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Knowledge Management in Instructional Design

By J. Michael Spector and Gerald S. Edmonds

Introduction

Instructional designers engage in activities related to the planning and implementation of instructional and performance support solutions. Available tools and technologies influence the way in which instructional designers accomplish their tasks. Knowledge management represents a technology that is changing how instructional design professionals work. This article will review what instructional designers do, describe knowledge management, and indicate how knowledge management is influencing instructional design.

Instructional Design

Instructional design (ID) professionals aim to improve individual and organizational performance. ID may be defined as a systematic approach to instructional planning that typically involves a project team analyzing a problem situation, exploring alternative performance support or instructional solutions, and then planning, implementing, evaluating, and managing solutions (Richey, Fields, & Foxon, 2000).

This process is often poorly-structured and iterative, involving people from different backgrounds and areas of expertise. In an instructional design project, different kinds of resources and artifacts are created: proposals, memos, analyses, solution strategies, lesson plans, evaluation plans, media support for lessons, performance data, and so on. According to the International Board of Standards for Training, Performance and Instruction (Richey et al., 2000), ID is an engineering discipline with principles, rules, and heuristics, many of which are sensitive to local conditions (individual learners, specific settings and resources, learning cultures, and so on).

ID professionals are required to resolve complex issues, such as connecting learning and performance objectives with assessable outcomes. Several people are often involved in these problem-solving processes. Some team members may work on one task/aspect of an instructional or performance solution (developing assessment measures, for example) while other team members may work on a different ID problem (for example, storyboarding specific lessons). ID activities may be accomplished at different times as well as at different locations. In short, ID is a complex, collaborative enterprise, requiring careful planning and management in order for goals to be achieved.

Knowledge Management

Management involves a collection of activities (such as situation assessment, goal definition, team development, resource allocation, and so on) aimed at ensuring project/task progress and quality of processes or products. Knowledge is typically defined in terms of collections of rules, principles and structured information that enable people to make decisions and solve problems. Knowledge management (KM), then, is a technology that focuses on the knowledge involved in a set of problem situations or in a system.

The notion of a system as a collection or combination of disparate, but identifiable, components organized to facilitate accomplishment of goals is essential in order to understand KM. A system is a complex and dynamic collection of different things, including people, information, administrative processes, and so on. One aspect of management is to facilitate the effective and efficient functioning of system components. KM focuses on the knowledge components within a system; some knowledge may be explicitly represented (in the form of information databases, policies and procedures, for example) and some may be implicit (in the form of tacit knowledge, organizational culture, habits, etc.). One goal of KM is to facilitate the transformation of implicit knowledge into accessible explicit knowledge that can be brought to bear in relevant problem-solving situations.

Knowledge management systems (KMSs) are tools aimed at supporting knowledge management. KMSs evolved from information management tools that integrated many aspects of computer-supported collaborative work environments (CSCW) with information and document management systems (Ganesan, Edmonds, & Spector, 2001; Grief, 1988; Kling, 1991). Key characteristics of a KMS are support for: (1) communication among various users; (2) coordination of users' activities; (3) collaboration among user groups on the creation, modification and dissemination of artifacts and products; and, (4) control processes to ensure integrity and to track the progress of projects.

Systems that support KM provide specific functions related to communication (e-mail and discussion forums); coordination (shareable calendars and task lists); collaboration (shareable artifacts and workspaces); and control (internal audit trails and automatic version control). A user-centered KMS contributes to an organizational culture of sharing by providing a sense of belonging to a community of users and by supporting reciprocity among users (Marshall & Rossett, 2000). KMSs extend the perspective of employees as knowledge workers by providing them with the means to create knowledge and to actively contribute to a shared and dynamic body of knowledge. A KMS provides support for many information functions, including: acquiring and indexing, capturing and archiving; finding and accessing; creating and annotating; combining, collating and modifying; and tracking (Edmonds & Pusch, 2002). These KMS functions allow multiple individuals to organize meaningful activities around shared and reusable artifacts to achieve specific goals. In short, a KMS addresses the distributed nature of work and expertise (Salomon, 1993).

Within business and industry, KM technology is being used to support organizational learning (Morecroft & Sterman, 1994; Senge, 1990). The dynamics of the global economy place a premium on organizational responsiveness and flexibility. Partly as a response to the demands of a highly competitive global economy, KMS technology has emerged as a new generation of information management systems. In contrast with previous information management systems, a KMS is designed for multiple users with different and changing requirements.

