Chapter 4.19
Integrating Knowledge, Performance, and Learning Systems

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INTRODUCTION AND BACKGROUND

Considerable effort has been devoted recently to development of systems or platforms that manage the learning, performance, or knowledge delivered to students and employees. These systems are generically labeled learning management systems (LMS), learning and content management systems (LCMS), performance support systems, and knowledge management systems (Rockley, 2002). Organizations increasingly use content management systems to deliver content objects to employees on a just-in-time basis to support knowledge and performance requirements (Rosenberg, 1999).

While systems are developed that efficiently manage learning, knowledge, or performance, it seems desirable to consider how integration of each of these areas into a single system would benefit organizations. A major challenge to developing such systems has been the degree to which they are interoperable and the components within each are reusable. Reuse of data or information for learning or performance solution development is considered the primary driving force behind the movement toward object-based architectures for such systems (Douglas & Schaffer, 2002; Schaffer & Douglas, 2004).

Ideas for integrating different sources of support for individuals and making its construction more cost effective have begun to take shape. Some

efforts have focused on reusable and interchangeable (between different delivery systems) content objects, such as the U.S. Department of Defense Advanced Distributed Learning initiative (http://www.adlnet. org). A big challenge in development of support is the lack of a pedagogical model that takes advantage of object-based architectures while promoting collaboration and knowledge capture and sharing. A significant move in this direction has been outlined by Collis and Strjker (2003) who view the learner as a contributor of knowledge that may be captured and stored for reuse by future learners or course designers. An expansion of this idea, focused on in this article, is the reuse of the contributions of various members of a design and development team. This includes artifacts, decisions, and rationales related to activities such as the analysis of needs, identification of metrics, and identification of causes and possible solutions to workplace problems. This approach essentially attempts to link the analysis and design processes related to initial development of solutions with the ongoing adaptation and evaluation of the solutions in practice.

MOVING FROM E-LEARNING TO E-PERFORMANCE DEVELOPMENT

Advances in technology have made integration of various types of information for the purpose of just-in-time learning and performance development more viable (Greenberg & Dickelman, 2000). The Internet and World Wide Web, along with various authoring tools, have facilitated development of digital materials that are easily accessible by learners and performers. The technology that has lagged is the pedagogy and design thinking and strategies required to make all of this digital information reusable and targeted toward adding value (Clark & Meyer, 2002). Structured training or learning experiences do not always translate into better performance, and, given the fast changing nature of modern organizations,

workers need to access critical and specific knowledge and performance support exactly when they need it. The traditional training approach relies on acquisition of knowledge in the hope that it will be useful and be remembered when needed. Unfortunately, much of this knowledge acquisition is explicit and context-specific and does not often transfer well to problem-solving situations (Smith, 2002).

Software development has for a number of years progressed toward embedding knowledge acquisition in context rather than rely up-front on training courses. This is evident through context-sensitive help, task-oriented help, task automation, and task wizards. For example, an LMS will often support a particular task such as entering a new course or adding new students to a course. Furthermore, content management systems are becoming object-based and will allow learners and designers to actively "pull" learning content on an as-needed basis. The development of tools to support the selection of content and to guide this kind of designing "on-the-fly" is also on the rise, as the new wave of user support tools are designed with an object-oriented architecture in mind (Spector, 2001).

Integrating knowledge, performance, and learning within a single system requires thinking of both the whole and the parts. The learners and performers who use the system will interact with an interface that is integrative and allows them to filter and select information most important to them (Gery, 1991). The kinds of information made more readily available to a particular user should be determined by their job role, function, performance objective, and organizational goal. Visual modeling tools are proposed as one way to aid in such integration during problem analysis. Such tools may allow collaborators to construct system models that identify key requirements and subsystems. The veracity of the models is tested as collaborators with multiple perspectives on the system provide feedback and revisions to the model. Subsequent KPL solutions developed

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