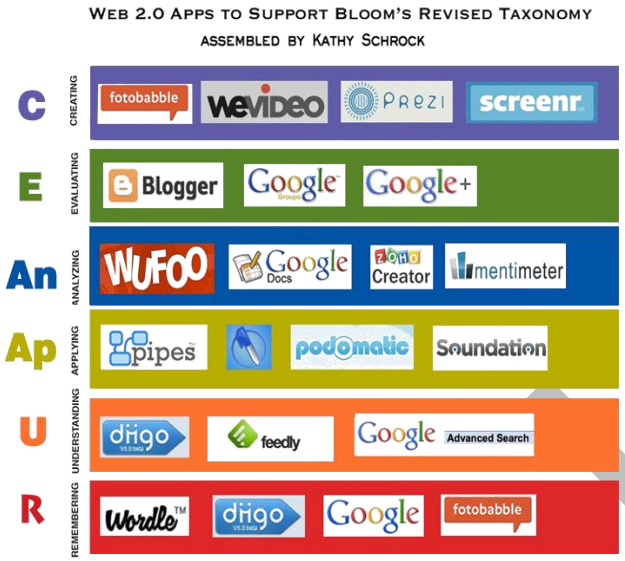

Figure4. Web 2.0 technologies and Bloom's Revised Taxonomy [18].

Figure5. Ipad applications to support Bloom's Revised Taxonomy [18].

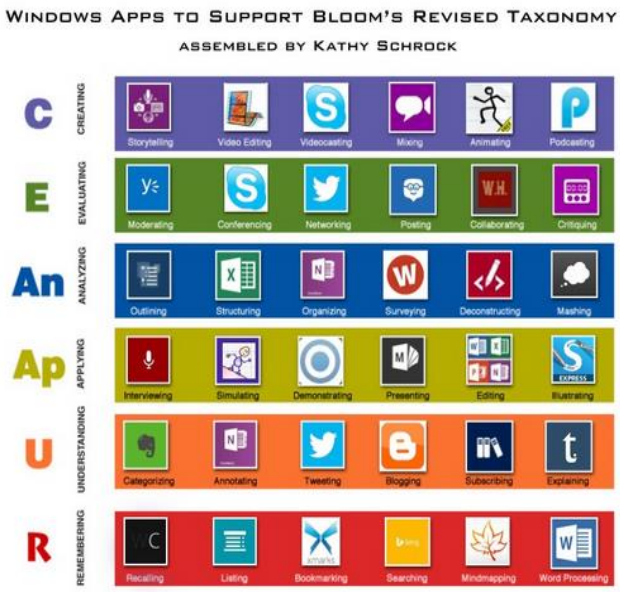

Figure6. Windows applications to support Bloom's Revised Taxonomy [18].

Table 2. Students' Survey of Use of Web 2.0 Technologies [20]

STUDENTS' SURVEY OF USE OF WEB 2.0 TECHNOLOGIES

	Social networks	wikis, blogs and forums	podcasts or video podcasts	shared video media (YouTube)
Use	85%	61%	42%	79%

5. Conclusion

This paper has aimed to include a review to the societal knowledge and knowledge-based network. An exploration of e-learning as a knowledge-generative process was carried out. The knowledge network gives rise diversity of knowledge along with interaction between individuals and the learning community. In support of knowledge building of learners, knowledge engineering is moving towards knowledge acquisition, clear representation, orderly data organization, content storage. The future research will deal for ultra-large-scale system that could fit a model of a knowledge building network in e-learning environment. Results expected from research on ultra-large-scale interactive systems could improve learners. The three broad areas for challenges of ULS will deal with design, control and assessment.

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References

[1] Anwar, N., & Sohail, M., *Assessing the Learning Level of Students through Bloom's Taxonomy in Higher Education in Punjab*, Journal of Educational and Social Research, 4(3), 83, 2014.

[2] Chandrasegarana, S., Ramania,K., Sriramc, R., , Horváthd, I., Bernarde, A., Harikf, R. & Gaoa, W., *The Evolution, Challenges and Future of Knowledge Representation in Product Design Systems*, Computer-Aided Design, Volume 45, Issue 2, , Pages 204–228, 2013.

[3] Gan, Y., & Zhu, Z., A Learning Framework for *Knowledge Building and Collective Wisdom Advancement in Virtual Learning Communities. Educational Teachnology & Society*, 10 (1), 206-226, 2007.

[4] Ghislandi, P., *E-learning – Theories, Design, Software and Applications*, InTech, http://www.intechopen.com, 2012.

[5] Kimmerle, J., Moskaliuk, J., & Cress, U., *Using Wikis for Learning and Knowledge Building: Results of an Experimental Study. Educational Technology & Society*, 14 (4), pp.138–148, 2011.

[6] Measuring the Impacts of Information and Communication Technology for Development, United Nations Conference on Trade and Development, UNCTAD Current Studies on Science, Technology and Innovation, No.3, 2011.

[7] Office of Educational Access and Success (OEAS), University System of Georgia (USG), Center for Advanced Communications Policy (CACP), Center for 21st Century Universities (C21U), *Development of Virtual Communities of Practice to Support Programmatic Efforts within University Systems*, Center for 21st Century Universities - Georgia Institute, March, 2012.

[8] Peng, J., Jiang, D., & Zhang, X. , *Design and Implement a Knowledge Management System to Support Web-based Learning in Higher Education*, Procedia Computer Science, 22, 95-103, 2013.

[9] Qwaider, W., *Integrated of Knowledge Management and E- Learning System, International Journal of Hybrid Information Technology* , Vol. 4 No. 4, October, 2011.

[10] Surjono, H., *The Design of Adaptive E-Learning System based on Student's Learning Styles*, (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 2 (5), pp. 2350-2353,2011.

[11] Tandi, L., *Education As The Key Factor Of Smart And Inclusive Growth – The Changing Education Policy Of Hungary Compared To Europe 2020 Strategy*, Knowledge Management and Information International Conference, Zadar, Croatia, pp.765-770, 2013.

[12] Tessa Parkes et al., *The Potential of Virtual Learning and Virtual Learning Environments for Advanced Doctoral Training in the UK, Report prepared for the Economic and Social Research Council* , June 2013.

[13] Discover Globe, Available from: http://discoverglobe.net/welcome/?p=356, (accessed January 2014).

[14] Knowledge Building International Project, Available from: http://kbip.co/, (accessed January 2014).

[15] Knowledge Forum, Available from: http://www.knowledgeforum.com/, accessed January 2014.

[16] NAAE Communities, Available from: http://communities.naae.org , (accessed January 2014).

[17] NewYork Times, Available from: http://www.nytimes.com/college/kn-index.html, (accessed January 2014).

[18] Schrok, K., http://www.schrockguide.net, (accessed January 2014).

[19] Oracle, Available from: http://www.oracle.com/partners/en/products/index.html, (accessed January 2014).

[20] World Academy of Science (2013), Available from: www.waset.org, (accessed January 2014).

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