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FOCAL ARTICLE

Transforming Our Models of Learning and Development: Web-Based Instruction as Enabler of Third-Generation Instruction

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Abstract

In this paper, I suggest that our methods for how to train are based historically on what we understand learning to be. I briefly trace the history of instructional design models, which embody both first-generation objectivist and second-generation cognitive constructivist views of learning. I then suggest we are on the cusp of a third-generation instructional model, one that places greater emphasis on the learner forming understanding largely through a process of social negotiation, either in training or on the job. I argue that Web-based instruction offers a technology ideally suited to the social constructivist approach at the core of this third-generation model. I discuss the importance of interaction in learning and suggest why Web-based networked learning may result in more, not less, interaction during training. Finally, I discuss other applications of third-generation learning such as peer mentoring and professional forums.

Throughout the history of industrial and organizational (I–O) psychology, advancements in training methods have been driven by our understanding at the time of what it means to learn (Kraiger & Ford, 2006). For example, models of classical and operant conditioning in the first half of the 20th century were reflected in stimulus–response-based training methods popular throughout the 1950s and 1960s. Bandura's (1977, 1982) social learning theory inspired the introduction of behavioral modeling training methods in I–O corporate training contexts (e.g., Decker & Nathan, 1985; A. P. Goldstein & Sorcher, 1974). In this paper, I argue that as a discipline we are poised to make a profound shift in how we understand learning to occur and, in turn, how we think about what should be trained and how that content should be trained. This shift is rooted in advancements in learning theory in other domains and further fueled by technological advances changing how we communicate both in training and on the job. To describe this shift, I will briefly review the history of prior instructional models that have framed our understanding of how we learn. I refer to these prior models as first- and second-generation instructional models. Following this review, I will introduce what I call third-generation instructional models and describe their application to several common forms of employee training and development.

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A Brief Review of Instructional Design Models

First-generation instructional models. Instructional design refers to the analysis of performance requirements, the design of training content, and the selection of training

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methods in order to train workers to do their jobs effectively. Much of our current thinking in I–O psychology about instructional design is founded on Goldstein's instructional systems design (ISD) model (I. L. Goldstein & Ford, 2002), which has been relatively unchanged from its initial development in the early 1970s (I. L. Goldstein, 1974). This model shares conceptual and structural overlap with popular models in the field of instructional design (e.g., Dick, Carey, & Carey, 2001; Gagné, Briggs, & Wagner, 1992; Gilbert, 1978). Common to all these models are phases of analysis, design, development, implementation, and evaluation; hence, the popular acronym ADDIE (Molenda, Pershing, & Reigeluth, 2003). After a problem is identified, there is an analysis of the root causes and a determination that training is a potential solution to the problem. This analysis is followed by a design phase, including the writing of training objectives, the development of training content, the implementation or delivery of training, and an evaluation of that training (which includes feedback on decisions made at all prior stages of the model). An underlying assumption of the model is that the causes of many performance problems lie in skill or knowledge deficits of employees but that responsibility for treatment of the problem rests with the organization (or trainer as representative of the organization).

The ISD model—and its approach to linking training methods to problem analysis—can be traced back to the influential work of Tyler (1949); Gagné (1962); and Gagne (1992). Gagné's model was based directly on a number of studies conducted by instructional and I–O psychologists in the late 1950s and early 1960s in multiple U.S. military bases (summarized best in Gagné, (1962). Gagné clarified the link between instructional principles (e.g., train to a state of overlearning) and systems design when he argued that such principles were secondary to effective design for improving performance: "If I were faced with the problem of improving training, I should not look for much help from the well-known learning principles like reinforcement, distribution of practice, response familiarity, and so on. I should look instead at the technique of task analysis, and at the principles of component task achievement, intratask transfer, and the sequencing of subtask learning to find those ideas of greatest usefulness in the design of training" (p. 90). Simply put, Gagné conceptualized effective instructional design as a process in which task performance is analyzed, component tasks are identified and trained, and a structure is provided that explicitly links component tasks, thus allowing successful completion of the full task. Note again that it is the responsibility of the designer or performance analyst to make decisions about which, and in which order, tasks should be trained.

