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The transfer of training: what really matters

Rebecca Grossman and Eduardo Salas

Although organizations invest billions of dollars in training every year, many trained competencies reportedly fail to transfer to the workplace. Researchers have long examined the 'transfer problem', uncovering a wealth of information regarding the transfer of training. Inconsistencies remain, however, and organizations may find it difficult to pinpoint exactly which factors are most critical. Using Baldwin and Ford's model of transfer, we identify the factors relating to trainee characteristics (cognitive ability, self-efficacy, motivation, perceived utility of training), training design (behavioral modeling, error management, realistic training environments) and the work environment (transfer climate, support, opportunity to perform, follow-up) that have exhibited the strongest, most consistent relationships with the transfer of training. We describe our reasoning for extracting such variables from the literature and conclude by discussing potential implications for practice and future research.

Introduction

Training has long been a fundamental concern in organizational contexts. Organizations rely on learning strategies, training technology and development efforts to prepare their workforce (Salas *et al*., 2006). In today's global economy, the knowledge, skills and abilities necessary to maintain a competitive advantage are growing and changing (Arguinis & Kraiger, 2009). As the nature of work changes, employees are increasingly required to develop a wide, mutable set of skills that are essential to the success of their organizations. Yet few workers possess the cultural competence, interpersonal skills and technological proficiency required for these changing work demands (Salas & Stagl, 2009).

In response to these issues, US organizations spend over $125 billion on employee training and development every year (Paradise, 2007). Training can be defined as the

❒ Rebecca Grossman, Graduate Research Assistant, Department of Psychology, Institute for Simulation and Training, University of Central Florida, FL 32826, USA. Email: rgrossman@ist.ucf.edu. Eduardo Salas, Professor, Department of Psychology, Institute for Simulation and Training, University of Central Florida, FL 32826, USA. Email: esalas@ist.ucf.edu.

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systematic acquisition of knowledge, skills and attitudes that together lead to improved performance in a specific environment (Salas *et al*., 2006). This encompasses what employees need to know, what they need to do and what they need to feel in order to successfully perform their jobs. Training is focused on producing permanent cognitive and behavioral changes, and on developing critical competencies for job performance. Organizations make increasingly large investments in training because it serves as a powerful tool for producing the targeted cognitive, behavioral and affective learning outcomes essential for their survival (Salas & Stagl, 2009). Effective training can yield higher productivity, improved work quality, increased motivation and commitment, higher morale and teamwork, and fewer errors, culminating in a strong competitive advantage (Salas *et al*., 2006). On the other hand, a poorly trained workforce can lead to errors, injuries and even legal issues, all of which can be extremely costly. As a grave example, recent reports estimate $183.0 billion are spent on employee injuries and deaths linked to deficient training practices every year (National Safety Council, 2010). Errors of all kinds are so prominent that entire training programs have been developed specifically to remedy them. Error management training, for instance, encourages trainees to make errors and learn from them throughout the training process (Keith & Frese, 2005). Furthermore, a poorly trained workforce can cost organizations billions of dollars in legal fees (Goldman, 2000). Not surprisingly, training has become a paramount concern of organizations and researchers alike.

Despite the emphasis on training, many organizations report a failure to effectively develop skills and anticipate future needs (IBM, 2008). The bulk of training expenditures then seemingly do not transfer to the job. Although employees may gain new knowledge and skills through training programs, learning alone is not sufficient for training to be considered effective. Of primary importance is the positive transfer of training, or the extent to which the learning that results from training transfers to the job and leads to relevant changes in work performance (Goldstein & Ford, 2002). In addition to application, the transfer of training involves the generalization and maintenance of the trained knowledge and skills (Ford & Weissbein, 1997). Estimates suggest that only 10 per cent of training expenditures transfer to the job (Georgenson, 1982), highlighting a glaring gap between training efforts and organizational outcomes. A more recent meta-analysis of the training effectiveness literature revealed a similar disconnect between learning and behavior. When learning criteria were compared with subsequent behavioral criteria (that is, work behaviors), effect sizes decreased substantially (Arthur *et al*., 2003). Further demonstrating the gap between learning and behavior, van Wijk *et al*. (2008) conducted a meta-analysis and found a corrected correlation of only 0.22 between organizational knowledge transfer and performance.

Organizations and researchers have long recognized the 'transfer problem' (Michalak, 1981). In a comprehensive review, Baldwin and Ford (1988) provided a critical analysis of the existing transfer literature and suggested directions for future research. Since their review, there has been an outpouring of both conceptual and empirical research, all aiming to bridge the gap between training and workplace performance (see Burke & Hutchins, 2007 and Hutchins & Burke, 2007). Numerous empirical studies, reviews and meta-analyses have yielded a wealth of information regarding the transfer of training. This vast database of sometimes inconsistent findings, however, could make it difficult for organizations to pinpoint exactly which factors are most critical for transfer. Although several authors have reviewed and summarized the extant literature (for example, Baldwin *et al*., 2009; Blume *et al*., 2010; Burke & Hutchins, 2007; Cheng & Hampson, 2008; Cheng & Ho, 2001; Merriam & Leahy, 2005), conclusions regarding the key components of transfer remain somewhat ambivalent. In an integrative review, for example, Burke and Hutchins (2007) identified factors that have been linked to transfer, and used the extant literature to assess the strength of each relationship described. Of the 31 relationships reported, only 17 were described as having a strong or moderate relationship with transfer. The remaining links were said to show mixed support, minimal evidence or a need to clarify findings through additional research. In another review, Cheng and Hampson (2008, p. 334) remarked

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that, 'inconsistent and unexpected findings have often disappointed researchers and training practitioners', despite the 'proliferation of transfer-related studies in the past several decades'. Furthermore, Blume *et al*. (2010, p. 1089) described the transfer literature as having 'remained characterized by mixed findings and [a] lack of empirical synthesis'.

Clearly, organizations looking to design training programs and facilitate transfer could benefit from an updated review that identifies only those factors that have shown the strongest, most consistent relationships with training transfer. Thus, the purpose of this paper is to identify and summarize the most critical findings relating to the transfer of training. Accordingly, our review is not meant to be comprehensive. We recognize that several factors that have been linked to transfer will not be covered. We argue, however, that although such evidence is crucial for furthering the science of training, less consistent findings are not as essential for organizations seeking straightforward recommendations. As mentioned, our goal is not to provide another comprehensive review of the transfer literature but, rather, to integrate findings from existing reviews and provide a translation for organizations seeking evidence-based guidance. We draw from only strong, unambiguous findings reported in empirical studies, and both qualitative and quantitative reviews. Because of the financial costs and organizational resources involved, we believe it is not practical, or perhaps even feasible, for organizations to consider every single factor that has been linked to transfer when implementing a training program. Instead, we feel that organizations can benefit from knowledge of the specific factors that have not only been consistently linked to transfer, but have also exhibited the strongest relationships.

