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## Article

# Towards a new training transfer portfolio: A review of training-related studies in the last decade

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Dodo zu Knyphausen-Aufseß, Manuel Smukalla, Magdalena Abt\*

## **Towards a New Training Transfer Portfolio: A Review of Training-related Studies in the Last Decade\*\***

This study updates and expands the reviews of empirical studies on training transfer published by Salas and Cannon-Bowers (2001), Cheng and Ho (2001) and Cheng and Hampson (2008). The authors identified 58 empirical studies since 1998 and integrate all transfer variables that have been subject of relevant studies. This is done by moving towards a new training transfer portfolio that is comprised of 13 categories of 36 sub-transfer variables. The purpose of this new training transfer portfolio is to facilitate the company's investment decision into transfer variables which (1) can be influenced by the company itself (sphere of control) and (2) which are worth the organizational and financial effort (cost-value ratio).

### **Auf dem Weg zu einem neuen Training-Transfer-Portfolio. Ein Überblick über empirische Studien zum Transfer von Schulungsmaßnahmen**

Dieser Beitrag gibt einen Überblick über empirische Studien zum Erfolg von Schulungsangeboten in Unternehmen und aktualisiert und erweitert damit frühere Reviews von Salas und Cannon-Bowers (2001), Cheng und Ho (2001) sowie Cheng und Hampson (2008). Berücksichtigt werden 58 Studien, die seit dem Jahr 1998 erschienen sind, und die in diesen Studien auftauchenden 36 Transfervariablen, die 13 Kategorien subsumiert werden können. Die Ergebnisse werden in einem Schulungstransferportfolio zusammengefasst, das die Entscheidung, ob ein Unternehmen in Schulungsmaßnahmen investieren soll oder nicht, zu unterstützen vermag. Im Vordergrund stehen dabei Variable, die (1) durch das Unternehmen beeinflusst werden können, und (2) Maßnahmen, die den damit verbundenen organisatorischen und finanziellen Aufwand rechtfertigen.

Key words: **trainee characteristics, training design, work environment, training-transfer-portfolio, learning motivation**

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## 1. Introduction

In a world driven by product and business innovations, we assume that an organization's competitive advantage is achieved through people (Pfeffer 1995). That is why many companies spend an increasing amount of money on training sessions, in the belief that it will improve the employees' performance and the firm's productivity. According to the Training Magazine's ongoing industry report, in 2006 US companies spent a total of \$55.2 billion (an increase of 7% compared to 2005) on formal training and \$15.8 billion on training products and services (Dolezalek 2006). In recent years, investments in training activities have increased all over the world (Velada et al. 2007, 283). However, unsettling questions continue to be raised about the return on this investment. Even if the exact amount of transfer varies from author to author, some indicate that only 10% of all training-related expenditures actually result in the transfer of recently acquired skills and knowledge back to the job (Georgenson 1982; Tannenbaum/Yukl 1992; Fitzpatrick 2001). This "transfer problem" presents a big challenge for organizations, given that training is considered to be a primary leverage point by which organizations influence their corporate performance (Kozlowski et al. 2000, 159). Bearing this learning-performance dilemma in mind, it is less surprising that Rouiller/Goldstein (1993) concluded that transfer is nearly as important as training itself. Knowing and understanding, therefore, which factors significantly enhance the training transfer would help professionals to move beyond the question *whether* training works to *why* and *how* training works (Tannenbaum/Yukl 1992, 423).

The aim of this article is to move towards a more integrative training transfer portfolio that helps to place 36 transfer variables into a broader construct. To do so, we first explain the framework and the research methodology applied in our study. Results are then discussed in the existing trilogy of training transfer, divided into 13 categories and integrated into a new transfer portfolio. Suggestions for further research, study limitations and a conclusion of our study are presented at the end of this paper.

