Use of Cognitive Apprenticeship Framework in Online Learning

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INTRODUCTION

Cognitive apprenticeship (Collins, Brown, & Newman, 1989) is an instructional framework that uses the underlying principles of traditional apprenticeship learning. The cognitive apprenticeship framework consists of the dimension of content, methods, sequence, and sociology. It focuses specifically on instructional modeling, coaching, and scaffolding. Through modeling, learners see expert facilitation techniques in a realistic setting. According to Schulte, Magenheim, Niere, and Schafer (2003), "the key issue is to make the problem solving process and the expert's thinking visible to the learner" (p. 271). During coaching, learners receive guidance while they attempt to execute tasks and demonstrate skills. Scaffolding, the process of supporting learners while they acquire new skills, is provided and faded as learners begin to demonstrate mastery of these new skills. These techniques are employed in situated learning environments. Further, cognitive apprenticeship sets out to (a) identify an expert's problem solving and critical thinking processes and make them visible to learners, (b) situate abstract task in authentic contexts, and (c) vary the diversity of situations in which problem solving may occur and articulate the common aspects in order to increase the potential for learning transfer (Collins, Brown and Newman, 1989).

BACKGROUND

Early studies related to cognitive apprenticeship involved teaching reading, writing, and mathematics (Palincsar & Brown, 1984; Scardamalia & Bereiter; 1985; Schoenfeld, 1985). Later studies examined the effectiveness of cognitive apprenticeship in classroom settings (Jarvela, 1995; Cash, Behrmann, Stadt, & McDaniels, 1996), through the use of instructional technology (Casey, 1996; Clark, 2002; Glazer, 2004), and online (Snyder, 2000; Wang & Bonk, 2001; Stockhausen & Zimitat, 2002; Schwarz, 2003; Parscal, 2007). Collins, Brown and Newman's (1989) cognitive apprenticeship model has four dimensions: content, methods, sequence, and sociology.

A brief description of each of these dimensions follows. The methods dimension is further divided into short descriptions of the instructional methods of modeling, coaching, scaffolding, articulation, reflection, and exploration.

Content

The cognitive apprenticeship framework is suitable for a variety of content areas; however, the ideal learning environment involves content that focuses on the types of knowledge required for developing expertise. These involve (a) domain knowledge, which is the conceptual, factual, and procedural knowledge specific to the subject matter; (b) heuristic or "tricks of the trade" strategies; (c) general approaches for directing one's own problem solving process; and (d) strategies for learning, acquiring new information, and reconfiguring knowledge already possessed.

Methods

In the cognitive apprenticeship framework, instructional methods are designed to promote the development of expertise. This is usually achieved by enabling learners to observe an expert, often the instructor, within an authentic and social setting. Instructional methods for the cognitive apprenticeship framework include modeling, coaching, scaffolding, articulation, reflection, and exploration. **Modeling**, coaching, and scaffolding are designed to assist learners to "acquire an integrated set of cognitive and metacognitive skills through processes of observation and of guided and supported practice" (Collins, Brown, & Newman, 1989, p. 481). Articulation and reflection are methods which help learners focus their observations of expert strategies and become con-

scious of and control their own strategies. Exploration is intended to encourage learner autonomy in executing tasks but also in identifying tasks to complete and future problems to be solved.

Modeling

Modeling involves the instructor demonstrating how a process unfolds and explaining why it happened as it did. The process of modeling provides learners with models for task performance by demonstrating the instructor's internal cognitive process while solving a problem or demonstrating a skill. It also allows the learner to simultaneously see what is happening and hear a verbal explanation of why it is occurring. Modeling also allows the instructor to make tacit knowledge and processes explicit. Learners will have a greater chance to understand what is occurring when the instructor verbally reveals his or her thinking processes. In the online environment, modeling can take the form of video or animated demonstrations performed by the instructor or other experts.

Coaching

In the cognitive apprenticeship framework, the instructor coaches the learners by providing hints and feedback. During **coaching**, the instructor observes the learners while they are performing or practicing tasks and offers hints, scaffolds, feedback, modeling, reminders, and additional tasks with the goal of bringing the learner closer to mastery. During coaching, the instructor may observe instances where a learner is struggling and provide help at critical times and with as much help as the learner needs to accomplish the task. Finally, coaching also provides the learner with the opportunity to see the process from the expert's perspective (Collins, 1991). As learners progress through the cognitive apprenticeship framework online, the role of the instructor as coach may diminish and peer coaching emerge as the learning community develops their expertise (Parscal, 2007). Online coaching can be offered in distance education through email, chat, phone, or through the discussion forum. It can be either synchronous or asynchronous. Like other types of instructional feedback, it should be offered soon after the triggering event.

Scaffolding and Fading

Wood, Bruner, and Ross (1976) introduced the term scaffolding to describe the effective intervention by a peer or instructor in the learning of another person. Scaffolding is the process of supporting learners while they acquire new skills (Greenfield, 1984). In cognitive apprenticeship, scaffolding occurs when the instructor or the learning environment assists the learner in managing task performance by completing those parts of the task that the learner has not yet mastered or by providing tools to enable the learner to advance in the execution of the task. Fading involving the gradual removal of the learning environment or instructor's support as the learners develop their mastery of the newly acquired skill. Scaffolding and fading strategies can be designed into instructional content which is enabled through a learning management system or it can be provided by the instructor or peer learners within the discussion forum.

Articulation

Articulation involves requiring learners to express their knowledge, reasoning, or problem solving processes. When articulating, learners are asked to consider and explain what they are doing; thus, making their tacit knowledge explicit. Through this process, learners are able to consolidate what they have learned, make knowledge available for other tasks, observe how the same strategies can be applied in different contexts, and gain a new perspective from peer learners (Collins, 1991). This can be accomplished through the discussion forum or through the use of multimedia. For example, learners can use audio or video recordings or synchronous camera technologies to articulate or demonstrate their knowledge.

Reflection

Reflection provides learners with an opportunity to reflect on what they have done, analyze their performance, and compare their own problem solving strategies with that of the expert or instructor. Learners may benefit from reflection because it encourages them to consider their actions in terms of how the performance or attempt may be improved. After reflection, learners are also