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Strategies for Supporting Self-Regulation During Self-Directed Learning in the Workplace

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Abstract
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Keywords
self-directed learning, self-regulation, adaptive guidance, metacognitive instruction, structured reflection

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Strategies for Supporting Self-Regulation During Self-Directed Learning in the Workplace

Now more than ever, organizations are relying on learning to develop human capital resources and gain competitive advantage (Noe, Clarke, & Klein, 2014). A recent survey of chief learning officers, for example, found that, over the next year, most expect learning to become even more aligned with company objectives and more valuable to the success of their organization (Anderson, 2015). This has resulted in more resources being devoted to learning activities than ever before, but also greater pressure to extract maximum value from these investments. Organizations are increasingly turning to technology-based learning as a way to circumvent the costs and constraints associated with sending employees to formal programs (Noe et al., 2014). In addition, organizations are seeking to leverage the potential of informal learning and to embed learning into the workplace so as to enhance its application and impact (Bear et al., 2008; Kozlowski et al., 2001).

The shift in learning from the classroom to technology and the workplace has redefined the role of the employee in the learning process. In particular, employees are increasingly being asked to engage in self-directed learning, characterized by greater learner control and autonomy. Advanced learning technologies, for example, provide employees with unprecedented control over important learning decisions, such as how much time to spend studying and practicing. When learning on the job, employees are often responsible for analyzing ambiguous experiential data and generating feedback about how to modify their behavior (DeRue, Nahrgang, Hollenbeck, & Workman, 2012). Although learning in organizations today is more self-directed and autonomous than ever, there is considerable evidence to suggest that individuals often make ineffective use of the control they are given over their learning (Bell & Kozlowski, 2002; Brown, 2001). In online environments, for example, individuals often implement ineffective learning

strategies and engage in poor planning (Sitzmann & Johnson, 2012). Similarly, individuals often struggle to learn through experience and can be overwhelmed by novel and challenging job assignments (DeRue & Wellman, 2009).

The goal of the current chapter, therefore, is to examine strategies that can be used to support self-regulation during self-directed learning in the workplace. Over the past decade, researchers have developed and evaluated a number of interventions designed to support self-regulated learning, including adaptive guidance, self-regulation prompts, planning interventions, metacognitive instruction, and structured reflection. Because this work has been largely compartmentalized, I adopt an integrative perspective in this chapter that argues that these various interventions represent manifestations of three overarching strategies for supporting self-regulation during self-directed learning. By focusing attention on these broader strategies, the aim is to not only gain greater insight into what we know about supporting self-directed learning but also to uncover issues that warrant future research attention.

In the next section, I provide an overview of self-directed learning and discuss the role of self-regulation in enabling learners to take advantage of the control offered by such environments. Before doing so, however, it is important to clarify a few important points about the scope the current chapter. First, much of the research in this area has focused on younger learners in academic settings (Schmidt & Ford, 2003). Although I discuss notable insights from this work, I focus primarily on research that has examined adults engaged in more unstructured learning environments so as to draw conclusions that are directly applicable to autonomous learning in the workplace. Second, it is important to highlight that the current chapter does not delve into recent research that has provided insight into how to design training interventions so as to engage individuals as active participants in the learning process (e.g., Bell & Kozlowski,

2008; Keith & Frese, 2008). Instead, attention is centered on the self-regulation strategies that organizations can deploy to help support employees' more informal and self-directed learning activities.

An Overview of Self-Directed Learning

Self-directed learning can take many different forms. It can occur formally or informally, online, or through social interactions (Noe et al., 2014). The defining feature of self-directed learning is the autonomy granted to learners. In particular, individuals have an opportunity to craft their learning experience through control over important features of the learning environment, such as content, sequence, and pace (Kraiger & Jerden, 2007). It is important to note that autonomy is not an absolute concept, but rather is experienced in degrees depending on the extent to which an individual has responsibility for various learning decisions (Nunan, 1996). Although self-directed learning is not a new concept, learning has become increasingly controlled by the learner in recent years as the traditional reliance on formal, classroom training within organizations has been supplanted by a growing emphasis on technology-based and workplace learning (Brown, 2001; Kozlowksi et al., 2001; Noe et al., 2014).