Key enabling technologies include object orientation, broadband communications, and adaptive systems. Object orientation provides for the creation of knowledge objects that can be easily found, modified and reused. Broadband communication allows users separated in time or space to work on large data objects effectively as a team. Adaptive systems recognize that different users may have different requirements and preferred working styles.

A KMS can be viewed as an activity system that involves people making use of objects (tools and technologies) to create artifacts and prod-

ucts that represent knowledge in order to achieve a shared goal. Previous information management systems focused on a small portion of such a system, such as a narrow set of objects in the form of a collection of records or simple communication between team members. A KMS embraces the entire activity system but maintains a focus on the human-use aspects (people with shared goals) as opposed to the underlying or enabling technology aspects. KMSs have already met with significant success in the business sector and are spreading to other sectors, including education (Marshall & Rossett, 2000) and instructional design (Ganesan et al., 2001).

Knowledge Management in Instructional Design

ID is a complex, collaborative activity involving teams whose members are often distributed in different locations. Consequently, it is natural to use a KMS to support ID. For example, the European Commission Fifth Framework Adapt[IT] Project involves the use of a KMS in the design and development phases of ID (Ganesan et al., 2001). Project Advance® at Syracuse University makes use of a KMS in all aspects of ID (Edmonds & Pusch, 2002). The ability to provide communication, coordination, collaboration and control makes it possible for an ID team to minimize time spent on mundane tasks (such as tracking documents and reconciling different versions) and focus on higher-level problem-solving activities (analyzing perceived problems, determining how to improve solutions based on outcome assessments, and so on).

The enabling technologies associated with KM (e.g., object orientation, broadband communication and adaptive systems) are also prominent, leading-edge educational technologies (see, for example, Wiley, 2001). The ability of KM technology to support school-based learning has been demonstrated (Marshall & Rossett, 2000). The ability of KM technology to promote collaboration among instructional designers has also been demonstrated, as indicated in the aforementioned projects. KM issues being addressed by ID researchers include: (a) the granularity of learning objects suitable for promoting effective learning and reuse; (b) the modes and types of communication appropriate for different users and tasks; and, (c) adaptive systems to support instructional design and development. The extent of transformation within ID communities of practice remains to be seen as the marriage of KM and ID is relatively recent, but the potential is enormous.

In conclusion, KM tools and systems are beginning to be used for the design and development of instructional systems and learning environments, and ID practice is changing as a consequence. For example, concurrent ID engineering is now more prevalent when KM is integrated with ID (Zucker & Demaid, 1992). There is a history of interaction between technology and instructional design. This interaction is evident in the design of learning environments. The Web provides a recent and visible example of technology influencing how instructional designers structure courses and plan learning activities. KM technology can be integrated into an instructional delivery framework (Marshall & Rossett, 2000). However, there is far-reaching potential for KM technology to influence all phases of instructional design—analysis and planning as well as implementation, delivery and management. KM tools and technologies have the potential to affect patterns of interaction among those who design and develop instruction, such as instructional designers, developers, content experts, system integrators, graphics artists, and media specialists. Specifically, a KMS enhances the communication, coordination, and collaboration among such a team while improving long-term productivity by facilitating access, archiving, retrieval and reuse of a variety of learning objects and instructional resources.

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Relevant Web Sites

Brint.Com Knowledge Management Portal
www.brint.com/km/

Computer Supported Collaborative Learning
carbon.cudenver.edu/~lsherry/cscl/cscl.html

Collaborative ID
soeweb.syr.edu/Faculty/Spector/publications/tools-principles-collab-design.pdf

CSCL Theories
www.edb.utexas.edu/csclstudent/Dhsiao/theories.html

First Principles of Instruction
www.id2.usu.edu/Papers 5FirstPrinciples.PDF

Groupware Links
www.usabilityfirst.com/groupware/cscw.txl

International Knowledge Management Newsletter
www.mjm.co.uk/knowledge/repch1.html

ITtoolbox Knowledge Management
knowledgemanagement.ittoolbox.com/

Knowledge Management Forum
www.kmnews.com/

Knowledge Management News (free digital newsletter)
www.kmnews.com/

Knowledge Management Resource Center
www.cio.com/research/knowledge/

Learning Objects
reusability.org/read/

Trends in CSCL Research
tecfa.unige.ch/tecfa/research/cscw/pointers.html

The Authors

J. Michael Spector is Professor and Chair, Instructional Design, Development and Evaluation, Syracuse University. **Gerald S. Edmonds** is Director, Project Advance, Syracuse University.

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