Although Gagné (1962) attempted to subordinate known instructional principles of the time, they still constitute the primary theoretical approach to the design of effective training (Kraiger & Ford, 2006). Gagné et al. (1992) characterized instruction as a nine-event process, ranging from gaining the learner's attention and informing him or her of the training objective, through presenting material and providing feedback and guidance, to assessing performance and enhancing transfer. Common to each event is the central role of the *instructor* in defining content, eliciting performance, and reinforcing correct performance. The role of the learner in this approach is so marginalized that Gagné often referred to making sure the learner is even attending to training as the *first event* of instruction (Gagné, 1985; Gagné et al., 1992).

Current instructional models also place primary emphasis on the instructor. For example, I. L. Goldstein and Ford (2002) discussed the following learning principles as characteristics of effective instruction: providing feedback, training to automaticity and overlearning, deciding between massed versus spaced practice, and training component tasks prior to linking tasks. Similarly, Noe and Colquitt (2002) built upon a literature review to offer multiple guidelines for training practitioners that include analyzing training program objectives to identify

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measurable outcomes, using advance organizers and modeling to cue important topics, providing opportunities for practice, offering feedback, and ensuring the training program is properly coordinated and arranged.

In sum, the most popular models for instructional design, those that have driven training design for over 4 decades, place the learner in a passive role, tasked only with-absorbing that information identified through prior analysis. In contrast, the organization—through its agents in the role of instructional designer and trainer—identifies the knowledge and skills to be taught through careful task analysis and determines optimal tactics for imparting those knowledge and skills on learners based on the application of empirically tested learning principles. I call this the first-generation instructional model, for although it remains popular today, its roots trace back to Taylor's scientific management model (see Callahan, 1962) and to Thorndike (1906), who proposed that learning occurred through strengthening of the bonds between situations and actions, and that teaching consisted primarily of using procedures such as demonstration and reinforcement to elicit closer approximations of (predetermined) appropriate responses.

Most training innovations between, say, 1960 and 1990 can be characterized as first-generation methods, reflecting a behavioral orientation to the specification and accomplishment of instructional objectives. In the field of instructional design, a key contribution was the work of Mager (1962), which called for highly detailed behavioral objectives. Mager argued that objectives that were neither detailed nor specific (in terms of content and criterion) could not be trained adequately. In I–O psychology, training texts such as Bass and Vaughn (1966) and I. L. Goldstein (1974) carefully linked the specification of objectives to the design of training, and in turn to the evaluation of training in terms of achievement of prior objectives. In instructional psychology, innovations focused on the development of automaticity through strategies such as proper sequencing of content (Dansereau, Evans, Wright, Long, & Atkinson, 1974), constant mapping conditions for practice (Schneider & Fisk, 1983), and the provision of knowledge of results and positive reinforcement (Fisk & Schneider, 1981; Schneider & Fisk, 1983).

In sum, first-generation models identified a single best way of performing a task, placed responsibility for the learning principally on the shoulders of the instructor, and characterized successful learning as the replication of criterion behavior.

Bridge between first- and second-generation instructional models. During a period roughly between the late 1970s and late 1980s, other authors advocated a more learner-based approach to learning. For example, Mayer (1979) reviewed theory and research on advanced organizers—models, outlines, or ideas that are presented at the beginning of training to assist learners in organizing subsequent instructional material. Stevens and Collins (1980) discussed learning as the process by which learners add, replace, delete, and generalize components of an initial mental model, whereas Glaser and Bassok (1989) argued that the process of forming appropriate mental models was best accomplished by embedding instruction in realistic contexts. Collins (1991) also championed the use of "situated" learning contexts in part because they help learners link new knowledge to existing knowledge, and they help make new knowledge more accessible. Thus, instructional psychologists were moving toward a model that focused less on instructor-defined, task-related objectives, to one that saw knowledge as individually constructed objectives within an awareness of the situations in which that knowledge would be applied. This latter perspective characterizes what I define as second-generation instructional models.