This shift has helped organizations to respond to pressures for improved efficiency and cost-control as well as to deliver learning that is more contextualized, which is crucial for developing more complex and adaptive skills (Kozlowski et al., 2001). At the same time, it has revealed some of the challenges that can arise when learners are given greater autonomy and control. Brown (2001), for example, studied employees in an online training course that allowed a high degree of learner control and found that many elected to skip critical material or move quickly through the course, which undermined their knowledge gain. Other studies have found that attrition is often a problem in online learning (Sitzmann & Ely, 2010; Welsh, Wanberg,

Brown, & Simmering, 2003). As learning moves out of the classroom, individuals are more likely to experience technical difficulties, interruptions, and other distractions that can undermine learning and prompt withdraw (Sitzmann, Ely, Bell, & Bauer, 2010). In addition, developmental work experiences, particularly those that are very challenging, are often characterized by considerable uncertainty, which can overwhelm individuals and diminish the value of the experience (DeRue & Wellman, 2009).

In order to navigate these challenges and make effective use of the control offered by self-directed learning environments, learners must become active participants in the learning process (Bell & Kozlowski, 2008, 2010). In particular, learners must engage in self-regulated learning, which refers to "the modulation of affective, cognitive, and behavioral processes throughout a learning experience to reach a desired level of achievement" (Sitzmann & Ely, 2011, p. 421). Self-regulation is triggered by goal setting and involves a number of interrelated processes, including planning, monitoring, metacognition, and self-efficacy, which influence how learners allocate their effort and attention, evaluate their progress toward desired objectives, and react to goal progress in terms of either reallocation of effort and attention or their withdrawal (Kanfer & Ackerman, 1989; Karoly, 1993). Given the importance of these processes for learning, particularly in environments characterized by a high degree of learner control, it is important to identify strategies that that can help learners to engage in effective self-regulation (DeRouin, Fritzsche, & Salas, 2005; DeRue & Wellman, 2009; Sitzmann, Bell, Kraiger, & Kanar, 2009). In the following section, I review a number of strategies that have emerged from recent research.

Strategies for Supporting Self-Directed Learning

Over the past few decades, considerable research attention has been focused on developing strategies that can support self-regulated learning and, in the process, increase the effectiveness of more autonomous or self-directed learning. These strategies are typically developed with the goal of influencing specific self-regulatory mechanisms (e.g., monitoring, metacognition), which has resulted in a multitude of different interventions, including adaptive guidance/advice, metacognitive instruction, planning interventions, self-regulation prompts, and structured reflection. The work in this area has been cross-disciplinary, with researchers in the areas of education, applied psychology, and information technology all developing various interventions, although there has been minimal integration across these various streams of research. The result is a somewhat fragmented literature that has been largely focused on evaluating specific interventions rather than developing an overarching theory about how to support self-regulation during self-directed learning.

In this section, I present a conceptual framework that organizes these various strategies into three broad categories based on the underlying intent of the strategy. The first category, prompting strategies, captures interventions that aim to *activate* critical self-regulation mechanisms during learning. The second, guiding strategies, refers to interventions designed to *augment* learners' self-regulatory activity. The final category, cultivating strategies, are designed to *advance* the capacity or capability of learners to engage in self-regulated learning. The goal of the framework is to move beyond a focus on specific interventions to more broadly consider different approaches that may be used to support self-regulation during self-directed learning. In doing so, it is possible to reveal points of convergence across seemingly disparate interventions as well as to identify how the three categories of strategies diverge, both conceptually and

practically. Table 1 provides an overview of the strategies and in the following sections I examine each in more detail, focusing attention on the key elements of each approach and reviewing research that has been conducted in each area.