Furthermore, we feel that training researchers can also benefit from our abbreviated set of factors shown to influence transfer. Researchers, too, will find it impractical to incorporate every single factor into their theoretical models and research designs. Rather than an expansion of the list of factors that can influence transfer, we feel that the literature can benefit from a shift in focus to a deeper investigation of the factors that have already yielded solid evidence. We echo comments made by Blume *et al*. (2010, p. 1095) suggesting that the focus of research should shift from 'the general question, Can training transfer? – which has already been answered affirmatively – to a more targeted focus'. Similarly, we argue that the specific factors we identify in this paper have now garnered sufficient evidence to suggest that they do, in fact, influence transfer, and that future research should begin to investigate these factors on a deeper level (for example, is each factor most important before, during or after training?). Other researchers have begun to carry out or call for a more detailed investigation of the factors shown to influence transfer. In Blume *et al*.'s (2010) meta-analysis, for example, the bulk of the predictor variables exhibited stronger relationships with transfer when the focus of training was on open as opposed to closed skills. We feel that we can contribute by providing a springboard for researchers interested in expanding our knowledge of the most prominent factors shown to influence transfer. To be clear, we are not suggesting that future research should not further investigate transfer relationships that have demonstrated less consistent relationships. Rather, we propose that our understanding of the factors we include is clear enough for researchers to begin investigating them at a deeper level. We hope to motivate future research and provide a starting point for those interested in pursuing it. Overall, we feel that our paper can serve as a guideline for both organizations interested in identifying the bottom line and for researchers interested in advancing our understanding of the transfer of training.

Factors influencing the transfer of training

Along with their qualitative review, Baldwin and Ford (1988) presented a model of the transfer process which includes training inputs, training outputs and conditions of transfer (see an adaptation of this model in Figure 1). Training inputs are thought to influence conditions of transfer both directly, and indirectly, through their impact on training outputs. In line with this model, our review will identify the training inputs

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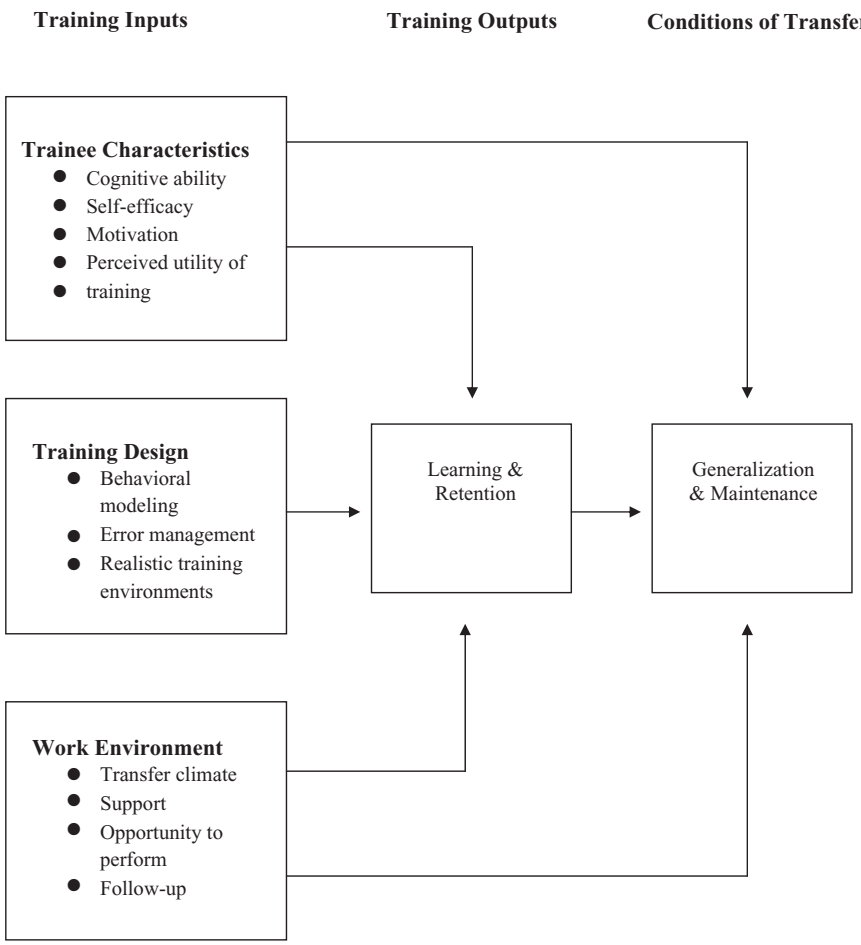

Figure 1: A Model of the Transfer Process. Adapted from Baldwin and Ford, 1988.

that have proven to be highly crucial for the learning, retention, generalization and maintenance of targeted skills, and will organize them into three main categories: trainee characteristics (cognitive ability, self-efficacy, motivation and perceived utility of training), training design (behavioral modeling, error management and realistic training environments) and work environment (transfer climate, support, opportunity to perform and follow-up). Each input will be described in light of previous reviews and more recent empirical findings, a summary of which can be found in Table 1. The implications for organizations and future research will then be discussed.

Trainee characteristics

It is widely accepted that trainee characteristics play a powerful role in the transfer of training (Burke & Hutchins, 2007). Some argue that such characteristics account for the bulk of variability in training outcomes (van der Klink *et al.*, 2001). We will focus on those traits that have shown the strongest, most consistent relationships with transfer. These include cognitive ability, self-efficacy, motivation and perceived utility of training.

Cognitive ability

Trainees' ability, particularly cognitive ability, is a strong predictor of transfer outcomes (Burke & Hutchins, 2007). Support has long existed, for example, that ability and

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Table 1: Key factors for the transfer of training

What	Comments	Citations
Trainee characteristics		
Cognitive ability	Trainees higher in cognitive ability have more success in processing, retaining, and generalizing trained skills.	Baldwin & Ford, 1988; Blume *et al*., 2010; Burke & Hutchins, 2007; Colquitt *et al*., 2000; Kanfer & Ackerman, 1989; Velada *et al*., 2007
Self-efficacy	Trainees higher in self-efficacy have more confidence in their ability to learn and apply trained competencies, and are more likely to persist when performing difficult tasks.	Blume *et al*., 2010; Burke & Hutchins, 2007; Chiaburu & Lindsay, 2008; Chiaburu & Marinova, 2005; Velada *et al*., 2007
Motivation	Transfer is facilitated when trainees are motivated to learn and transfer throughout the training process.	Baldwin *et al*., 2009; Blume *et al*., 2010; Burke & Hutchins, 2007; Chiaburu & Lindsay, 2008; Chiaburu & Marinova, 2005; Facteau *et al*., 1995; Lim & Johnson, 2002; Naquin & Holton, 2002; Tziner *et al*., 2007
Perceived utility of training	Trainees who perceive training as useful and valuable are far more likely to apply new competencies in the workplace.	Burke & Hutchins, 2007; Chiaburu & Lindsay, 2008; Gilpin-Jackson & Bushe, 2007; Velada *et al*., 2007
Training design		
Behavioral modeling	Behavioral modeling facilitates transfer when both positive and negative models are used, and when opportunities to practice are provided.	Taylor *et al*., 2005
Error management	Error management promotes the transfer of training by allowing trainees to anticipate potential issues, providing them with knowledge of how to handle such problems, and highlighting the negative outcomes that can occur if training is not transferred.	Burke & Hutchins, 2007; Heimbeck *et al*., 2003
Realistic training environment	Conducting training and practice in environments that resemble the workplace increases the likelihood that trained competencies will transfer.	Burke & Hutchins, 2007; Kraiger, 2003; Salas *et al*., 2006