## 2. Framework and methodology for examining empirical studies on training transfer relationships

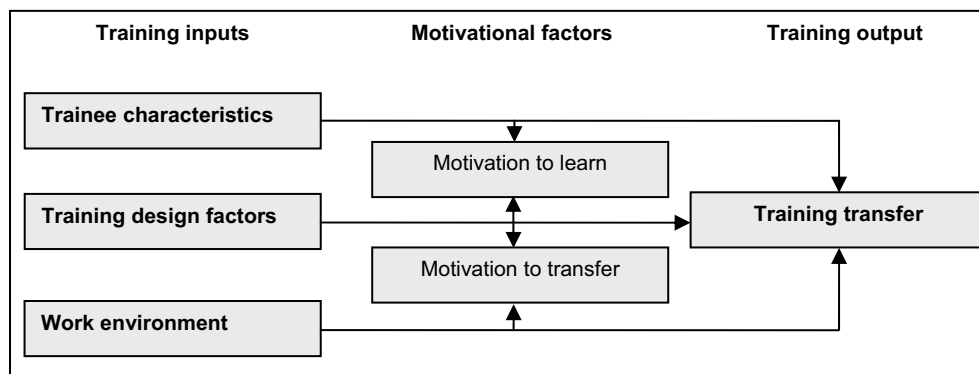
Training transfer can generally be defined as the degree to which trainees apply the knowledge, skills and abilities (KSAs) gained in training to their job (Wexley/Latham 1981, 14). For transfer to occur, learned behavior must be generalized to the job context and maintained over a period of time (Baldwin/Ford 1988, 63).

Despite the urgent need for a better understanding of the transfer process, previous reviews of Cheng/Ho (2001) and Cheng/Hampson (2008) have failed to include all training inputs factors of trainee characteristics, training design and work environment factors suggested by Baldwin/Ford (1988). In contrast, we acknowledge this multidimensional nature of training transfer which becomes apparent in the research framework applied in this study (figure 1).

The figure illustrates that training input factors include three elements: trainee, training design and work environment characteristics. First, *trainee characteristics* consist of the trainees' ability, personality and their training-related expectations (Baldwin/

Ford 1988, 64). Second, *training design* is defined as the degree to which training has been designed and delivered to give trainees the ability to transfer learning to the job (Holton III et al., 2000, 345). Finally, *work environment* refers to any influence(s) on transfer existing or occurring outside the learning intervention itself (Burke/Hutchins 2008, 112). These training predictors will then influence the training motivation – the pre-training-related motivation to learn and the post-training-related motivation to transfer – as well as the final training transfer.

**Figure 1: Framework of the training transfer (adapted from Baldwin/Ford, 1988, 65)**



Our research framework is in line with the recent studies conducted by Velada et al. (2007) and Chiaburu and Lindsay (2008) as well as the transfer models of Colquitt et al. (2000) and Kontoghiorghes (2002). It is well-suited for reducing complexity and to gain an overall picture of what recent research has found out on the topic of our interest. Applying this framework, the aim of the following analysis is to generate a more integrative perspective on the training transfer that acknowledges all three training input variables in their direct and indirect effect on the training output. This is done by integrating a large set of 36 sub-transfer variables into the research framework illustrated in Figure 1, by focusing on only one training output (training transfer) and by deriving a new training transfer portfolio.

To analyze the impact of various transfer variables, we conducted an extensive literature search. Specifically, we systematically searched four online databases: EbscoHost, SSRN, ERIC and Google Scholar. Using relevant keywords, we searched for: *training transfer*, *transfer of training*, *learning transfer*, *transfer of learning* and *transfer performance*. We selected only articles from journals with a double-blind review process in order to ensure academic quality.

In our study, we did not explicitly search for articles with the German key word *Bildungscontrolling*. One reason was that we want readers who are not familiar with the German language to have access to the literature we integrated in our review. Moreover, despite of the connotations of the English term *controlling*, *Bildungscontrolling* refers to a specific German literature that has, compared to *training transfer*, a more limited focus on cost-value (or, alternately, benefit) ratios and quantifiable – often monetary – measures (Käpplinger 2007). Finally, Käpplinger (2007, 8) states that the last empirical

study of the Federal Institute for Vocational Education and Training (BIBB) goes back to 1999 (see Krekel/Seusing 1999) and that no more recent empirical studies are available (some new data is provided in Käßplinger 2009). Therefore, we considered this literature to be largely outside the timeframe which our review of empirical studies is focusing on, but will integrate selective insights of this literature in our discussion section that is devoted to the development of a new training transfer portfolio.