[INSERT TABLE 1 HERE]

[Strategies for Supporting Self-Directed Learning in the Workplace]

Prompting Strategies

Recognizing that individuals often fail to make appropriate decisions about how to allocate their time and effort during self-directed learning, prompting strategies use questions to encourage self-regulatory activities, such as monitoring learning behaviors and reflecting on learning progress (Sitzmann et al., 2009). The prompts, which are implemented at specified intervals during learning, ask learners to answer questions about their self-regulatory activities, such as whether they are setting goals, enacting effective learning strategies, and making progress toward their goals. The questions can target general self-regulatory activities (e.g., concentrating on learning the material) or specific processes that have been identified as critical for learning in a particular context (e.g., emotion-control in stressful learning environments). Examples of questions that have been used in past research include "Am I setting goals to ensure I have a thorough understanding of the training material?" and "Do I understand all of the key points of the training material?" (Sitzmann & Ely, 2010). By answering these questions, learners are more likely to recognize deficiencies in these areas and take steps to increase subsequent self-regulatory activity, which should in turn enhance their learning.

To date, research in this area has focused primarily on strategies designed to prompt metacognition or one of its subcomponents. Metacognition refers to an individual's knowledge of and control over his or her cognitions and includes planning, self-monitoring of learning, and

self-evaluation of progress (Flavell, 1979; Ford, Smith, Weissbein, Gully, & Salas, 1998). As Sitzmann and Ely (2011) note, metacognition is a term that is often used very broadly to refer to all aspects of cognitive self-regulation (see also Dinsmore, Alexander, & Loughlin, 2008). Research to date has provided somewhat mixed evidence for the effectiveness of prompts as a strategy for increasing individuals' metacognitive activity and improving important learning outcomes. Van den Boom, Pass, Merriënboer, and Gog (2004), for instance, found that providing undergraduate students with prompts that asked them to reflect on important self-regulatory activities (e.g., planning, monitoring, evaluation) at three different phases during an online course did not significantly increase metacognitive activity or learning performance. In a web-based course administered to undergraduate students, Kauffman (2004) discovered that self-monitoring prompts, which specifically asked students to reflect the completeness of their notes, did not influence self-reported levels of metacognitive awareness but did increase student achievement on a declarative knowledge test. Across three studies, Bannert and Mengelkamp (2013) examined the effects of prompts in a hypermedia learning environment, which uses hyperlinks and other features to provides individuals with dynamic, nonlinear access to multimedia learning content. They found that the results varied depending on the nature of the prompts (e.g., reflection prompts, metacognitive prompts) and the outcome examined (e.g., metacognitive activity, knowledge). In contrast to Kauffman (2004), for example, Bannert and Mengelkamp (2013) found that metacognitive prompts designed to initiate planning, monitoring, and evaluation activities during the different phases of learning led to increased metacognitive activity (e.g., analysis and evaluation as measured through video analysis) but did not affect recall or knowledge. Similarly, Berthold, Nückles, and Renkl (2007) found that metacognitive prompts, which in this case were questions designed to induce the monitoring of comprehension,

increased metacognitive activity during video-based training but did not impact learning (as measured by tests of immediate understanding and delayed retention).

Other studies have provided more unequivocal support for the utility of prompting strategies. Siztmann et al. (2009), for example, showed across two studies that trainees prompted to engage in self-monitoring and self-evaluation during learner controlled technology-delivered instruction exhibited greater improvements in their knowledge and performance over time than trainees not prompted to self-regulate. Sitzmann and Ely (2010) found that prompting self-regulation throughout online training increased learning and that time on task fully mediated this relationship. Further, the intervention reduced attrition and helped trainees to maintain their level of self-regulatory activity following poor learning performance. In a hypermedia learning environment, Bannert, Sonnenberg, Menglekamp, and Pieger (2015) showed that metacognitive prompts that could be configured by learners in terms of their order and timing led to more systematic navigation behavior and higher levels of transfer performance immediately following learning and in a follow-up session conducted three weeks later.