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Table 1: Continued

What	Comments	Citations
Work environment		
Transfer climate	Situational cues and consequences largely determine whether or not learned competencies are applied in the workplace.	Blume *et al*., 2010; Burke *et al*., 2008; Colquitt *et al*., 2000; Gilpin-Jackson & Bushe, 2007; Kontoghiorghes, 2001; Rouiller & Goldstein, 1993; Salas *et al*., 2006
Support	Both supervisor and peer support are critical for the transfer of training.	Awoniyi *et al*., 2002; Blume *et al*., 2010; Burke & Hutchins, 2007; Chiaburu & Marinova, 2005; Cromwell & Kolb, 2004; Gilpin-Jackson & Bushe, 2007; Hawley & Barnard, 2005; Kontoghiorghes, 2001; Saks & Belcourt, 2006; Salas & Stagl, 2009; Salas *et al*., 2006; Taylor *et al*., 2005
Opportunity to perform	For training to successfully transfer, trainees need the resources and opportunities to apply their new skills and abilities to the workplace.	Burke & Hutchins, 2007; Clarke, 2002; Cromwell & Kolb, 2004; Gilpin-Jackson & Bushe, 2007; Lim & Johnson, 2002; Salas *et al*., 2006
Follow-up	To facilitate transfer, the formal training period should be followed by additional learning opportunities (e.g. after action reviews, feedback, job aids).	Baldwin *et al*., 2009; Salas & Stagl, 2009; Salas *et al*., 2006; Velada *et al*., 2007

aptitude assessments relate to individuals' trainability (Baldwin & Ford, 1988). Such assessments typically measure overall intelligence, which reflects individuals' ability to understand complex ideas, adapt to their environments, learn from experiences and engage in various forms of reasoning (Neisser *et al*., 1996), all of which can be critical to learning and applying training content. Kanfer and Ackerman's (1989) research suggests that cognitive ability affects trainee performance through its influence on attentional resource capacity. Individuals with high cognitive ability may be better equipped to process and retain information provided during training. Velada *et al*. (2007), for instance, examined potential predictors of training transfer in a large grocery organization. Results indicated that training retention, a construct they related to cognitive ability, was significantly related to the transfer of training. Strong evidence of the role of cognitive ability was found in an extensive meta-analysis based on two decades of training research (Colquitt *et al*., 2000). The authors reported a corrected correlation coefficient between cognitive ability and training transfer of 0.43. More recently, Blume *et al*. (2010) echoed these findings in another thorough meta-analytic review of the transfer literature. Cognitive ability emerged as the single strongest predictor of training transfer. Overall, research suggests that cognitive ability is crucial for the transfer of training. Those who are higher in cognitive ability are more likely to successfully

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acquire, utilize and maintain trained competencies. Organizations can safely assume that trainees' cognitive ability will play a vital role in the ultimate success of their training programs.

Self-efficacy

Self-efficacy, which has also been linked to the transfer of training, can be defined as a judgment an individual makes about his or her ability to perform a given task (Bandura, 1982). The higher the trainees' self-efficacy, the more confidence they will have in their ability to successfully acquire targeted skills and perform trained tasks. In challenging situations, individuals with low self-efficacy are more likely to lessen or discontinue their effort, whereas those with high self-efficacy are more likely to exert additional effort in order to meet the challenge (Robbins & Judge, 2009). Clearly, this notion has important implications for training programs that often focus on novel or difficult work behaviors. Not surprisingly, self-efficacy has consistently shown positive relationships with the transfer of training (Burke & Hutchins, 2007). One example is a study that collected data at two points in time following training, and found that performance self-efficacy significantly related to training transfer (Velada *et al*., 2007). Research suggests that self-efficacy partially contributes to transfer through its influence on motivation (which is further discussed below). Colquitt *et al*. (2000), for example, identified self-efficacy as a significant predictor of both training motivation and training outcomes based on a meta-analytic review of the relevant literature. Individual studies following their review continue to yield similar results. A study by Chiaburu and Marinova (2005) indicates that self-efficacy positively relates to pretraining motivation, which, in turn, significantly predicts transfer. Chiaburu and Lindsay (2008) drew similar conclusions after investigating the role of self-efficacy in transfer outcomes. Several other studies have also demonstrated a positive relationship between self-efficacy and transfer, either directly or indirectly, through trainee motivation (e.g. Ford *et al*., 1998; Holladay & Quiñones, 2003).

It is important to note, however, that high self-efficacy might not unconditionally result in positive transfer outcomes. Recent work has identified circumstances in which self-efficacy did not correlate with valued performance outcomes. In a meta-analytic review, for instance, self-efficacy predicted performance in jobs or tasks of low complexity, but not those of medium or high complexity (Judge *et al*., 2007). Interestingly, a study by Vancouver and Kendall (2006) found that self-efficacy actually negatively related to motivation and performance when it was examined at the individual level. The authors suggested that high self-efficacy could cause individuals to feel they are adequately prepared for a challenge, and could thus reduce their motivation to prepare or put forth sufficient effort. Although these studies do not examine transfer specifically, they have implications for performance in general that might extend to the training domain. The training literature could certainly benefit from future research examining this possibility.

Nevertheless, existing research continues to demonstrate the significance of self-efficacy in the transfer of training. Consistent with previous findings, a recent meta-analysis (Blume *et al*., 2010) showed a positive relationship between self-efficacy and transfer. In sum, the extant literature suggests that trainees must believe in their ability to perform certain skills before they can be transferred to the workplace. Individuals higher in self-efficacy will be more confident in their ability to learn and apply new things, and thus will likely be more motivated to transfer training. Although self-efficacy may not be an obvious component of training programs, organizations could greatly benefit from understanding its significant role in the transfer of training.

Motivation

In more recent years, trainee motivation has emerged as a significant contributor to the transfer of training (Baldwin *et al*., 2009). Motivation refers to the processes that account for an individual's intensity, direction and persistence of effort toward attaining a goal (Robbins & Judge, 2009). For transfer to occur, trainees must believe that they are capable of learning, that their effort to learn will change their performance and that a

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change in their performance will lead to valued outcomes (Facteau *et al*., 1995). In relation to transfer, motivation has been conceptualized and studied in various ways. Specifically, pretraining motivation, motivation to learn and motivation to transfer have all exhibited important relationships with training outcomes (Burke & Hutchins, 2007). Naquin and Holton (2002), for example, developed a construct termed motivation to improve work through learning (MTIWL) that encompasses both motivation to learn and motivation to transfer. The authors found that MTIWL predicted transfer significantly greater than other relevant variables in their study. In an investigation of the effects of trainee characteristics on training effectiveness, Tziner *et al*. (2007) found that motivation to learn was the strongest contributor to training outcomes. Lim and Johnson (2002) explored factors that were thought to facilitate or hinder transfer, and identified motivation to transfer as a primary supporting variable. Other studies have also demonstrated the impact of motivation to transfer and pretraining motivation on the transfer of training (e.g. Chiaburu & Lindsay, 2008; Chiaburu & Marinova, 2005). Blume *et al*.'s (2010) meta-analysis provides additional evidence of a positive relationship between motivation and transfer.