Our review also excludes samples of secondary or primary schools' children as they might be influenced by development factors which may not be relevant in mature populations. Moreover, we excluded studies on training of employees who are frequently required to respond in emergency situations (e.g., employees in hospitals, police and fire departments and members of the armed forces). These employees require a more specific training that recognizes that they will be under stress when required to respond (for an overview, see Driskell and Johnston 1998). We conducted searches exclusively on articles published after 1998 since Cheng/Ho (2001) and Salas/Cannon-Bowers (2001) merely reviewed articles up to that point of time and since we felt that articles before this date would be less likely to focus on the framework presented in figure 1. This procedure left us with 58 empirical studies from 12 journals: An overview of all the studies we integrated in our review is provided in the appendix (table).

### 3. Description and analysis

The results are categorized for discussion purposes using the training input taxonomy described before. The authors identified 36 sub-transfer variables divided into 13 categories that shall now be discussed separately.

#### 3.1 Trainee characteristics

*Ability variables:* It is believed that trainees with high ability scores will benefit from their increased information processing capacity and, consequently, understand and master the training content more efficiently. Colquitt et al. (2000) studied 106 articles from 1975 to 1998 and showed that individuals with highly developed *cognitive skills* will learn more effectively since they reflect their actions, determine their problems and adjust their course of action accordingly and, hence, transfer their learned skills more easily to the daily job situation. Carter (2002) examined the relationship between training methods and cognitive ability to determine whether a match between these two variables would increase the learning performance. Results suggest that organizations should fit their training methods to the trainee's ability as lecture-based trainings require relatively passive trainee participation, whereas case-study-based trainings require active participation. Bates/Holton (2004) indicate that *basic skills* play an important but often neglected role in the transfer of training. It was found that people with low literacy levels displayed higher levels of motivation than those participants with high literacy skills.

*Learner readiness and perceived utility:* *Learner readiness* is defined as the extent to which individuals are willing and prepared to enter and participate in training (Holton III et al. 2000, 344). This readiness directly impacts the trainee's motivation to transfer (Holton III et al. 2000) as well as his final training transfer (Devos et al. 2007). *Perceived*

*training utility* refers to the extent to which trainees judge training content to reflect job requirements accurately (Holton III et al. 2000, 345). However, findings on this first level reaction measure of Kirkpatrick's evaluation model (1998) are less clear. Seyler et al. (1998) and Velada/Caetano (2007) showed that utility reactions are positively related to the perceived training transfer and to the perception of learning. In opposition to these findings, Bates et al. (2000) and Ruona et al. (2002) cast doubts about any influence of the perceived learning utility as the variable only explained a marginal part of the variance in motivation to transfer and training transfer. Further research is, consequently, needed.

*Personality variables:* Empirical evidence shows that at least two of five personality variables (introversion and emotional stability) are believed to play an important role in the transfer process. In Rowold's study (2007), it was found that *introversion* is negatively related to the motivation to learn and to transfer. Introverts are normally characterized as being less talkative, assertive, outgoing than extroverts and may, as the study was conducted in a call center, even have faced greater problems to perform due to the noisy and unfavorable environment than extroverts. *Emotional stability* reflects the absence of feelings of anxiety, insecurity, nervousness and comprehends an increase in the tolerance for potentially stressful conditions (Herold et al. 2002, 856). Similar to introversion, Rowold (2007) and Colquitt et al. (2000) demonstrated that any fear negatively impacts the pre-training-related motivation and self-efficacy. The results of Rowold (2007) and Lievens et al. (2003) reveal that *agreeableness*, which is characterized by attributes such as being courteous, cooperative and trusting, only fosters an increased motivation before the training session but not after the training session. Results for *conscientiousness* and *openness to experience* have been mixed. Within a call center context, Rowold (2007) questioned any influence of one of the both variables, whereas Colquitt and Simmering (1998) found that conscientiousness is positively related to the motivation to learn both initially and after performance feedback. In the study of Herold et al. (2002) it became evident that openness to experience lacked any relation to the motivational components but impacted the learning dimension. Apart from these "Big Five" personality traits adopted from psychology (e.g. Wiggins 1996), three other personality variables appeared that affect the training transfer: locus of control, affectivity and goal orientation. *Locus of control* refers to a person's belief that the enforcement of their behavior is either under their own control (internal locus of control) or in the hands of powerful others (external locus of control) (Furnham/Steele 1993, 444). Colquitt et al. (2000) found evidence that internals exert greater effort towards collecting relevant KSAs in a training situation than externals as they believe mastering the program is under their own control. Naquin/Holton (2002) and Machin/Fogarty (2004) studied the impact of *positive affectivity*, the tendency to experience positive emotional states, and *negative affectivity* on the pre-training motivation as well as the post-training motivation. It was revealed that people who perceive positive emotional states tend to be more motivated and self-efficacious and, consequently, more likely to transfer KSAs to the job than people who perceive the opposite. In terms of *goal orientation*, Colquitt/Simmering (1998) showed that learning orientation is positively related to the motivation to learn and by contrast that performance orientation is negatively related to this motivational dimension. These results are justi-