One of the challenges that arises when attempting to reconcile these mixed findings is that although each of these studies examined metacognitive prompts, there were differences in the specific activities that were targeted and the questions used to induce them. Few studies have compared the effects of different types of prompts, thus creating a need for future research that directly examines how different prompting interventions affect learning processes and outcomes (Bannert et al., 2015). The pattern of findings across these various studies suggests some other factors that may be important to consider when implementing prompting strategies. First, these strategies may be more effective when learning takes place over an extended period of time. Van den Boom et al. (2004), for example, suggest that the prompts in their study may have had

limited effects due to the short duration of the study task (one session of approximately two hours). In the studies where prompts have proved more successful (e.g., Sitzmann et al., 2009; Sitzmann & Ely, 2010), the courses have not only been longer in duration (e.g., 4 hours) but learning could be spread out over several weeks. In longer and more dispersed courses, prompts may be especially critical for sustaining self-regulated learning. A second and related consideration is the extent to which individuals are exposed to prompts during learning. Kauffman (2004), for example, suggests that the prompts in his study may not have activated students' metacognitive awareness because they were delivered at only three points during learning. Sitzmann and Ely (2010) also showed that continuously prompting self-regulation throughout learning was much more effective than prompting self-regulation only during the first half of training or delaying the intervention until the latter half of training. Together, these findings suggest that repeated exposure to prompts enhances the effects of the strategy on learning processes and outcomes. Finally, some scholars have suggested that these strategies are only effective if learners comply with the prompts; that is, if they pay attention to them and take steps to engage in the highlighted activities (Bannert et al., 2015; Reid & Morrison, 2014). It is interesting to note that in those studies in which prompts have had stronger effects learners have been asked to actually respond to the questions on a 5-point scale to ensure they were attending to the intervention and reflecting on their self-regulation (Sitzmann et al., 2009; Sitzmann & Ely, 2010). Soliciting learner responses to the prompts may be an effective means of ensuring compliance and increasing the effectiveness of the strategy.

Overall, research suggests that prompting strategies can be an effective means of enhancing self-regulated learning. Interestingly, most studies have examined the effects of prompts in the context of more bounded learning experiences, such as an online course.

However, prompting strategies may prove particularly valuable for more informal learning, which tends to have a longer time horizon and allow more opportunity for individuals to shape their own learning experience. Thus, it will be important for future research to examine prompting strategies in the context of more informal and autonomous development.

Guiding Strategies

Guiding strategies are designed to augment learners' self-regulation activity by providing information they need to make effective decisions about how to deploy their attention and allocate their effort (Bell & Kozlowski, 2002). Whereas prompting strategies encourage learners to engage in self-regulatory activities, guiding strategies aim to shape the quality and focus of these activities. Learners may not possess well developed self-regulatory skills or may find their skills and abilities stretched in more complex and ambiguous learning environments (DeRue et al., 2012; Kozlowski, Toney, et al., 2001). Thus, guiding strategies supplement learners' self-regulation by providing evaluative or prescriptive information needed to make better learning decisions. Although guided learning can take many different forms (cf. Kirschner, Sweller, & Clark, 2006), I focus below on several strategies that have been developed specifically to support self-regulated learning in more autonomous learning environments.

Building on earlier research on advisement strategies (e.g., Tennyson, 1980), Bell and Kozlowski (2002) developed an adaptive guidance intervention designed to support learners' self-regulatory processes in more complex, learner-controlled environments. Adaptive guidance is designed to support self-evaluation by providing learners with diagnostic information to help them calibrate their progress and pinpoint performance discrepancies. In particular, the guidance informs individuals whether their performance of key skills and strategies reflected low, medium, or high levels of proficiency, based on a comparison of their past performance to