The reader may have predicted that second-generational models reflect cognitive or information-processing theories of learning. As Kraiger and Ford (2006) noted, although the I–O training field was mired in what Campbell (1971) characterized as

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"voluminous, nonempirical, nontheoretical, poorly written, and dull" (p. 565), a cognitive revolution was spreading through other psychological fields, characterized in large part by proposals of several information processing models that depicted human learning as a process of selecting, attending to, acting upon, and storing new information (e.g., J. R. Anderson, 1982; Neisser, 1967). Application of these models to training lagged several decades behind their introduction in the cognitive sciences (Ford & Kraiger, 1995; Howell & Cooke, 1989; Kraiger, Ford, & Salas, 1993; Lord & Maher, 1992).

However, as described below, second-generation instructional models are characterized primarily in terms of the active involvement of the learner in selecting, acting upon, and organizing new knowledge. The direct impact of cognitive/information-processing learning theories was simply to broaden first-generation instructional models. Principally, what changed was a broadening of learning outcomes as the target of instruction (Kraiger et al., 1993). Traditional methods of task analysis (to determine content) could be augmented by cognitive task analysis methods (e.g., Dubois, 2002; Schraagen, Chipman, & Shalin, 2000), whereas behavioral objectives could be complemented by cognitively and affectively oriented learning objectives (L. W. Anderson et al., 2001; Kraiger et al., 1993).

Although the cognitive revolution served to focus greater attention on "meaning making," by individuals (Bruner, 1990), it still called for direct instruction (i.e., instructor-learner dyad) as the primary form of imparting knowledge. This point is driven home by Baumann (1988) who characterized the instructor as being "in command of the learning situation" (p. 714) and who "in a face-to-face reasonably formal manner, tells, shows, models, demonstrates, teaches the skill to be learned" (p. 714). In the next section, I describe second-generation instructional models that significantly change the roles of instructor and learner.

Second-generation instructional models. Second-generation instructional models differ from first-generation models in three ways. The first is the shift in emphasis from objectively defined knowledge and skill domains to learner-constructed models of task-relevant knowledge and skills. The second is a shift from sequenced training based on behaviorally based learning principles to activities that inspire learner exploration and sense making. The third (and underlying the first two) is the shift from instructor-centered to learner-centered models of instruction. Thus, second-generation models view the learner as the primary force in instructor-learner dyads. It is both inevitable and essential that the learner extract meaning from the skills and knowledge presented in training; the role of the instructor shifts to facilitating learning development.

Second-generation instructional models are enactments of constructivist theories of learning. Constructivist learning approaches were developed as a radical departure from objectivist approaches that were built on the notion of an objective world independent of the human mind to be communicated down from instructor to learner. Constructivism builds upon Bruner's (1990) assertion that individual learners must actively "build" knowledge and skills; equally important is the assumption that knowledge resides within these built knowledge structures, rather than in the external environment. Although it is still necessary to identify skills and knowledge necessary to perform appropriately in a given environment (such as one's job), the role of instructional design in constructivism is to structure authentic learning environments that maintain learner motivation and provide tools for learners to explore, solve problems, discover meaning, and create their understanding of how to apply knowledge in their daily lives.

Constructivist theories of learning are consistent with assumptions of adult learning theory (Knowles, 1980; Knowles, Holton, & Swanson, 2005). Both constructivist and adult learning theories place high importance on learners' prior learning and the importance of linking new knowledge and skills to prior experience. Both portray learners as active participants in the learning

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process, with adult learning theory placing greater emphasis on a learner's "need to know" (in order to solve problems or accomplish tasks). Both also place emphasis on maintaining and enhancing motivation to learn. Instructional strategies incorporating constructivist principles include why specific things (behaviors, commands, functions, etc.) are being taught, focusing on accomplishing tasks rather than memorization, taking into account a wide range of different backgrounds of learners in the design of instructional materials, and allowing learners to discover things for themselves, but providing guidance and help when mistakes are made (Knowles et al., 2005).

Jonassen (1994) proposed multiple characteristics of constructivist learning environments. These include the following: (a) They provide and allow for multiple representations of reality, (b) these multiple representations model the complexity of the real world, (c) these environments emphasize knowledge construction instead of knowledge reproduction, (d) they emphasize authentic tasks in meaningful contexts, (e) they emphasize real-world scenarios or problems rather than a predetermined sequence of instruction, (f) they encourage thoughtful reflection on learning experiences, and (g) they support the collaborative construction of knowledge through social negotiation.