fiable as learning-oriented trainees view training as an opportunity to gain new KSAs, whereas performance-oriented individuals are afraid of losing out. This coherence was completed by the study of Ford et al. (1998) who argued that learning-oriented individuals significantly improve their post-training self-efficacy, whereas performance-oriented employees decrease their levels of self-efficacy. The study of Chiaburu/Tekleab (2005) additionally found that performance-oriented individuals when compared with learning-oriented individuals were not only less motivated to learn but also less likely to transfer the learned KSAs to the job.

*Valence/expectancy:* According to Vroom's expectancy theory (1964), motivation is shaped by (a) the expectation that an act will be followed by a certain outcome (*expectancy*) and (b) the value and desirability of that result (*valence*). Colquitt et al. (2000) provide evidence that valence strongly correlates with the motivation to learn and the final transfer of training. Additionally, Smith et al. (2008) found that learning as well as performance orientation have a direct impact on the expectancy and valence of the trainees. Once again, it becomes apparent that learning orientation is a stronger predictor for expectancy and valence than performance orientation as, from an empirical point of view, it explains a bigger portion of variance.

### 3.2 Work design factors

*Pre-training factors:* Pre-training factors are those interventions that can be applied prior to a practice session to improve the effectiveness of the session (Cannon-Bowers et al. 1998, 292). Even though Cannon-Bowers et al. (1998) show that these factors are numerous (i.e. metacognitive strategies, advance organizers, preparatory information, pre-practice briefs), Foster/Hoff Macan (2002) focused only on *attentional advice* that provides information, independent of performance, about the process or strategy. The researchers discovered that participants who receive this attentional advice and information perform at higher levels on an immediate as well as delayed follow-up task than those who do not receive any advice at all.

*Training content factors:* It is widely agreed that *overlearning* impacts the subsequent retention of training content (Machin/Fogarty 2003). Lim (2000) showed that the more the training material is repeated, the more the trainees applied the learned principles on the job. Machin/Fogarty (2003) gathered data from 137 trainees who underwent an advanced training for a computerized information system and demonstrated that the greater the similarity between the training context and the actual transfer context (*identical elements*), the greater the final learning performance and post-training self-efficacy will be. Accordingly, the authors revealed that *varied practice*, which aims to learn new KSAs under a variety of conditions, significantly enhances the learning retention and post-training self-efficacy since it helps to better understand the training content. Only very recently has the function of *error-based training* as one part of the training design factors been discussed. Participants in error-based trainings are only given minimal guidance and are explicitly encouraged to make errors during the training to think about the causes of the errors and learn from them. Keith/Frese (2005) found evidence that error-based training led to a higher adaptive training transfer when compared with error-avoidant training. The same result for job performance was obtained by Heimbeck et al. (2003). However, research also unfolded that it is

important to avoid a one-size-fits-all approach towards error-based training. Keith/Frese (2008), for example, conducted a meta-analytical study of 24 studies (N=2,183) and revealed that the effectiveness of error management training is limited to tasks that provide clear feedback. Even though the result did not quite reach significance at the 5% level ( $p=0.08$ ), the statistics indicated that all studies which used tasks with clear performance feedback yielded a significant, positive size effect (Cohen's  $d=0.56$ ). An approach that is similar to the error-based management approach is the guided and enactive exploration mode. *Guided exploration* is a form of skill acquisition that provides learners with the knowledge of appropriate strategies in a step-by-step approach, whereas *enactive exploration* provides individuals with unstructured opportunities to explore effective strategies, in which self-directed learning is encouraged. Wood et al. (2000) and Debowksi et al. (2001) found that enactive exploration will be more effective on structured tasks with more informative feedback, whereas guided exploration is more effective on complex, ill-structured tasks that provide less feedback.