specified performance standards. Moreover, adaptive guidance seeks to influence how learners allocate their attention and effort (i.e., self-monitoring) by suggesting what they should study and practice based on their past performance. For example, an individual might be told that he or she has reached a minimal level of performance in a particular area, but needs to study and practice specific task elements in order to achieve mastery. Bell and Kozlowski (2002) found that learners who received adaptive guidance during learner-controlled, technology-based training followed a more appropriate, ramped study and practice sequence, spending 25% more time studying relevant training material and practicing almost twice as many of the relevant training topics. In addition, adaptive guidance had a positive effect on learners' self-efficacy early in training and resulted in higher levels of basic and strategic knowledge and performance during training and improved strategic performance on a more complex transfer task. Kanar and Bell (2013) extended these findings by comparing two forms of adaptive guidance that differed in terms of whether the learning recommendations were presented using controlling language (e.g., "you have to") or autonomy-supportive language (e.g., "you might"). Overall, the results revealed that learners who received controlling guidance exhibited greater growth in their basic and strategic performance over the course of training, suggesting that in complex, autonomous learning environments it may be beneficial to use guidance to constrain learners' perceived choices so as to conserve their attentional resources and increase the likelihood they engage with critical material. However, future research is needed to replicate these findings since studies have shown autonomy-support to be beneficial in other learning contexts (e.g., Liu and Fu, 2011; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004).

Within the education literature, several related guiding strategies have been examined. Aleven, McLaren, Roll, and Koedinger (2006), for example, developed a tutoring system called

Help Tutor, which provides guidance about students' metacognitive activities to help them become better learners. The Help Tutor agent compares students' metacognitive behaviors, in particular their help-seeking (e.g., asking for a hint), to an ideal or correct model and provides feedback and guidance when "meta-cognitive bugs" are identified (Aleven et al., 2006, p. 111). Roll, Aleven, McLaren, and Koedinger (2011) evaluated the effects of Help Tutor by integrating it into a commercial tutoring system for geometry. They found that Help Tutor improved several aspects of students' help-seeking behavior and students were able to transfer these skills to future units in which the tutor was no longer available. Although the tutor improved students' help-seeking behavior, it did not lead to gains in learning, which the authors suggest may have been because the metacognitive support imposed excessive cognitive load that interfered with knowledge acquisition. A related strategy that has received significant attention is metacognitive scaffolding, in which agents (artificial or human) or templates (e.g., diagrams) are used to help students enact different aspects of self-regulated learning (Azevedo & Hadwin, 2005; Quintana, Zhang, & Krajcik, 2005). A key difference across the various forms of scaffolding is whether the information provided is static/fixed or adaptive/dynamic. Azevedo, Cromley, and Seibert (2004) compared fixed and adaptive scaffolding designed to help students regulate their learning in a hypermedia environment. The fixed scaffolding provided learners with domain-specific sub-goals designed to guide learning, whereas the adaptive scaffolding condition gave learners access to a tutor that would help guide them through activities such as planning their learning and monitoring their understanding. Azevedo et al. (2004) found that learners who received the adaptive scaffolding were better able to regulate their learning and also exhibited greater improvement in their mental models of the domain.

The strategies examined thus far deliver guidance while individuals are engaged in learning. However, guiding strategies can also be used to augment self-regulatory activities that occur prior to and following learning experiences. Sitzmann and Johnson (2012), for example, developed an intervention in which trainees were guided through a process of planning when, where, and how much time they were going to devote to training before each module of an online course. For example, trainees were asked to select dates on a calendar for when they planned to log into the course and were also asked to check the locations (e.g., home, work, library) where they were planning to participate in each module. Siztmann and Johnson (2012) found that the planning intervention improved learning and reduced attrition, but only when trainees followed through on their plans or when the intervention was paired with prompts that targeted self-regulatory processes that occur subsequent to planning (e.g., monitoring, concentration). Following developmental experiences, structured or guided reflection is a strategy that can be used to help individuals engage in a process of systematically analyzing their behavior and generating feedback about how to change their behavior and improve their future performance (Ash & Clayton, 2004). DeRue et al. (2012), for example, had MBA students engage in structured reflection through after-even reviews (AERs) following four key developmental experiences that occurred over an eight-month period. Prior to each AER session, the students were asked to answer a set of questions designed to have them reflect on different aspects of the experience, including their own behavior and contributions, lessons learned, and specific actions they plan to take to further improve their performance. During the AER session, a trained facilitator guided the students through a discussion in which they were asked to analyze their experiences, consider different approaches they may have taken, and identify how they will