For example, consider a basic supervisory skills training program. A first-generation approach would identify commonly performed tasks or critical skills for supervisors (e.g., assigning tasks and giving feedback). Training may occur through a variety of methods, but the goal is to enhance individual effectiveness on the same set of tasks or skills.

A second-generation approach to design would begin with an understanding of how individuals differ in terms of prior experience as a supervisor or under other supervisors. Based on prior experience, trainees might differ in self-perceptions of supervisory style, specific skills that need to be developed, or how certain skills might best be trained. For example, one trainee may need to learn how to provide clear directions, another may need to learn what tasks are better delegated than performed by oneself, whereas a third may need to correct a belief that delegating creates resentment among subordinates. Given the same domain of skills and knowledge to be trained, a second-generation approach would offer more individualized identification of specific learning needs as well as greater breadth in learning methods.

A nontraining example of a constructivist approach would be a group yoga class. The instructor calls out the same positions to all students, but depending on the prior experience, skills, and flexibility of each student, each might execute the position in a slightly different way. Further, one is moving into the position to relieve stress, another to increase flexibility, another to build strength. However, as long as each student is moving toward his or her own goal and pushing farther than his or her last effort, the instructor is satisfied. Thus, in second-generation instructional models, the instructor does not presume that all trainees learn the same things, and the instructor's role is to provide a rich environment in which trainees acquire and organize knowledge in personally meaningful ways, and an environment to develop skills useful for further exploration of the knowledge/skill domain.

Second-generation approaches to training suggest that (individual) trainee mental models mediate the relationship between knowledge acquisition and performance. Indeed, recent research in training supports this proposition. As trainees acquire procedural knowledge, they refine the cognitive structures used to organize and access that knowledge (Yi & Davis, 2001). In addition, Davis, Curtis, and Tschetter (2003) found that the quality of trainee knowledge structures predicted posttraining self-efficacy for performance.

Although second-generation instructional models may be operationalized through multiple instructional models, it should also be evident that these environments share much in common with various forms of Web-based instruction (WBI). WBI refers to a "hypermedia-based instructional

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program [that] utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported" (Khan, 1997, p. 6). To a large extent, WBI is much like traditional classroom instruction, in which there is often a set of learning objectives, material to be conveyed, skills to be practiced, and perhaps some form of assessment to document learning. At its best, WBI provides multiple methods of delivering content including text, audio, and video (think multiple media, not just multimedia). Knowledge as content can be packaged in a hypermedia format, so learners can click on information chunks that are hierarchically organized to provide not only an overall structure to the entire domain but also the opportunity to drill down for more information as learners progress. Skills as content can be modeled through streaming video, and some skills can be practiced online with immediate feedback.

One proposed advantage of computer-based training systems including WBI is the capacity of those systems to adapt to individual learners (K. G. Brown, 2001; Vrasidas, 2000), presumably to enhance learner motivation and improve learning (Reeves, 1993). The adaptability of a learning system to individual learners is referred to as its level of learner control. Learner control refers to the extent to which learners can define their own learning experiences by exercising control (i.e., choice) over features of the learning environment such as the pace, content, and sequencing of training content (Friend & Cole, 1990). When high learner control is coupled with pure constructivist approaches to instruction, the result is a learning environment in which learners are free to explore topics of personal interest, practice new skills, receive feedback, and control the ways in which they experience content (e.g., read vs. listen to audio presentations). Such computerized learning environments can be designed for single workstations or placed online and accessible whenever and wherever by an organization's workforce.

However, there is one principal problem with this adaptive and open learning system. It does not work—or at least not consistently and predictably. Meta-analytic evidence (in computer-based training) indicates that the overall effect size for learner control is positive but small (Kraiger & Jerden, 2007). Training with learner control is often not much more effective than training without learner control, and often times it is worse. In addition, the confidence intervals around mean effect sizes are large, even after accounting for frequently studied moderators. Thus, there are likely individual and/or situational moderators that influence when learner control is effective.