Whereas few studies have compared the different types of motivation in relation to transfer, limited empirical findings suggest that motivation to transfer may play the most significant role. Specifically, Chiaburu and Lindsay (2008) examined both motivation to learn and motivation to transfer and found that motivation to transfer exhibited a markedly stronger relationship with transfer (0.43) than did motivation to learn (0.07). Interestingly, however, they also found a positive relationship between motivation to learn and motivation to transfer (0.26), suggesting that motivation to transfer may still play an important, albeit indirect role. The authors proposed that motivation to learn might influence trainees' performance in the instructional environment, yet motivation to transfer is more likely to trigger the proactive behaviors necessary for actual transfer. Taken together, these findings indicate that it is critical that trainees remain motivated during multiple stages of the training process for transfer to occur. Trainees must believe that it is possible to learn and increase performance, and that such improvements will benefit them. Although trainee motivation is another factor that is often overlooked, it undoubtedly plays a crucial role before, during and after training.

Perceived utility/instrumentality

Transfer can also be influenced by the perceived utility or value associated with participating in training (Burke & Hutchins, 2007). Training has high utility or instrumentality when trainees perceive a clear link between required performance and outcomes that they value (Chiaburu & Lindsay, 2008). Burke and Hutchins (2007) summarized factors that influence perceptions of training utility. These include trainees' evaluation of the credibility of the new skills for improving performance, their recognition of a need to improve job performance, their belief that applying new learning will improve performance and their perception of the practicality of the new skills for ease of transfer. Velada *et al*. (2007) showed that trainees' assessments of how applicable the training was to the job, or the degree to which training instructions matched job requirements, significantly related to training transfer. Similarly, Gilpin-Jackson and Bushe (2007) emphasized the importance of trainees' judgments about the value of the training. Finally, Chiaburu and Lindsay (2008) surveyed employees from a large service organization in the United States and found a strong relationship between training instrumentality and transfer. Instrumentality was also related to motivation to transfer, the primary predictor of training transfer in this study. In general, trainees who perceive training as useful and valuable are far more likely to apply new competencies to the workplace than those who do not. Trainees who are not assured of the importance of training will lack the motivation to learn and apply targeted skills. Organizations would be well advised to devote a portion of their training programs to communicating the necessity and utility of their training efforts.

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Training design

The design and delivery of training programs significantly impact learning and, ultimately, transfer outcomes. Learning principles have been used to facilitate the learning, retention and generalization of targeted skills. We focus on the use of behavioral modeling, error management and realistic training environments, all of which have shown strong relationships with the transfer of training.

Behavior modeling

Behavior modeling has emerged as an effective training strategy, perhaps because it incorporates several different learning principles. Based on Bandura's (1977) social learning theory, this approach includes clearly defined explanations of behaviors to be learned, models displaying the effective use of these behaviors, opportunities for trainees to practice learned skills and the provision of feedback and social reinforcement following practice (Taylor *et al*., 2005). In a meta-analytic review, Taylor *et al*. (2005) concluded that behavioral modeling facilitated transfer the most when mixed (both positive and negative) models were provided, when trainees generated their own scenarios during practice, when trainees were prompted to set goals, when trainees' supervisors also underwent training and when rewards and sanctions were instituted in the work environment. Behavioral modeling thus appears to be an effective strategy for promoting the transfer of training. Providing opportunities for trainees to observe and practice targeted behaviors enhances their ability to learn and retain new information. Of the array of learning strategies to choose from when designing training programs, research suggests that behavior modeling is of particular importance for the transfer of training.

Error management

Error management is a related training strategy that has also proven to effectively promote transfer (Burke & Hutchins, 2007). Allowing trainees to make errors and providing error management instructions have emerged as effective ways to facilitate the proper use of targeted knowledge and skills in the workplace. Heimbeck *et al*. (2003), for example, found that training transfer was greater for trainees who were provided with error training and error management instructions as compared to trainees who received error training alone or those who were prevented from making errors during the training process. Error-based training allows trainees to anticipate what can go wrong, and equips them with the knowledge of how to handle potential problems. Furthermore, such training can enhance the perceived utility of training by exemplifying negative outcomes that can occur without the acquisition of trained skills (Burke & Hutchins, 2007). Additional support was found in a recent meta-analysis in which error management training yielded greater transfer outcomes than error-avoidant training methods (Keith & Frese, 2008). Error management training was especially effective for post-training, rather than within training performance, and for novel, rather than similar tasks, two critical components of training transfer. In sum, transfer is facilitated when training incorporates information regarding potential errors and how they should be dealt with. Providing information about incorrect behaviors appears to be equally as important as communicating target behaviors. Organizations can benefit from recognizing error management as an effective strategy for promoting the transfer of training.

Realistic training environment

A recurring theme in the literature is the importance of authentic training and practice settings. Aspects of training should mirror the environment in which trained competencies will be applied as closely as possible. Many organizations go as far as conducting on-the-job training, which takes place in the actual physical and social environment where the tasks being trained will be performed (Salas *et al*., 2006). Trained skills are more likely to transfer to the job following training in this case because they were learned and practiced in the work environment. Training settings that closely resemble

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multiple aspects of the workplace, however, can also be effective. Kraiger (2003), for example, summarized training techniques that have been shown to enhance transfer. These include the use of identical elements, stimulus variability and varying conditions of practice. Such strategies allow trainees to gain experience with multiple conditions that can occur on the job. Similarly, practice scenarios should encompass characteristics of the actual work environment (Salas *et al*., 2006). Accordingly, many training programs now incorporate the use of simulations. Interestingly, both low-fidelity (e.g. role-playing) and high-fidelity (e.g. full-motion simulators) simulations have shown to be equally effective training strategies. Realistic practice scenarios also help promote active learning, a technique thought to maintain trainees' attention and contribute to transfer (Burke & Hutchins, 2007). Overall, conducting training and practice in environments that resemble the workplace increases the likelihood that trained competencies will transfer. Providing a relevant training context essentially allows trainees to gain experience implementing targeted behaviors in the appropriate environment. Realistic training environments are thus significant contributors to the transfer of training.

Work environment

The work environment following training has a significant impact on transfer outcomes. The effectiveness of a training program is largely dependent on the trainees' ability to use their newly acquired competencies on the job (Salas *et al*., 2006). Environmental factors help determine whether or not trainees exhibit learned behaviors once they return to the work setting. Even programs that are designed and delivered effectively will fail to yield positive transfer outcomes when the subsequent work environment does not encourage the use of targeted behaviors. The most critical components of the work environment include transfer climate, support, opportunity and follow-up.