*Post-training factors:* During the last decade, three post-training interventions have prevailed: goal-setting interventions, self-management interventions and relapse prevention (Huint/Saks 2003, 182). Firstly, Richman-Hirsch (2001) found evidence that *goal-setting interventions* enhance the training transfer, particularly when employees are working in an environment that supports skill acquisition. More specifically, Brown (2005) stated that participants who are urged to do their best and who set proximal plus distal goals have higher transfer scores than those who just set distal outcome goals. This finding is justifiable because trainees who set proximal goals should experience "small wins" and, consequently, be more motivated to transfer training content to the job. Secondly, *self-management interventions* are an organizational effort to teach trainees how to exert control over certain aspects of their decision making process and behavior (Frayne/Geringer 2000, 361). After self-management training interventions, Frayne/Geringer (2000) and Pattni et al. (2007) disclosed an increase in the employee's objective and subjective job performance and a significant increase in their levels of post-training self-efficacy. Thirdly, *relapse prevention (RP)* is a cognitive-behavioral strategy that enables trainees to identify high-risk situations, to be aware of transfer obstacles and equips them with coping strategies to overcome these obstacles (Gaudine/Saks 2004, 58). It was found that RP modules discourage trainees in favorable transfer environments but encourage trainees in less favorable environments (Burke/Baldwin 1999). Similarly, Gaudine/Saks (2004) validated that the effectiveness of RP trainings mainly depend on the organizational context. The researchers discovered that in the hospital where the study was conducted, trainees had frequent opportunities to transfer skills immediately on the job and, therefore, negated the potential benefits of a post-training RP.

### 3.3 Work environment

*Job/career variables:* During the last decade, the impact of a number of job/career variables on the motivational and transfer outcome was studied. Tracey et al. (2001) found evidence that *job involvement* increases the trainee's motivation of learning and impacts his capability to master the training content. This finding is less surprising as people who are highly involved in their job are more likely to be motivated since any



participation in training is viewed as a way of gaining new KSAs, of improving their job performance and of increasing their feelings of self-esteem. Kontoghiorghes (2001a, 2002) added that the more *committed* and *satisfied* employees are within the organization, the more likely they are motivated to learn and transfer training to the daily job. Colquitt et al. (2000) showed that *career exploration and planning* are positively related to the motivational and transfer of training as individuals that are seeking to advance within an organization are more likely to recognize the importance of developing additional skills. However, useful training programs may not only be subject to involvement, commitment, satisfaction and career exploration as identified before, but also acknowledge the trainees' immediate *training needs*. Therefore, Lim/Morris (2006) revealed that even three months after the training session, trainees experience a certain degree of necessity to transfer learning to the job, particularly, when they are expected to perform a new task.

*Social support:* Since 1998, 22 studies have appeared which examined the impact of social support variables on the actual training transfer. This popularity is not surprising considering that social support is believed to play a central role in the transfer process (Tracey et al. 1995). Fecteau et al. (1995) suggested three types of social support variables: peer support, supervisor support and organizational or upper management support. Six out of seven studies conducted since 1998 (Seyler et al. 1998; Bates et al. 2000; Colquitt et al. 2000; Cromwell/Kolb 2004; Chiaburu/Marinova 2005; Kirwan/Birchall 2006) found *peer support* to be of crucial importance in facilitating the training transfer. Solely the study of Enos et al. (2003) failed to show that peer support impacted the training transfer. The authors discovered a low but non-significant correlation with the transfer of training which may be attributed to the fact that the researchers overestimated the magnitude of the social support variables and, consequently, chose a sample size (N=84) that lacked the statistical power to detect smaller relationships. This would also explain why all other three social support variables were non-significantly related to the transfer performance. Despite peer support, *supervisor support* has probably been the variable that has attracted the most attention in training research during the last decade. Table 1 gives an overview of all studies that measured a positive relationship (significant and non-significant) between supervisor support and training motivation and/or transfer or a negative relationship.