lead differently in the future. DeRue and colleagues found that students who participated in the after-event-reviews (AERs) showed greater improvement in their leadership behaviors over time.

Overall, these studies demonstrate that guiding strategies can be an effective tool for supporting self-regulation before, during, and following self-directed learning experiences. However, future research is needed to better understand the boundary conditions of these strategies. For example, studies comparing autonomy-supportive and controlling learning environments have yielded somewhat inconsistent findings (Patall, Cooper, & Robinson, 2008), suggesting that more work is needed to determine when each type of guidance should be used. Similarly, although Azevedo et al. (2004) found support for the proposed benefits of adaptive scaffolding, they note that more research is needed to examine how different scaffolding methods impede or facilitate specific aspects of self-regulated learning.

Cultivating Strategies

Interventions that fall into the final category, cultivating strategies, aim to develop individuals' capacity to engage in self-regulated learning. These interventions are rooted in the idea that individuals can learn how to better regulate their cognitive activities and often involve teaching specific metacognitive strategies, such as using self-questioning to monitor comprehension (Schmidt & Ford, 2003). In contrast to strategies that aim to activate or augment self-regulation during learning, cultivating strategies are not embedded in the learning environment (Azevedo & Cromley, 2004). Rather, these strategies are implemented in the pre-training environment in order to prepare individuals to use self-regulated learning strategies during subsequent learning engagements. A second and related distinction is that these strategies do not necessarily need to be tailored to a specific learning context and, at least theoretically, can be used to develop generic self-regulatory skills that individuals are able to apply across diverse

learning situations. In contrast, self-regulatory prompts and guided information often need to be customized to fit the content and goals of a particular learning event. Accordingly, cultivating strategies may be better suited to supporting more informal learning than prompting or guiding strategies. However, compared to these other interventions, less research attention has been devoted to understanding whether individuals can be taught to regulate their learning in more complex, self-directed learning environments. Yet, there is an emerging body of research in this area, which I examine below.

Metacognitive instruction is an intervention that aims to increase the frequency and accuracy of learners' assessments of their knowledge and, in turn, help them make better decisions about allocate their time and effort (Schmidt & Ford, 2003). It can take many different forms but generally involves informing learners of the importance of metacognition during learning, making them aware of common metacognitive errors (e.g., overestimating their level of understanding), and teaching them strategies they can use to enhance their metacognitive activity. For example, individuals may be taught to use self-questioning (e.g., "Are we getting closer to our goal?" "What worked? What didn't work" "Why I am doing this?") to improve the accuracy of their planning, monitoring, and evaluation activities (Keith & Frese, 2005; Mesmer-Magnus & Viswesvaran, 2010)). Although research has provided support for the effectiveness of metacognitive instruction, the majority of this work has been conducted on young children in academic settings (Schmidt & Ford, 2003). Several recent studies, however, have examined whether the effects of metacognitive instruction generalize to adults in nonacademic settings. Keith and Frese (2005), for example, found that providing university students with metacognitive instruction on how to use self-questioning failed to improve their performance during training on a software program. Schmidt and Ford (2003), however, found that a similar metacognitive

training intervention enhanced metacognitive activity during a web-based training program, but only among trainees who were low in performance-avoidance orientation. Azevedo and Cromley (2004) found that providing training in planning, monitoring, and other aspects of self-regulated learning enhanced individuals' subsequent self-regulatory activity and mental model development in a hypermedia learning environment.