Transfer climate

Transfer climate has been conceptualized as observable or perceived situations in organizations that inhibit or facilitate the use of learned skills (Rouiller & Goldstein, 1993). When trainees perceive a positive transfer climate, they tend to apply learned competencies more readily on the job (Salas *et al*., 2006). Characteristics of a positive transfer climate include cues that prompt trainees to use new skills, consequences for the correct use of skills and remediation for the incorrect or lack of use, and social support from supervisors and peers through the use of incentives and feedback. Furthermore, Rouiller and Goldstein (1993) classify these characteristics into two categories: situational cues and consequences. Situational cues include things such as manager goals, peer support, equipment availability and opportunity to practice trained skills. Consequences consist of punishment and positive and negative feedback following the application of trained skills. The combination of such characteristics can significantly influence the degree to which trained skills are transferred to the workplace. In a longitudinal study examining technology training, for example, the relationship between training and intentions to use new skills on the job was mediated by employees' perceptions of available resources (Marler *et al*., 2006). Perceptions of resources were based on beliefs about whether or not sufficient time to practice new skills would be provided, whether or not supervisors would support the learning process and whether or not documentation and expert help would be available. Whereas several important factors contribute to climate (as discussed in more detail in the following sections), transfer climate as a whole has shown important relationships with transfer outcomes. Colquitt *et al*. (2000) reported a corrected correlation coefficient of 0.37 between climate and transfer. A recent meta-analysis showed similar results, with transfer climate showing the highest relationship with transfer as compared to other components of the work environment (Blume *et al*., 2010). In a qualitative exploratory study, trainees identified an unsupportive transfer climate as the greatest inhibitor to the transfer of training (Gilpin-Jackson & Bushe, 2007). Trainees were reportedly

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hesitant to apply new skills to the workplace when they feared breaking organizational norms. Burke *et al*. (2008) analysed data from 68 organizations around the world and showed that a strong organizational safety climate significantly impacted the transfer of safety training. Finally, Kontoghiorghes (2001) found evidence that transfer climate, specifically task cues that prompt the use of new skills and knowledge acquired in training, was among the most influential variables for the transfer of training. Overall, a positive transfer climate is critical for the application and maintenance of new skills on the job. Organizations that do not take transfer climate into account could seriously hamper their training efforts.

Support

Perhaps through its impact on transfer climate, support is one of the most salient aspects of the work environment related to transfer. Both supervisor and peer support significantly influence the propensity for trainees to utilize trained competencies in the workplace. Supervisors can provide support in various ways and at multiple stages in the training process. Although Baldwin and Ford (1988) reported some ambiguity regarding what constitutes support, subsequent research identifies several broad behaviors that are generally included in this dimension (Salas *et al*., 2006). Goal setting, for example, can have a significant impact on transfer outcomes. Prior to training, supervisors should communicate goals regarding the desired performance, the conditions under which the performance will be expected to occur on the job and the criterion of acceptable performance (Burke & Hutchins, 2007). Following training, trainees should be prompted by their supervisors to set proximal and distal goals for applying newly acquired competencies in the workplace (Taylor *et al*., 2005). Research indicates that specific and difficult goals, in combination with feedback, can greatly enhance motivation and, in turn, performance (Robbins & Judge, 2009). Importantly, goal setting can facilitate transfer by directing attention, stimulating action, increasing persistence and prompting trainees to utilize newly acquired knowledge and abilities (Locke & Latham, 2002). It is worth noting, however, that the benefits of goal setting are not without their limitations. Some scholars have argued that when particularly specific or difficult, goals can actually be detrimental due to their potential to narrow one's focus, shift risk attitudes and precipitate the psychological costs associated with goal failure (Ordoñez *et al*., 2009). Furthermore, the same goals may not prove beneficial when applied to different people, as individuals differ in their abilities and the degrees to which they identify with certain goals. Nevertheless, research generally indicates a positive relationship between goal setting and transfer (e.g. Burke & Hutchins, 2007). Supervisors can likely facilitate optimal transfer outcomes by implementing goal setting while remaining cognizant of its potential limitations.

Supervisors can also support trainees by providing recognition, encouragement and rewards, and modeling trained behaviors (Salas & Stagl, 2009; Salas *et al*., 2006). Furthermore, Lim and Johnson (2002) identified supervisors' participation in discussions of new learning, involvement in training and provision of positive feedback as forms of support most recognized by trainees as positively influencing their transfer. Cromwell and Kolb (2004) showed that trainees who received high levels of supervisor support transferred more knowledge and skills 1 year after participating in a training program than those who reported lower levels of support. Likewise, trainees cited lack of management support as a significant barrier to the transfer of training. Other studies have emphasized the importance of supervisor involvement or participation in training for transfer outcomes (e.g. Gilpin-Jackson & Bushe, 2007; Saks & Belcourt, 2006). Supervisory support in the form of encouragement for the application of new skills (Kontoghiorghes, 2001), information sharing, direct feedback and the provision of resources (Awoniyi *et al*., 2002) has also shown strong relationships with the transfer of training. Finally, supervisor support emerged as one of the strongest predictors of transfer in a recent meta-analysis by Blume *et al*. (2010).

Support from peers has also shown consistent relationships with transfer. Chiaburu and Marinova (2005), for instance, reported that peer support showed a strong, direct relationship with transfer, as well as an indirect influence through its impact on

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motivation. Trainees in Gilpin-Jackson and Bushe's (2007) study indicated that observing others using trained skills and being able to coach one another greatly facilitated training transfer. Cromwell and Kolb (2004) showed that high levels of peer support related to the transfer of knowledge and skills 1 year after training. Another study demonstrated that transfer is facilitated when trainees network with peers and share ideas about course content (Hawley & Barnard, 2005). A meta-analytic review of the transfer literature also established a positive relationship between peer support and the transfer of training (Blume *et al*., 2010).

Little evidence exists suggesting that one type of support exerts a stronger influence on transfer than does the other (i.e. supervisor versus peer support). A recent study found no difference when feedback, a form of support, was provided by peers versus when it was provided by supervisors (Van den Bossche *et al*., 2010). More important in this case was the number of people providing feedback and the helpfulness of the feedback, both of which positively related to motivation to transfer and, in turn, actual transfer. Results of the aforementioned meta-analysis (Blume *et al*., 2010), however, do indicate a stronger relationship between supervisor support and transfer (0.31) than between peer support and transfer (0.14), although the authors were quick to point out the small sample sizes on which these findings were based. In sum, the transfer of training is facilitated through the provision of both supervisor and peer support. Of all of the work environment variables, support has garnered perhaps the strongest evidence for its role in the transfer of training. Organizations should have little doubt that support, from both supervisors and peers, does matter.

Opportunity to perform

Employees need ample opportunities to apply their new skills to the workplace for positive transfer to occur (Burke & Hutchins, 2007). Research consistently shows that a lack of such opportunities can seriously inhibit the use of trained competencies on the job. Clarke (2002), for example, identified limited opportunity to perform skills on the job as the strongest barrier to successful training transfer. A study by Lim and Johnson (2002) demonstrated that the provision of opportunities can also be conceptualized as a form of support. Trainees rated opportunity to use trained skills as the highest form of support, and conversely, the lack of opportunity to use training as the biggest obstacle to transfer. After conducting interviews with trainees, Gilpin-Jackson and Bushe (2007) concluded that having time to use new skills is critical for training transfer. Similarly, Cromwell and Kolb (2004) showed that lack of time was a significant barrier to transfer. To provide opportunities, managers should modify recent trainees' workloads to allow them to practice new skills on the job (Clarke, 2002). Furthermore, delay between training and opportunity for trainees to use their learned skills should be minimized for optimal transfer outcomes (Salas *et al*., 2006). For training to successfully transfer, trainees need the resources and opportunities to apply their new skills and abilities to the workplace.

