Knowledge Management in Adaptive Learning Systems

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ABSTRACT

A number of recent studies have contributed to Knowledge Management (KM) and Learning integration. They are mainly based on organizational learning analysis. In this paper, KM is discussed from the viewpoint of adaptation in learning systems. The learning systems use and process great amount of different data, information, and knowledge, which is necessary to analyze before KM methods can be applied. The main components of Adaptive Learning System (ALS) are discussed with respect to the KM processes.

Goal of ALS is becoming self-directed learners. Learners will identify important resources for Life Long Learning in their field of study. For ALS, the Learners characteristics is more important, they can define a learning agenda and follow it for reaching teaching goals. Course Management Systems, as a part of ALS, provide better communication with learners, quick access to course materials, and support for administrating and grading examinations.

Keywords

Adaptive learning systems, Knowledge management, Self-directed learning.

1. INTRODUCTION

The high potential for synergies between Knowledge Management (KM) and e-Learning seems obvious given the many interrelations and dependencies of these two fields. However, the relationship has not yet been fully understood and harnessed. On the one hand, learning is considered to be a fundamental part of Knowledge Management because employees must internalize, or learn, shared knowledge before they can use it to perform specific tasks. So far, research within KM has addressed learning mostly as part of knowledge sharing processes and focuses on specific forms of informal learning (e.g., learning in a community of practice) or on providing access to learning resources or experts. On the other hand, learning might also benefit from KM technologies. Especially those technologies that focus on the support of technical and organizational components can play an important role in relation to the development of professional e-Learning systems.

For decades, technology has been the driving force behind globalization, accelerating change and the tremendous economic, social, geopolitical, and cultural shifts of the 21st century. It has profoundly changed life in Armenia and around the globe.

The stereotyped image of the student as one who is 18-23 years old in residential, full-time study is being challenged by a new reality. The Armenian economy is now information-driven, and a university degree has become an increasingly important credential in the marketplace, both for new entrants into the labor force and those already employed. Working adults who want to succeed in the present economic climate are pursuing a higher education in increasing numbers, and they are creating a new majority among undergraduates at college campuses across the country.

Adult students are loosely identified with a larger group characterized as "non-traditional." We can define five characteristics that typically define non-traditional students. That type of the students often:

- Attend part-time.
- Are financially independent of parents.
- Work full-time while enrolled.
- Have dependents other than a spouse.
- Lack a standard high school diploma.

Same universities have struggled to adapt to this changing student marketplace, often finding themselves burdened by traditions and practices that prove ill-suited for adults. Unlike the returning veterans of World War II, who went to institute under the GI Bill, today's adult learners are unwilling and unable to emulate traditional-aged students either inside or outside the classroom. Adult students have unique needs, especially if they are employed. Among others, these needs include:

- Different kinds of information about their educational options.
- Institutional flexibility in curricular and support services.
- Academic and motivational advising supportive of their life and career goals.
- Recognition of experience and work-based learning already obtained.

These needs reflect how the experience, knowledge, skills, and attitudes of adult learners are different from the traditional-aged student.

2. ASSESSMENT OF LEARNING OUTCOMES

The institution defines and assesses the knowledge, skills and competencies acquired by adult learners both from the curriculum and from life/work experience in order to assign credit and confer degrees with rigor. What should a college graduate know and be able to do? The issue of learning outcomes (and their successful demonstration) lies at the heart of widespread calls for accountability. The accumulation of passing grades next to course listings on transcripts is unacceptable if learners have not really learned, i.e., have not acquired the knowledge, skills, and attitudes to make them employable and functional in society.

Through standards articulated by the regional accrediting agencies, colleges and universities have followed ideals of college-level learning defined across several domains:

- Communication (reading, writing, speaking, listening)
- Computation (quantitative and scientific reasoning)
- Critical thinking (independent judgment, weighing values)
- Aesthetic and ethical awareness (appreciation of arts and culture)
- Lifelong learning ('learning to learn' or continuous education)

These domains prescribe a necessary but by no means sufficient view of the capabilities that an educated person must have today. To function successfully as parents, employees, and citizens, college-educated people are

increasingly called upon to demonstrate their abilities and achievements in the 'soft' skills as much as the 'hard' courses. These include, (among many others):

- Problem-solving
- Interpersonal diagnosis
- Teamwork
- Self-control
- Planning

Clarity about learning outcomes serves many purposes. Once defined, learning outcomes answer questions of accountability to standards of student educational achievement; they foster curricular cohesion and focus instructional efforts; they facilitate intra-and inter-institutional evaluation; they place the undergraduate program in relation to secondary and graduate education; they inspire educational planning. Last but not least, clarity about learning outcomes is a pre-requisite for quality assurance in programs of Prior Learning Assessment that are vitally important to adult learners.