Looking across these and other studies one can begin to identify several factors that may shape the effectiveness of metacognitive instruction. First, Keith and Frese (2005) suggest that the training phase in their study may have been too short (30 minutes) to realize the benefits of metacognitive activities. In support of this claim, the benefits of enhanced metacognitive activity have been more readily observed in the studies with longer training periods (Azevedo & Cromley, 2004: 45 minutes; Schmidt & Ford, 2003: 65 minutes). Thus, similar to the prompting strategies discussed earlier, efforts to develop individuals' metacognitive skills may yield the greatest returns in learning engagements that extend over a longer period of time. Second, Schmidt and Ford's (2003) findings suggest that individual characteristics, such as goal orientation, may predispose learners to react differently to metacognitive instruction, ultimately influencing the effects of the intervention on learning. Indeed, recent research suggests that a significant proportion of learners may be resistant to metacognitive instruction (Jing, 2006). These findings suggest that metacognitive instruction may not benefit all learners and should not be viewed as a one-size-fits-all strategy. Finally, a meta-analysis of pre-training interventions by Mesmer-Magnus and Viswesvaran (2010) compared self-questioning metacognitive strategies to those that instruct individuals to "think aloud" about the process or skill being learned or the relationships among concepts. They found that self-questioning strategies were more effective than think aloud strategies for cognitive learning, whereas think aloud metacognitive strategies

were more effective for skill-based learning. These results suggest that the effectiveness of metacogntive instruction may depend on the extent to which the specific metacognitive strategies taught are aligned with the processes critical to achieving desired learning outcomes.

In most studies of metacognitive instruction, the intervention has been administered immediately prior to training, which makes it difficult to draw conclusions about potential effects over time and across different learning situations. However, a few studies suggest that cultivating strategies may hold promise for building sustained self-regulatory capabilities. Noordzij, van Hooft, van Mierlo, van Dam, and Born (2013), for example, provided unemployed job seekers with learning goal orientation training, which taught them to set goals focused on learning and improvement. The training improved not only their cognitive self-regulation as measured immediately after training but also the effectiveness of their job search activities as measured 12 months later. Frayne and Geringer (2000) found that training a group of insurance salespeople in self-management strategies (e.g., self-monitoring, self-evaluation) led to sustained improvements in self-regulation (e.g., self-efficacy) and performance over a 12-month period.

Future Directions

In recent years, research has made significant strides in terms of not only identifying the challenges that employees face in autonomous learning environments but also developing various interventions to help them overcome these challenges. By organizing these interventions into three broad categories – prompting, guiding, and cultivating – the current chapter aimed to provide an integrative perspective on the different strategies that be used to support employees' self-regulation during self-directed learning. In this final section, I use this integrative perspective to highlight new and necessary areas to be pursued by future research.

Relative and Synergistic Effects

Since studies in this area have tended to focus on examining a single intervention, we currently have a limited understanding of the relative effectiveness of these different strategies for supporting self-directed learning. That is, we do not know whether (or when) it is more effective to use prompts to activate learners' self-regulatory processes, to provide guidance information to augment these processes, or to cultivate learners' self-regulatory capabilities. Perhaps more importantly, we need to gain insight into how these different strategies can be used in concert to support different aspects of employees' self-regulated learning. In one of the few studies to examine multiple interventions, for example, Sitzmann and Johnson (2012) showed that a planning intervention was advantageous for enhancing learning and reducing attrition when it was paired with prompts that targeted self-regulatory processes that occur subsequent to planning. As they conclude, "Via targeting a breadth of self-regulatory processes, it may be possible to assist trainees in avoiding the vast majority of pitfalls that can impede their progress in online training" (Sitzmann & Johnson, 2012, p. 977). These findings underscore the need for future studies that evaluate multiple strategies, so as to better understand their relative and synergistic effects on self-regulated learning.