There are several reasons why high control training does not work. Mayer (2004) provided a recent review and strong critique of open discovery methods of instruction. Mayer reviewed three areas of programmatic research (discovery of problem-solving rules, discovery of conservation strategies, and discovery of programming concepts) where learners fail to learn by pure discovery methods or do not learn as much as those who receive guided discovery instruction in the form of structure and support in the process of sense making. In the field of I–O psychology, a similar conclusion was reached by Bell and Kozlowski (2002), who proposed a method of adaptive guidance in computer-based instruction as a superior method of allowing learners to explore and be active in learning while also providing trainees with diagnostic and interpretive information to help them make effective learning decisions. Adaptive guidance provides an overall structure but still allows for learners to maintain some control over their learning environment (Bell, Kanar, Liu, Forman, & Singh, 2006).

In addition, other research indicates that learners tend to be poor judges of what or how much they need to learn and/or practice (Tennyson, 1980; Williams, 1993). This effect may be greatest for low-ability learners (Bell & Kozlowski, 2002; DeRouin, Fritzsche, & Salas, 2004). Thus, given control (by the computer), learners often make suboptimal decisions regarding learning needs or learning tactics. In current research we are conducting in my laboratory, the problem may be even

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worse—preliminary evidence suggests that even when advised what or how to learn, nonexpert individuals are likely to discount advice and rely on intuition regarding optimal learning strategies. It is also possible that, particularly for novice or low-ability learners, the difficulty of the training content, coupled with the need to navigate in a high learner control environment, may place unduly high cognitive load on individual learners (see Van Merriënboer & Sweller, 2005).

Accordingly, although second-generation models provide a "step forward" in that they endorse personalization of content by learners, they often fail (at least in respect to computer-based training) by requiring decision-making and self-management skills beyond the capabilities of many learners. Bell and Kozlowski's (2002) adaptive guidance model represents one approach to managing learner behavior in WBI environments. Alternatively, responsibility for defining content, determining individual needs, and tracking progress may be distributed among learners through socially based learning approaches. That is, when progressing on their own, learners risk misunderstanding key concepts or developing incorrect behaviors. Particularly in instances in which the training content references interpersonal domains (e.g., customer service, supervisory practices), where learning is embedded in a social context, those risks can be minimized by defining learning as a socially negotiated process.

Learning as social negotiation and knowledge as a socially constructed outcome are in fact characteristics of a third philosophy of instruction, namely, social constructivism. In the following section, I distinguish cognitive constructivist (discussed above) from social constructivist approaches and use the latter as a foundation for third-generation learning models. These third-generation models differ from prior models not only in terms of their definition of what it means to learn but also in the role that peers and other actors play in the learning process.

Third-generation instructional models. Constructivist models of instruction can be broadly separated into two general approaches—cognitive constructivism and social constructivism. Although the former approach has emerged from foundational writings by Ausubel (1968), Bruner (1990), and others, the latter is largely influenced by the writings of Vygotsky (1978, 1986). Whereas cognitive constructivism emphasizes the role of the individual in forming meaning, social constructivism proposes that all learning and understanding are inherently social. Palinscar (1998) suggested that social constructivism emerged in part from research on instruction that shows the importance of alignment between thinking and discourse between teacher and learner. For example, think-alouds have been shown to be an excellent way for experts to communicate reading or problem-solving strategies to novices (e.g., Duffy et al., 1986), as are verbal probed protocol analyses in which novices describe how they might solve a problem while being asked probing questions by experts (e.g., "Why would you do that?" "What would that tell you?"; Glaser, Lesgold, & Gott, 1991; Means & Gott, 1988). Related to issues of (too much) learner control discussed above, social interaction between peers also results in more effective learning of many concepts. For example, explaining one's understanding of a phenomenon to a peer leads to deeper mental processing and better learning (e.g., Scardamalia & Bereiter, 1989).