The Adult Learning Focused Institution is clear about the outcomes it expects from adult students and backs up those expectations through its academic policies, procedures, and services.

Exemplary practice supporting this principle occurs when an institution:

- Designs educational experiences with learning outcomes in mind.
- Finds ways to integrate the perspectives of a range of stakeholders, such as businesses and the community, in defining learning outcomes.
- Embraces a variety of assessment techniques for measuring learning outcomes and assigning credit for prior learning.
- Documents what learners know and what they can do as a result of their educational experience.
- Uses learning outcomes to establish a foundation for those who wish to pursue subsequent degrees.
- Promotes the opportunity to gain credit through organizations' instructional programs for adult learners.
- Initiates a dialogue with community-based organizations to learn what knowledge, skills and abilities are needed by organizations and the community, and then develops learning outcomes based on these needs.
- Regularly re-evaluates external instructional programs to ensure their relevance and rigor in relation to the institution's offerings.
- Creates pathways for adult learners to gain credit for learning from a variety of sources, so that college-level learning acquired prior to enrollment can be accepted towards institutional credentials and degrees.
- Promotes opportunities to gain credit through Prior Learning Assessment.

3. TEACHING-LEARNING PROCESS

The institution's faculty uses multiple methods of instruction (including experiential and problem-based methods) for adult learners in order to connect curricular concepts to useful knowledge and skills. John Keats once observed, "Nothing ever becomes real till it is experienced – even a proverb is no proverb to you until your life has illustrated it." At the Adult Learning Focused Institution, faculty members eschew the pursuit of learning simply "for its own sake." Rather, learning at an ALFI is pursued as a means to a practical end; the "end" being translated differently by each individual student according to his or her education and career goals.

To the extent that learning empowers students to adapt to current and future environments, and to find solutions to challenges that life, career, and good citizenship will present, is the measure of the need that adults feel for connecting education with its application. For example, colleges and universities routinely seek to impart critical thinking and problem-solving skills through the curriculum. However, in addition to presenting a theoretical base, acquiring these skills demands both experiential and problem-based methods. The ALFI strikes a fine balance in the learning environment between theory and application, recognizing that an effective teaching-learning process delivers the curriculum through the voice of experience as readily as through the voice of the professor.

Exemplary practice supporting this principle occurs when an institution:

- Employs a teaching-learning process that includes a high degree of interaction among learners and between learners and faculty.
- Considers adult learners to be co-creators of knowledge. Therefore, learning experiences and projects are often designed in cooperation with learners and directly relate to the adult learner's work and personal world.
- Offers multiple methods of instructional delivery to enhance convenient access to education and to provide choices about preferred learning modes.
- Uses assessment as an integral part of the learning process and in ways that enhance competency and self-confidence.
- Encourages faculty to build upon the knowledge, interests and life-situations that adults bring to their education to develop learning experiences. When working in partnership with businesses and/or unions, faculty members strive to present material in a framework that incorporates the issues and language of the learners' workplace and communities.
- Supports faculty members' work with adult learners, staff, adjunct faculty, and local community resources in developing collaborative learning experiences.

4. IDENTIFIED BARRIERS FOR INTEGRATION

An interview-based study demonstrated that perceived connections between KM and e-Learning are not operationalized, i.e., integration ideas are rarely implemented in practice [5]. The reasons for the so far weak integration of KM and e-Learning on a conceptual and technical level are related to several barriers that are elaborated next.

Problems on a Conceptual Level propose a division of a typical workplace into a work space, a learning space, and a knowledge space. In order to enable effective learning, these spaces have to be linked. One of the arising problems is cognitive disconnection between the three spaces, because "each of the spaces has an inherent structure, which mirrors to some extent the mental model of the people who are using it" [8]. Benmahamed, Ermine & Tchounikine state in their work that one of the problems is to connect already available conceptual KM models to learning activities and existing learning standards such as IMS Learning Design [1].

Each of the spaces listed above (i.e., work, learning, and knowledge space) is implemented on different technical systems [8]. Examples of these spaces include specific desktop applications, e-Learning platforms, and KM System such as the Intranet. Each of these systems potentially has its own content structure, which makes the integration of the systems more difficult. KM addresses learning mostly as a part of knowledge sharing processes and focuses on specific forms of informal learning (e.g., learning in a community of

practice) or on providing access to information resources or experts. KM systems focus on knowledge acquisition, storage, retrieval, and deployment of knowledge. However, they do not explicitly address learning processes themselves, which is essential for effective learning and competence development [10]. In addition, Schmidt states that "KM does not fully realize that it is mainly about facilitating purpose-oriented learning in organizations" [9].