Follow-up

The completion of formal training should not mark the end of the learning experience. The period immediately following the official training program holds various opportunities for enhancing learning and maintenance (Salas & Stagl, 2009). After action reviews, for example, can serve to debrief trainees and provide further education. Trainees should reflect on their training experience and follow up with practice and discussion. Training instructors and supervisors should also provide post-training follow-up and feedback (Baldwin *et al*., 2009). Velada *et al*. (2007), for example, found that feedback regarding trainees' post-training performance significantly influenced transfer. Furthermore, Salas *et al*. (2006) emphasize the use of job aids, tools that are designed to assist with job performance and further facilitate the transfer of training. There are various job aids that can be utilized including informational aids, procedural aids and decision-making and coaching aids. Job aids facilitate transfer by providing important instructions and other reference materials, thereby reducing the mental workload required to apply new skills to the workplace. In an updated review of the

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transfer literature, Baldwin *et al*. (2009) concluded that post-training interventions such as relapse prevention, self-management, goal setting, training in self-talk and post-training instructor follow-ups generally show positive effects on the transfer of training. Organizations should therefore continue to facilitate the learning process following the completion of training to promote positive transfer.

Discussion

The global economy and technological advances of today require organizations to make constant adjustments in order to maintain a competitive advantage (Arguinis & Kraiger, 2009). One such change is the set of knowledge, skills and abilities that are now critical for success. Most employees do not inherently possess the qualities needed to meet these changing work demands, however. As a result, organizations invest billions of dollars in training interventions every year (Paradise, 2007). Despite these efforts, many of them reportedly fail to develop the skills and abilities they target (IBM, 2008). Although employees might learn from their training experiences, trained competencies are generally not applied or transferred to the workplace. Training transfer refers to the application, generalization and maintenance of trained skills on the job (Ford & Weissbein, 1997). The apparent transfer problem has long been a paramount concern of organizations and researchers alike (Michalak, 1981). The large expanse of training literature that has thus accumulated is highly useful but could create difficulty for organizations trying to identify key findings. Accordingly, the purpose of this paper was to identify factors that have shown the strongest, most consistent relationships with the transfer of training. Based on Baldwin and Ford's (1988) model of transfer, we presented the trainee characteristics, features of the work design and elements of the work environment that have largely shown significant relationships with training transfer. We will discuss the implications of these findings below.

Trainee characteristics

Research has demonstrated a strong relationship between trainees' cognitive ability and the transfer of training (for example, Baldwin & Ford, 1988; Colquitt *et al*., 2000). Although this is not a characteristic that organizations can necessarily control, they can consider these findings when determining which employees will participate in training. Furthermore, the use of job aids might lessen the gap between trainees with higher and lower cognitive ability by decreasing the cognitive load that is required to apply training to the workplace.

Self-efficacy has also continually been linked to transfer outcomes (for example, Burke & Hutchins, 2007; Colquitt *et al*., 2000). Before trainees can transfer new competencies to the job, they must believe that they are capable of successfully acquiring and performing them. Encouragingly, interventions designed to increase learner self-efficacy have been shown to effectively improve training performance (Burke & Hutchins, 2007). Unlike other trainee characteristics, such as intelligence or personality, this implies that self-efficacy is susceptible to interventions. When implementing interventions or selecting trainees on the basis of self-efficacy, however, organizations should be cognizant of research suggesting the possibility of having too much self-efficacy (Vancouver & Kendall, 2006). If trainees are overly confident in their abilities, they might experience reduced motivation to learn and decrease the amount of effort they exert during training. These propositions have not yet been empirically supported in relation to transfer, however, and the current training literature generally suggests that at least a moderate level of self-efficacy is essential for the transfer of training.

Motivation relates to trainees' intensity, direction and persistence toward attaining a goal (Robbins & Judge, 2009). Pretraining motivation, motivation to learn and motivation to transfer have all demonstrated important relationships with training transfer (Burke & Hutchins, 2007). Motivation has also proven to be susceptible to interventions. Goal setting, in particular, is a well-established method for increasing motivation

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(Robbins & Judge, 2009). Goals serve as a source of motivation by directing attention, energizing, increasing persistence and prompting the utilization of existing knowledge or strategies, or the search for new information required to carry out the goal (Locke & Latham, 2002). Goals do have potential limitations, however (e.g. overly narrowed focus), which should be carefully considered in the event that they are implemented (Ordoñez *et al*., 2009). Ultimately, training transfer can potentially be increased when interventions designed to improve motivation are implemented.

Transfer is facilitated when trainees perceive clear links from training to performance required on the job, and outcomes they consider valuable (Chiaburu & Lindsay, 2008). Organizations can potentially increase trainees' perceptions of training utility by ensuring that the relevance of training programs are clearly communicated to those who participate in them.

Aligning human resource practices to promote transfer

The determinants of training transfer clearly extend far beyond the characteristics of the training program itself. Perhaps the most basic factors to consider are those that characterize the individuals being trained. The results of this and other reviews suggest that organizations can promote transfer by carefully considering the individual-level factors shown to influence transfer (i.e. cognitive ability, self-efficacy, motivation and perceived utility) when recruiting and selecting trainees. Specifically, organizations can benefit from aligning their recruitment and selection practices with the goals of their training programs. Other researchers have emphasized the importance of integrating various organizational practices (e.g. Pfeffer, 1998). Arguably, implementing practices in a piecemeal, isolated fashion might be ineffective or, in some instances, even counterproductive. Organizations can thus enhance transfer by aligning training efforts with related human resource practices. Because cognitive ability has exhibited strong, consistent relationships with transfer, for example, only individuals high in cognitive ability should be selected to participate in training that is particularly important or difficult. This notion is in line with other findings in the human resource literature showing that businesses that reportedly have aligned practices, in some instances, outperform those who do not (e.g. Verburg *et al*., 2007).

Training design

Research also suggests that behavior modeling, error management and realistic training environments are aspects of training design that are critical for the transfer of training (e.g. Keith & Frese, 2008; Kraiger, 2003; Taylor *et al*., 2005). Clearly, each of these factors can be manipulated to promote transfer. Organizations should consider these strategies when implementing training programs.

Work environment

Transfer climate has also emerged as significant predictor of transfer outcomes (Salas *et al*., 2006). Fortunately, this is another factor that can be largely influenced by the organization. To facilitate transfer, the workplace should contain cues that prompt the use of new skills, and trainees should be provided with such things as opportunities to practice, goals and incentives and performance feedback (Rouiller & Goldstein, 1993). Similarly, efforts should be made to increase supervisor and peer support, other important contributors to the transfer of training (e.g. Blume *et al*., 2010; Van den Bossche *et al*., 2010).

Not surprisingly, trainees need opportunities to apply new competencies in order for them to transfer to the job (e.g. Burke & Hutchins, 2007). Organizations can provide opportunities by designating time and resources for the application of new skills. Supervisors, for example, can modify recent trainees' workloads to increase their opportunities to practice what they learned in the workplace.