Social constructivism posits that individual learning and development take place in a social and cultural context that is constantly changing (Palinscar, 1998). This view is consistent with Hiltz (1994) who wrote that "the social process of developing shared understanding through interaction is the 'natural' way for people to learn" (p. 22). Although each of us acquires knowledge that is objectively true (e.g., the original capital of the United States) or personally meaningful (e.g., the time of day in which we are the most productive) without social interaction, much of the knowledge and skill base required to perform our jobs is socially negotiated. For example, for a supervisor to delegate tasks effectively to a subordinate, there

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must be a shared understanding of the roles (and authority) of each party, there must be agreement on the language used to describe the task, and there should be agreement on the criterion by which the task is judged to be completed. Further, because the domain of tasks to be delegated may change over time (and the subordinates to whom tasks are delegated may change), effective training should provide the supervisor with skills to negotiate meaning as tasks, contexts, and subordinates change.

From this vantage, expertise is not described solely in terms of skills or accumulated knowledge but also in terms of competencies at explaining and understanding, recognizing norms and practices within a specific social context (e.g., job, workgroup, or organization), and skills at new learning as contexts change (Lave & Wenger, 1991). Just as cognitive constructivism proposes that the goal of instruction should not be to define a content domain but to enable individual understanding of that domain (related to prior experience), social constructivism proposes that the goal of instruction should be to create interactive learning environments in which training participants learn from instructors, participants learn from each other, and the instructor learns from participants.

The notion that much of the knowledge contributing to effective job performance is socially defined is clearly at odds with first-generation objectivist models and perhaps with second-generation cognitive constructivist models. However, with exceptions such as military and paramilitary organizations, and heavily regulated jobs and/or industries, there is very often more than one way to carry out one's job, and performance is determined as much by social norms as job descriptions. Safety behavior is one example that comes easily to mind. Thus, consider scenarios in which instead of training one "right way" (as determined by a formal needs analysis), trainees and managers meet as a group to consider options for completing tasks and jointly identify a range of acceptable behaviors prior to the first day on the job. Note too with changing work environments, third-generation instructional models require less "back-to-the-classroom" training and more on-the-job relearning through social networks.

Social constructivism and WBI. For reasons detailed below, WBI is particularly well suited to fostering social interactions useful for construing meaning. However, it is critical to first define what is meant by interaction in the context of instruction. The seminal work by Moore (1989) distinguished among three types of interaction within distance learning: learner–content interaction, learner–instructor interaction, and learner–learner interaction. Moore characterized learner–content interaction as the defining characteristic of instruction; it is the process of intellectually interacting with training content that results in permanent changes in learners' knowledge, skills, or attitudes. Although content can be engaged in different ways, for present purposes I will focus on the second and third forms of interaction.

The second type of interaction is the learner–instructor interaction. The instructor prepares and/or presents the content, and sets goals for affecting the learner in ways that include capturing interest, sustaining motivation, enhancing self-regulation, and instilling knowledge of, attitudes about, or skills in performing the training content. Instructors do this by organizing content, presenting content, demonstrating skills, modeling attitudes or values, and requiring assessment but also by counseling, supporting, advising, chastising, and challenging learners as necessary. Interactions in face-to-face contexts have the benefit of enabling charismatic behavior by instructors but may suffer if the instructor is not so gifted. Instructors in face-to-face contexts have opportunities to monitor learner interest and understanding and adjust accordingly; however, instructors in a distance context have the opportunity to personalize communication and approaches with individual learners (see Moore, 1989).

Learner–learner interactions refer to exchanges among training participants in an effort to extract meaning, complete projects,

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prepare for examinations, or provide support and encouragement for each other. Moore (1989) predicted that learner–learner interactions would emerge as a challenge to thinking and practice in distance education in the 1990s, and, 20 years later, I suggest that they are a cornerstone to third-generation instruction.

Learner–learner interactions are not new to education or training. College instructors frequently use project teams in classes and students form study groups on their own. Professional trainers commonly use breakout groups, whereas executive education instructors understand the importance of such groups to foster peer collaborations that may persist well beyond the end of the program.

However, are such interactions an effective means to enable learning by participants? Garrison (1993) suggested that such interactions are critical to socially derive meaning in distance learning environments in that "learners attempt to interpret, clarify and validate their understanding through sustained dialogue (i.e., two-way communication) and negotiation" (p. 202). Whitelock, Romano, Jelfs, and Brna (2002) argued that not only do peer learning groups improve problem-solving performance and learning, but also they can enhance the emotional well-being of isolated learners. Moore (1989) also suggested that the incorporation of learner–learner interactions through group assignments not only fosters learning of the primary content but also provides opportunities for developing or improving group behavior or group leadership skills.

