Contextual Design of Online Learning Technologies

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INTRODUCTION

Contextual design is a human-centered methodology for designing information systems from a rich understanding of customer work practice (Beyer & Holtzblatt, 1998). This article explores the application of contextual design to online learning systems development. Beginning with definitions of Instructional Systems Design (ISD) and contextual design, this chapter then offers a detailed description of the latter, and concludes by considering its relevance to the design of online learning technologies.

To avoid confusion, it is important to understand the differing backgrounds of ISD and contextual design. ISD models are process models for the development of instruction or instructional *systems* (ASTD, 1988; Dick & Carey, 1996; Kemp, Morrison & Ross, 1998). In this context, "systems" refer to the interrelatedness of all parts of an instructional program and the attempt of the development process to account for the many parts and their interdependencies. Contextual design grew out of very different soil—a soil in which "systems" means "information systems;" that is, computers, software and related technologies. As a computer system design method, contextual design focuses on how best to design systems—hardware and software—to meet customers' needs. While these needs may include learning or training, the concern is less with learning how to do something than with actually doing it— quickly, cheaply, effectively. With instructional design, *content* is nearly always critical. With contextual design, as will be seen, *work practice* is critical.

With the growth of online learning environments, designing instruction or learning is not always easily separable from the design of the technology used in delivery. This linkage is not new. Instructional designers have had to concern themselves with the design of delivery technology for decades. But the capability and malleability of computer-based, and especially Web-based, delivery technologies have heightened the need for instructional designers to attend to technology design.

While some online instructional designers may have the luxury—or the curse—of designing instruction within a predetermined technical framework, others must balance design of instruction with design of its delivery technology. Still others design delivery technologies, such as virtual learning environments or course management systems, without designing instruction at the same time, hoping (or naively assuming) that the technology will suit the educational needs it purports to address.

CONTEXTUAL DESIGN

Contextual design is a human-centered design methodology created by Karen Holtzblatt and Hugh Beyer to address the needs of commercial software and information system development (Beyer & Holtzblatt, 1998). The methodology emphasizes the need to base design decisions on a shared understanding of how real people do real work in real contexts. It has been applied to such varied design problems as enterprise portals, system administration tools, instructional software and library systems (Holtzblatt, 2001; Rockwell, 1999; Curtis, Heiserman, Jobusch, Notess & Webb, 1999; Normore, 1999; Notess, 2001, 2004).

Because contextual design is described in great detail in Beyer and Holtzblatt (1998), this chapter provides a brief overview of the process. Contextual design consists of six steps.

1. Contextual Inquiry
2. Work Modeling
3. Consolidation
4. Work Redesign
5. User Environment Design
6. Paper Prototyping

Each step below provides examples illustrating the relevance of contextual design to online instructional settings.

Step 1: Contextual Inquiry

Designers identify real users or potential real users and visit them in their places of work. The inquiry is a combination of observation and interviewing. Interviewing focuses on understanding the users, their work and the context of their work. A key assumption behind contextual inquiry is that taking people away from their work tasks and context makes them unable to provide an adequate explanation of their work—what they do, why they do it, how they do it. Their decontextualized explanations are less detailed and less accurate than what is learned *in situ* observations and discussions. The reason for this difference is that skilled workers are skilled and productive because they do not rely exclusively on what is in their conscious awareness. Much of one's work knowledge is either internalized to the point where it is tacit, or the knowledge is embedded in the environment, including tools and processes.

In contextual inquiry, the interviewer asks the users to continue doing their work while the interviewer observes and plies them with questions about what is happening and why. Contextual inquiry is typically done in one- to three-hour sessions, and in some situations the session may be recorded, although often this is not necessary. The interviewer takes notes, makes sketches and asks clarifying questions to form a detailed picture of the work. An important function of the inquiry is to arrive at an accurate understanding of the activity being observed. As the interviewer watches, he or she will form hypotheses about the work—for example, why something is being done. The interviewer then articulates the hypotheses to see if they are accurate. Beyer and Holtzblatt (1998, p. 56) call this validation process "interpretation."

Although contextual design uses the term "work" to describe what we are interested in understanding, the word should be taken in its broadest sense of *purposeful activity*. In a learning context, "work" could include reading, preparing deliverables, preparing a lesson module, recording a lecture, answering student e-mail, meeting in an online study group, browsing the Web, and so forth. Any of these tasks is a potentially relevant target for contextual inquiry.

Step 2: Work Modeling

The contextual interview is followed by the interpretation session. In the interpretation session, the design team (or a subset) meets to hear the interviewer "replay" the interview—to talk through the entire interview, describing what was seen and heard.

During the replay, design team members ask clarifying questions and capture data in five types of models:

- The *flow model* identifies the key people/roles involved in the work and the communication and work products that move between them. For example, in an online learning context, key people are instructor and learner. Some of the work products that move between them are assignments and completed homework. However, the goal of contextual inquiry is to capture realistic detail, not just idealized descriptions. So a flow model might well include seemingly peripheral people such as departmental secretary or housemate—anyone with whom the user interacted in the course of doing the work of interest. Even in instructorless, self-paced online learning, there often are multiple players. Another important type of data to capture on flow models is *work breakdowns*. Breakdowns on the model indicate problem areas in the work. For example, if a learner is preparing a deliverable and is confused about one of the requirements but cannot find the original assignment, that is a work breakdown. Breakdowns are important because they indicate opportunities for improvements.
- The *sequence model* captures the actual sequence of steps the user followed, along with what triggered each activity and what the motivating goals and intents were. If work is purposeful activity, it then becomes crucial to understand the intents that drive the work. Nevertheless, much of what people do is the result of triggering events in their environment. For example, a student may be working on writing a document—her intent is to finish it and submit it. But while she's writing, she notices that her e-mail icon appears, and so she stops and open her e-mail. Reacting or replying to her e-mail may lead to another work sequence and set of intents, which may or may not be rel-

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