Individualized Support

Research in this area has generally been agnostic with regard to the role of individual differences in shaping the effects of different support strategies. The result has been an implicit assumption that these strategies are beneficial for all learners (Schmidt & Ford, 2003). Recent research, however, has yielded evidence that challenges this assumption. Sitzmann et al. (2009), for instance, found that prompting self-regulation produced stronger performance gains over time for learners with higher ability or higher self-efficacy. As noted earlier, Schmidt and Ford

(2003) found that metacognitive instruction enhanced metacognitive activity for learners with lower performance-avoidance orientation, but led to lower metacognitive activity among highly avoidant learners. Kanar and Bell (2013) found that controlling guidance was more effective for learners' high in ability and low in pre-training motivation, where autonomy-supportive guidance was more effective for highly motivated learners. DeRue et al. (2012) showed that individuals who are conscientious, open to experience, and emotionally stable and who have had extensive challenging career experiences benefit the most from structured reflection. These findings highlight the importance of adopting a learner-centered perspective in future research so as to understand how individual characteristics interact with these strategies to influence effects on self-regulated learning. Tannenbaum, Beard, McNall, and Salas (2010) highlight a number of individual factors that are relevant to informal learning, including learner motivation, personality characteristics (e.g., locus of control, goal orientation, conscientiousness), and self-awareness, which may represent ripe targets for future work in this area.

Balancing Autonomy and Support

As discussed earlier in this chapter, autonomy can be experienced in various degrees depending on how much control a person is given over their learning. Although I have focused largely on the challenges that can arise when learners are afforded a high degree of control, it is important to recognize that too much structure can also stifle learning (Tannenbaum et al., 2010). The key, therefore, is to allow learners sufficient autonomy while also providing them the support and structure they need to be successful, which is fundamental aim of the strategies we have examined. Yet, determining the ideal mix of autonomy and support for a particular learner and learning situation, remains a challenge. Although recent work has begun to explore this issue (e.g., Kanar & Bell, 2013), as Tannenbaum et al. (2013, p. 317) note, "research is needed to

clarify how, when, and what types of tools and other processes can be used to provide support that fosters rather than inhibits informal learning."

Supporting Social Learning

As the nature of work in organizations shifts from individual jobs to team-based work arrangements (Kozlowski & Bell, 2013), employees' autonomous learning activities increasingly involve interactions with team members. Organizations are also making greater use of social media tools and communities of practice in an effort to facilitate greater informal, peer-based learning (Noe et al., 2014). McFarland and Ployhart (2015) recently developed a contextual framework that identifies eight discrete and ambient stimuli (e.g., latency, interdependence, synchronicity) that distinguish social media contexts from other forms of digital communication and physical contexts. Using this framework they argue that social media platforms may offer a number of practical benefits for employee development and knowledge sharing relative to more traditional practices. For example, social media may allow for employee development and knowledge sharing that is less expensive, faster, and more user-friendly as well as provide broader access to information and other people. However, they also note that there are potential risks involved in using social media for development and knowledge sharing, including that success depends greatly on whether employees actually use the platforms for productive purposes and are able to find relevant information quickly. Given the important role of social interaction in contemporary models of learning (Kraiger, 2008), future research needs to examine how the support strategies can be applied to self-directed learning that is socially embedded. Choi, Land, and Turgeon (2005), for example, showed that guidance was a useful strategy for increasing learners' peer-questioning activities during discussion sessions of an online course. The guidance provided scaffolds for generating different types of questions and was delivered

through the same online collaboration tool that learners used to exchange questions and answers on assigned discussion questions.

Conclusion

As learning in organizations becomes increasingly autonomous and self-directed, employees are being given greater responsibility for important learning decisions. If left to bear this burden alone, both individual development and organizational performance will suffer. Fortunately, recent research has devised numerous strategies that can be used to enhance learners' self-regulation, ultimately enabling more effective self-directed learning. Yet, there still remains much to learn. It is hoped that the integrative perspective provided in the current chapter has not only yielded insight into not only what we know about these different strategies but will also stimulate the future research needed to advance our understanding of how to optimally support self-directed learning in the workplace

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