As described above, competency development takes mostly place during informal learning at the workplace. The learning process is characterized by self-organized activities such as selecting the environment for learning (e.g., Internet), defining learning goals (e.g., related to a work problem), finding and selecting content for learning (e.g., websites or colleagues), and following a preferred learning path. As motivated above, the competence development process largely relies on the learner's own initiative. Performing these activities requires certain skills and expertise in the domain. This is considered to be one of the main barriers for an integration of KM and e-Learning: While many KM systems provide little or no guidance to inexperienced individuals, many e-Learning courses provide too much guidance and prevent the learner from self-directed learning. They are not flexible in terms of their navigation, or content selection/hiding.

According to constructivist learning perspectives, knowledge cannot be transmitted to learners, but must be individually constructed and socially co-constructed by learners [7]. Learning systems should provide learners with a wide range of services to assist and facilitate knowledge construction, because learners may construct their own meaningful understanding of a learning theme from different paths rather than imposing them on a particular learning method. This means that the amount of guidance provided to the learner should be adapted to his/her needs and context.

Situated learning approaches developed mainly at the end of the 1980s emphasize that a human's tasks always depend on the situation they are performed in, i.e., they are influenced by the characteristics and relationships of the context [3]. Because of the relation between cognition and context, knowledge and the cognitive activities meant to create, adapt, and restructure the knowledge can't be seen as isolated psychological products – they all depend on the situation in which they take place.

Schmidt highlights the problem that both KM and e-Learning have a limited and isolated consideration of context. First, e-Learning solutions often do not consider that corporate learning takes place in an organizational context and that learning goals are based on real-world needs. In addition, the author states that also the authoring process takes place (and is encouraged to take place) in the same context as the learning itself, which relates obviously to the peer-to-peer knowledge sharing philosophy where the "knowledge re-users" (i.e., the learners) also become knowledge creators. Secondly, many KM approaches neglect the fact that the delivery of information chunks does not necessarily mean that the user acquires new knowledge. In particular, if the individual's context and characteristics are ignored (i.e., his/her knowledge structures, preferred needs, and learning styles) learning might not take place at all [9].

Ideally, integrating KM and e-Learning also means to use all available knowledge resources in an organization (e.g., documents, humans, experiences, process descriptions) as learning material. This entails some difficult problems, because e-Learning in contrast to KM puts much more emphasis on delivering personalized content and exploiting relations, links and cross references existing within the learning material. This, of course requires, structuring the material into relatively small fragments, which can then be combined into bigger objects in the preferred way. In addition to that, all fragments and combined objects have to be annotated with adequate metadata to provide information about relations to other objects, technical prerequisites, and presentation style and so on. Only a small part of this work can be done automatically, most of it has to be done by hand and takes a lot of time. In a typical e-Learning scenario, most of the content is produced in advance, and the repository is usually not very dynamic. In contrast to that, content is produced all the time and often by the employees themselves in a KM scenario. This makes the process of structuring and annotating very difficult, because in most cases there is simply no time available for these tasks. A middle course, meeting the demands of both easy authoring on the one hand, as well as enabling interconnectedness and personalization of content on the other hand, is required.

Another barrier in the use of KM for e-Learning is the fact that information chunks in KM systems often lack interactivity [2]. Learning tasks and activities are an important characteristic of good instructional design. Engaging learners and actively involving them in the learning process often increases motivation and learning gain. However, the information chunks in KM systems are usually not designed for instruction. To be successfully re-used for learning these information chunks need to be embedded in interactive learning activities. Another strategy to make instruction effective is tailoring of content and teaching strategy to the learner's individual needs and preferences. "The effectiveness of human tutors generally does not stem from an overabundance of training and preparation but from the tutor's ability to work one-to-one with a student, and to provide constant feedback that enables constructivist learning" [2]. However, the concept of interactivity is suffering from lack of operational definitions.

Adaptive systems strive to monitor students and select next learning steps. In fact, Brusilovsky and Vassileva [4] distinguish between two types of adaptive course sequencing: adaptive and dynamic courseware generation. While adaptive courseware generation creates a course suited to the needs of the students based on a static student model before they encounter it, systems with dynamic courseware generation observe and dynamically regenerate the course according to the student's progress. Especially the latter type of adaptation might encounter more and more attention in the future, because it is able to adapt learning to the current context during the learning process. Thus, adaptively might help to re-use the existing information in KM systems for instruction. However, conventional e-Learning systems are usually not prepared for dynamic selection and sequencing of learning material yet.

Another important issue is that individuals should be able to recognize trends and to identify correlations within their daily work or the subjects they are working on. So far, most e-Learning systems do not support recognizing trends or correlations between subjects. Jantke, Lunzer & Fujima emphasize that e-Learning could be much more successful by making it more cognitively adequate, entertaining, and illustrating to the learner [6].

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