Finally, research shows that organizations should not consider the completion of formal training the end of the learning process (Salas & Stagl, 2009). Training should

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be followed up with after action reviews, discussions, practice and feedback in order to promote transfer (e.g. Baldwin *et al*., 2009). Job aids are also a relatively simple way to increase the probability that trained skills will be applied to the job (Salas *et al*., 2006).

Implications for research and practice

Baldwin and Ford's (1988) early call for additional research did not fall on deaf ears. Since their review, an explosion of conceptual and empirical research has greatly expanded our understanding of transfer and has advanced the science of training. Although great progress has been made, a number of findings remain inconsistent or ambiguous. Even in recent years, scholars have described the transfer literature as having 'mixed findings' and a lack of 'synthesis' (Blume *et al*., 2010, p. 1089). Thus, the goal of this paper was to extract the strongest, most consistent findings from the literature in order to help organizations, and even researchers, identify the 'bottom line'. We argue that organizations cannot feasibly incorporate every factor that has been linked to transfer into their training programs. Rather, they could benefit from a set of best practices or guidelines identifying only those factors which are most likely to make a significant impact on their transfer outcomes. We are not the first researchers to recognize the need for a unified set of transfer guidelines. In their recent investigation of best practices, Burke and Hutchins (2008, p. 109) stated that, 'best practice reports in training, or specifically for the transfer of training, are limited, lacking in practicality, dated, or often anecdotal in nature'. Although their research is certainly valuable, the authors' focus was on identifying best practices used by experienced training professionals rather than on those supported in the literature. We believe that our identification of the strongest, most consistent findings reported in the literature can serve as a valuable compliment to Burke and Hutchins's (2008) practice-based paper.

In addition to providing a succinct guide for organizations, we believe that our paper can also serve a purpose for training researchers. The factors included in our review, we argue, have now garnered sufficient evidence suggesting that they do, in fact, reliably exhibit strong relationships with the transfer of training. Instead of investigating whether or not these factors influence transfer, attention should now be shifted to examining the conditions under which the factors are most important. Consistent with other researchers (for example, Blume *et al*., 2010), we encourage future researchers to take a closer look at the variables that we extracted. Of particular interest, for example, is identifying when each factor is most important – before, during or after training. As previously mentioned, incorporating multiple factors into training programs might not be financially or logistically practical for many organizations. Future research examining when it is most important to focus on each factor could prove valuable for organizations with fewer resources. We hope our paper can serve as a springboard for researchers interested in examining these and similar questions.

Conclusions

Organizations that seek guidance when developing training programs and promoting the transfer of training can rely on a vast database of literature that has resulted from decades of research. Such resources, however, contain numerous, sometimes inconsistent, findings that can make it difficult for organizations to pinpoint exactly which factors are most critical for training transfer. We identified variables related to trainees, training design and the work environment that have shown the strongest, most consistent relationships with transfer. This simplified review can serve as a basic guideline for those interested in determining what really matters in regard to the transfer of training.

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References

Arguinis, H. and Kraiger, K. (2009), 'Benefits of training and development for individuals and teams, organizations, and society', *Annual Review of Psychology*, **60**, 451–74.

Arthur, W., Bennett, W., Edens, P. S. and Bell, S. T. (2003), 'Effectiveness of training in organizations: a meta-analysis of design and evaluation features', *Journal of Applied Psychology*, **88**, 234–45.

Awoniyi, E. A., Griego, O. V. and Morgan, G. A. (2002), 'Person-environment fit and transfer of training', *International Journal of Training and Development*, **6**, 25–35.

Baldwin, T. T. and Ford, J. K. (1988), 'Transfer of training: a review and directions for future research', *Personnel Psychology*, **41**, 63–105.

Baldwin, T. T., Ford, K. J. and Blume, B. D. (2009), 'Transfer of training 1988–2008: an updated review and agenda for future research', *International Review of Industrial and Organizational Psychology*, **24**, 41–70.

Bandura, A. (1977), *Social Learning Theory* (Englewood Cliffs, NJ: Prentice Hall).

Bandura, A. (1982), 'Self-efficacy mechanism in human agency', *American Psychologist*, **37**, 122–47.

Blume, B. D., Ford, J. K., Baldwin, T. T. and Huang, J. L. (2010), 'Transfer of training: a meta-analytic review', *Journal of Management*, **39**, 1065–105.

Burke, L. A. and Hutchins, H. M. (2007), 'Training transfer: an integrative literature review', *Human Resource Development Review*, **6**, 263–96.

Burke, L. and Hutchins, H. (2008), 'A study of best practices in training transfer and proposed model of transfer', *Human Resource Development Quarterly*, **19**, 107–28.

Burke, M. J., Chan-Serafin, S., Salvador, R., Smith, A. and Sarpy, S. A. (2008), 'The role of national culture and organizational climate in safety training effectiveness', *European Journal of Work and Organizational Psychology*, **17**, 133–52.

Cheng, E. W. L. and Hampson, I. (2008), 'Transfer of training: a review and new insights', *International Journal of Management Reviews*, **10**, 327–41.

Cheng, E. and Ho, D. (2001), 'A review of transfer of training studies in the past decade', *Personnel Review*, **30**, 102–18.

Chiaburu, D. S. and Lindsay, D. R. (2008), 'Can do or will do? The importance of self-efficacy and instrumentality for training transfer', *Human Resource Development International*, **11**, 199–206.

Chiaburu, D. S. and Marinova, S. V. (2005), 'What predicts skill transfer? An exploratory study of goal orientation, training self-efficacy and organizational supports', *International Journal of Training and Development*, **9**, 110–23.

Clarke, N. (2002), 'Job/work environment factors influencing training effectiveness within a human service agency: some indicative support for Baldwin and Ford's transfer climate construct', *International Journal of Training and Development*, **6**, 146–62.

Colquitt, J. A., LePine, J. A. and Noe, R. A. (2000), 'Toward an integrative theory of training motivation: a meta-analytic path analysis of 20 years of research', *Journal of Applied Psychology*, **85**, 678–707.

Cromwell, S. E. and Kolb, J. A. (2004), 'An examination of work-environment support factors affecting transfer of supervisory skills training to the workplace', *Human Resource Development Quarterly*, **15**, 449–71.

Facteau, J. D., Dobbins, G. H., Russel, J. E. A., Ladd, R. T., Kudisch, J. D. (1995), 'The influence of general perceptions of the training environment on pretraining motivation and perceived training transfer', *Journal of Management*, **21**, 1–25.

Ford, J. K. and Weissbein, D. (1997), 'Transfer of training: an updated review', *Performance and Instruction Quarterly*, **10**, 22–41.

Ford, J., Smith, E., Weissbein, D., Gully, S. and Salas, E. (1998), 'Relationships of goal orientation, metacognitive activity, and practice strategies with learning outcomes and transfer', *Journal of Applied Psychology*, **8**, 218–33.

Georgenson, D. L. (1982), 'The problem of transfer calls for partnership', *Training and Development Journal*, **36**, 75–8.