If learner–learner interaction proves beneficial to learning content and individual development, is it more likely to occur in an online environment than a face-to-face context? Surprisingly, the answer may be yes. In one study, Phillips, Santoro, and Kuehn (1988) tried unsuccessfully to build group interaction in an undergraduate class but found it much easier to create meaningful interactions using distance education techniques. Based on a review of research on computer-supported collaborative learning environments, Kreijns, Kirschner, and Jochems (2003) found that social interaction does not occur simply because the technology enables it but does occur when there is an instructional environment that encourages group cohesion and trust, and values communities of learning.

There are at least three reasons why social interaction among peers may be greater in Web-based learning environments than in typical face-to-face contexts. The first reason is that the instructor has a diminished presence in WBI. The instructor may be known and available to all participants, but instruction (and learning) can occur without awareness of the instructor's presence. When something is not understood, learners have the opportunity to ask peers, consult outside experts, or ask the instructor. Although these same options may be available in conventional settings, habit (or preferences of the instructor) often results in questions directed only at the instructor. Further, because the instructor has less immediate presence in WBI, the course must be structured with guidelines for action and around a core of common social networking skills that allow learners to succeed (Vrasidas & McIsaac, 1999). This structure provides exactly the direction missing in so many pure learner control environments.

The second reason is that there are multiple methods in which peers may interact. In conventional settings, learners meet face-to-face during instructional time or on their own. They may also communicate via e-mail or phone when not together. However, in an online course, learners are provided a variety of ways to interact, and instructional objectives can be met only when learners consciously choose multiple forms of interaction. Further, asynchronous communication (when correspondence between any two individuals is separated by time) is commonly used and accepted in online courses. Accordingly, opportunities for learner–learner interaction can be built into a course in multiple ways including group projects, whiteboard, file sharing, wiki documents, chat rooms, threaded discussions, and video or audio conferencing. Learners may interact via e-mail, course postings, instant messages, or discussion

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lists. (See Vrasidas, 2000, for a useful overview of social constructivist instructional methods.) By varying how and why learners interact, each participant is given multiple ways of interacting with others.

The third and final reason is that online instruction changes individuals' motivation to participate. In particular, multiple studies have shown that various forms of distributed learning alter the social hierarchy of organizations. For example, when chat rooms and threaded discussions are used, individuals contribute without the benefit of socially defined markers (e.g., title or office space) to convey status. Thus, learners are evaluated on the quality of contributions not these markers. This often has the effect of encouraging greater participation among organizational members who might not participate in a traditional setting. Similarly, training participants who lack self-confidence or need more time to form opinions or craft answers often find asynchronous online communication to their advantage.

In sum, third-generation instructional models suggest that (a) knowledge is socially constructed, with shared meaning arising from interactions among instructors and learners; (b) the role of instructional design is to define broad content areas and create tools and instructional strategies to enable collaborative learning among instructors and learners, but also (and in particular) among learners and learners (Curtis & Lawson, 2001); (c) learning through socially mediated ways not only results in knowledge that can be transferred back to an applied context but also may result in social skills that also transfer to the same context; and (d) although socially mediated interactions are not limited to online courses, there is some evidence and considerable logic to suggest that such interactions are more common or easier in online formats, particularly among younger workers who are more comfortable with technology than more senior employees.

Implications and Applications

Third-generation instructional models, embodied in WBI, have the potential to change our fundamental understanding of how we learn and how we facilitate learning in organizations. What is necessary, from both an applied and research perspective, is a greater understanding of how and why WBI works, and how its effectiveness—particularly through course-enabled social networks—can be leveraged to improve other strategies for employee development.