Gilpin-Jackson, Y. and Bushe, G. R. (2007), 'Leadership development training transfer: a case study of post-training determinants', *Journal of Management Development*, **26**, 980–1004.

Goldman, D. (2000), *Legal Landmines to Avoid in Employment Training*. Retrieved from http://www.ihrnet.com (accessed 17 February 2010).

Goldstein, I. L. and Ford, J. K. (2002), *Training in Organizations*, 4th edn (Belmont, CA: Wadsworth Thompson Learning).

Hawley, J. D. and Barnard, J. K. (2005), 'Work environment characteristics and implications for training transfer: a case study of the nuclear power industry', *Human Resource Development International*, **8**, 65–80.

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Heimbeck, D., Frese, M., Sonnentag, S. and Keith, N. (2003), 'Integrating errors into the training process: the function of error management instructions and the role of goal orientation', *Personnel Psychology,* **56**, 333–61.
Holladay, C. and Quiñones, M. (2003), 'Practice variability and transfer of training: the role of self-efficacy generality', *Journal of Applied Psychology,* **88**, 1094–103.
Hutchins, H. M. and Burke, L. A. (2007), 'Identifying trainers' knowledge of training transfer research findings – closing the gap between research and practice', *International Journal of Training and Development,* **11**, 236–64.
IBM (2008), *Unlocking the DNA of the Adaptable Workforce, the IBM Global Human Capital Study* (Milwaukee, WI: IBM).
Judge, T. A., Jackson, C. L., Shaw, J. C., Scott, B. A. and Rich, B. L. (2007), 'Self-efficacy and work-related performance: the integral role of individual differences', *Journal of Applied Psychology,* **92**, 107–27.
Kanfer, R. and Ackerman, P. L. (1989), 'Motivation and cognitive abilities: an integrative/-aptitude-treatment interaction approach to skill acquisition', *Journal of Applied Psychology,* **74**, 657–90.
Keith, N. and Frese, M. (2005), 'Self-regulation in error management training: emotion control and metacognition as mediators of performance effects', *Journal of Applied Psychology,* **90**, 677–91.
Keith, N. and Frese, M. (2008), 'Effectiveness of error management training: a meta-analysis', *Journal of Applied Psychology,* **93**, 59–69.
Kontoghiorghes, C. (2001), 'Factors affecting training effectiveness in the context of the introduction of a new technology – A US case study.', *International Journal of Training and Development,* **5**, 248–60.
Kraiger, K. (2003), *Perspectives on Training and Development. Handbook of Psychology: Volume 12, Industrial and Organizational Psychology* (Hoboken, NJ: Wiley), pp. 171–92.
Lim, D. H. and Johnson, S. D. (2002), 'Trainee perceptions of factors that influence learning transfer', *International Journal of Training and Development,* **6**, 36–48.
Locke, E. and Latham, G. (2002), 'Building a practically useful theory of goal setting and task motivation: a 35-year odyssey', *American Psychologist,* **57**, 705–17.
Marler, J. H., Liang, X. Y. and Dulebohn, J. H. (2006), 'Training and effective employee information technology use', *Journal of Management,* **32**, 721–43.
Merriam, S. B. and Leahy, B. (2005), 'Learning transfer: a review of the research in adult education and training', *PAACE Journal of Lifelong Learning,* **14**, 1–24.
Michalak, D. F. (1981), 'The neglected half of training', *Training and Development Journal,* **35**, 22–8.
Naquin, S. S. and Holton, E. F. III (2002), 'The effects of personality, affectivity, and work commitment on motivation to improve work through learning', *Human Resource Development Quarterly,* **13**, 357–76.
National Safety Council (2010), *Summary from Injury Facts, 2010 Edition*.
Neisser, U., Boodoo, G., Bouchard, T. J., Boykin, W. A., Brody, N., Ceci, S. J. *et al*. (1996), 'Intelligence: known and unknowns', *American Psychologist,* **51**, 77–101.
Ordoñez, L., Schweitzer, M. E., Galinsky, A. D. and Bazerman, M. H. (2009), 'Goals gone wild: how goals systematically harm individuals and organizations', *Academy of Management Perspectives,* **23**, 6–16.
Paradise, A. (2007), *State of the Industry: ASTD's Annual Review of Trends in Workplace Learning and Performance* (Alexandria, VA: ASTD).
Pfeffer, J. (1998), 'Seven practices of successful organizations', *California Management Review,* **40**, 96–124.
Robbins, S. P. and Judge, T. A. (2009), *Organizational Behavior* (Upper Saddle River, NJ: Pearson Prentice Hall).
Rouiller, J. Z. and Goldstein, I. L. (1993), 'The relationship between organizational transfer climate and positive transfer of training', *Human Resources Development Quarterly,* **4**, 377–90.
Saks, A. M. and Belcourt, M. (2006), 'An investigation of training activities and transfer of training in organizations', *Human Resource Management,* **45**, 629–48.
Salas, E. and Stagl, K. C. (2009), 'Design Training Systematically and Follow the Science of Training', in E. Locke (ed.), *Handbook of Principles of Organizational Behavior: Indispensible Knowledge for Evidence-Based Management*, 2nd edn (Chichester: John Wiley & Sons), pp. 59–84.
Salas, E., Wilson, K., Priest, H. and Guthrie, J. (2006), 'Design, Delivery, and Evaluation of Training Systems', in G. Salvendy (ed.), *Handbook of Human Factors and Ergonomics*, 3rd edn (Hoboken, NJ: John Wiley & Sons), pp. 472–512.
Taylor, P. J., Russ-Eft, D. F. and Chan, D. W. L. (2005), 'A meta-analytic review of behavior modeling training', *Journal of Applied Psychology,* **90**, 692–709.

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Tziner, A., Fisher, M., Senior, T. and Weisberg, J. (2007), 'Effects of trainee characteristics on training effectiveness', *International Journal of Selection & Assessment,* **15**, 2, 167–74.
Van den Bossche, P., Segers, M. and Jansen, N. (2010), 'Transfer of training: the role of feedback in supportive social networks', *International Journal of Training & Development,* **14**, 81–94.
van der Klink, M., Gielen, E. and Nauta, C. (2001), 'Supervisory support as a major condition to enhance transfer', *International Journal of Training and Development,* **5**, 52–63.
van Wijk, R., Jansen, J. J. P. and Lyles, M. A. (2008), 'Inter- and intra-organizational knowledge transfer: a meta-analytic review and assessment of its antecedents and consequences', *Journal of Management Studies,* **45**, 830–53.
Vancouver, J. B. and Kendall, L. N. (2006), 'When self-efficacy negatively relates to motivation and performance in a learning context', *Journal of Applied Psychology,* **91**, 1146–53.
Velada, R., Caetano, A., Michel, J. W., Lyons, B. D. and Kavanagh, M. J. (2007), 'The effects of training design, individual characteristics and work environment on transfer of training', *International Journal of Training and Development,* **11**, 282–94.
Verburg, R., Den Hartog, D. N. and Koopman, P. L. (2007), 'Configurations of human resource management practices: a model and test of internal fit', *International Journal of Human Resource Management,* **18**, 184–208.

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