Palinscar (1998) describes social constructivism as an "emerging" theory, and not surprisingly, as a paradigm it has its critics (e.g., Winner, 1993). More importantly, the direct implications of social constructivism for adult instruction are not fully delineated. For example, it is not clear what learning activities are consistent with social constructivism when the desired outcomes are complex skills. In the same vein, the merits of collaborative learning, inside and outside of online courses, are still being debated and have yet to be empirically validated in a convincing matter. Thus, one immediate implication is for more research conducted by researchers interested in adult learning and/or organizational training on the effectiveness of different strategies for facilitating socially negotiated meaning and collaborative learning in ad hoc or intact groups.

Assuming though that there is merit in centering instruction on shared meaning and processes of collaborative learning, and assuming that learning together and building share meaning is more prevalent in online environments than in traditional training contexts, it is reasonable to wonder why this may be so. An argument advanced earlier is that online learning contexts level perceived social power among participants and thus encourage greater participation among less powerful learners. It was also suggested that online and asynchronous communication may elicit responses from learners who fear immediate evaluation or need more time to form ideas and opinions. If these explanations are accurate, then they hold important implications for face-to-face instruction. More attention should be paid to the climate of the classroom or training program. Various instructional strategies should be employed to de-emphasize power

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differences among participants or to empower and engage less verbal participants.

To the extent that learner–learner interactions are validated as effective learning tools both at the group and individual levels, more emphasis should be placed on weaving team training and team learning into both formal training and informal training on the job. There is considerable support for the effectiveness of formal team training (e.g., Salas, Nichols, & Driskell, 2007), but effects are mainly investigated at the team level. Additional research should investigate the impact of team training on individual learning. Further, the influence of variables such as perceived team climate, team trust, social power (within the team), and immediacy—each at the individual level—should be investigated for their effects on individual learning.

Greater emphasis both in research and practice should be placed on social networks as an informal learning tool on the job. There are two emerging areas of research that embody this call. The first is research on peer mentoring (e.g., Allen, Russell, & Maetzke, 1997; Bryant, 2005). Proponents of peer mentoring recognize that because mentors serve both prosocial and technical functions (Kram, 1983), greater benefits of mentoring may ensue from protégés developing a network of mentors than relying on one mentor alone (de Janasz & Sullivan, 2004; van Emmerik, 2004). Implicit in the notion of peer mentoring is the notion that one's coworkers may be resources for technical knowledge for which there is no other readily available source. However, the research on learner–learner interaction suggests two additional benefits of peer mentoring. The first is that social networking with peers (in the context of one's job) may increase motivation to learn and develop, and sustain motivation during learning struggles or applying learning to new tasks. The second is that there are positive outcomes of being a mentor: demonstrating new skills, using think-alouds, and engaging in reciprocal instruction (e.g., A. L. Brown & Palinscar, 1989) are all ways of socially negotiated new knowledge and new skills in both the protégé and the mentor.

A second emerging area of research is on professional forums (for a review, see Cianciolo, Heiden, & Prevou, 2006). Professional forums are Web sites designed for specific jobs or communities, such as junior officers in the Army or Java programmers. These forums may be sponsored by an organization but often emerge within communities of common interest. (The Academy of Management's Research Methods Web site shares many common characteristics with a professional forum.) The forums allow participants to post and respond to questions on topics such as how to handle job-related scenarios, discuss strategies for individual or professional development, post tools and content of interest to other members, or seek advice from experts who are recruited to participate in the forum. As noted by Cianciolo et al., in their current form, professional forums seem best suited to the "passionate professional," one who values lifelong learning and professional development. However, as more workers become aware of the value of these forums for rapid access to work-related knowledge, anonymous feedback, and long-term career advice, professional forums may be perceived as essential by all types of workers.

Finally, as evidenced by the growing popularity of online training, e-mentoring (Ensher & Murphy, in press), and professional forums, the distinction between learning and job performance is becoming blurred. In *The Digital Economy*, Tapscott (1996) predicted that at some point one's job will be to learn. Third-generation learning implies the same. Third-generation learning rejects the notion of a purely objective knowledge domain, or skills and competencies to be learned. Instead, learning also involves a continual process of socially negotiated meaning. Although job-relevant knowledge and skills can be acquired in training, a key purpose of formal instruction is to enhance social and learning skills and prepare individuals for everyday learning on the job through live and technologically mediated interaction with others.

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