The studies summarized in table 1 already suggest a certain direction. A majority of 79% of all studies indicated a positive relationship (comprising 32% that failed to provide statistical significance), whereas 21% identified a negative one. Taking a closer look at some of the studies, the authors admitted that their divergent findings go back to either a lack of statistical power (Enos et al. 2003), measurement errors (van der Klink et al. 2001), the particular study design (Gumuseli/Ergin 2002; Velada et al. 2007) or to other suppressor variables that influenced the training transfer (Chiaburu/Marinova. 2005). Following the suggestions made by researchers who identified a positive correlation, it is, consequently, reasonable to argue that supervisor support is of fundamental importance within the transfer process. Last but not least, Cromwell/Kolb (2004) as well as Saks/Belcourt (2006) found evidence that the more *upper management* makes the effort to facilitate the transfer process, the more trainees will apply the newly learned KSAs.

**Table 1: Studies on supervisor support since 1998 according to value and statistical significance**

Positive and significant relationship	Positive but non-significant relationship	Negative and significant relationship	Negative but non-significant relationship
<ul style="list-style-type: none"> <li>▪ Lee/Pucel, 1998</li> <li>▪ Seyler et al., 1998</li> <li>▪ Bates et al., 2000</li> <li>▪ Colquitt et al., 2000</li> <li>▪ Kontoghiorghes, 2001b</li> <li>▪ Cromwell/Kolb, 2004</li> <li>▪ Pidd, 2004</li> <li>▪ Liebermann/Hoffmann, 2008</li> <li>▪ Scaduto et al., 2008</li> </ul>	<ul style="list-style-type: none"> <li>▪ Awoniyi et al., 2002</li> <li>▪ Gumuseli/Ergin, 2002</li> <li>▪ Enos et al., 2003</li> <li>▪ Chiaburu/Tekleab, 2005</li> <li>▪ Saks/Belcourt, 2006</li> <li>▪ Devos et al., 2007</li> </ul>	<ul style="list-style-type: none"> <li>▪ Nijman et al., 2006</li> </ul>	<ul style="list-style-type: none"> <li>▪ Van der Klink et al., 2001</li> <li>▪ Chiaburu/Marinova, 2005</li> <li>▪ Velada et al., 2007</li> </ul>
∑ 9 studies	∑ 6 studies	∑ 1 study	∑ 3 studies

*Opportunity to use-variables:* *Opportunity to use* refers to the extent to which trainees are provided with or obtain resources and tasks on the job enabling them to use the skills taught in training (Bates et al. 2000, 25). In their qualitative study, Lim/Johnson (2002) discovered that the opportunity to use training on the job is the first reason for high transfer and that vice versa any lack of the same is the first reason for low transfer. A variable that certainly overlaps with the opportunity to use construct are the *task cues*. They defer to the extent to which design and nature of the job itself remind the trainee of applying newly learned skills and knowledge acquired in training (Rouiller/Goldstein 1993) and directly impact the trainee's motivation to learn (Kontoghiorghes 2002). However, they are less specific than the opportunity to use-construct as they refer to every job component that encourages the application of newly learned skills.

*Organizational culture:* Egan et al. (2004) studied the impact of *organizational learning culture*, which they defined as the capacity for integrating people and structures to move an organization in the direction of continuous learning and change. The researchers disclosed that the learning culture makes significant positive contributions to the employees' motivation to transfer as well as to their job satisfaction. Similarly, within a Jordanian context, Bates/Khasawneh (2005) revealed that organizational learning culture is a significant predictor of organizational innovation. However, as opposed to the construct of organizational learning culture, *resistance to change* captures all organizational norms that discourage rather than encourage the use of skills acquired in training. Bates et al. (2000) discovered that resistance to change correlates negatively with the motivation to transfer since individuals who perceive any organizational change as a threat will be less likely to transfer KSAs to the daily job. Kontoghiorghes (2001a, 2002) found moderate evidence that companies which make their employees contribute to a *quality mission* were more motivated to learn than companies lacking this demand. Nevertheless, Clarke's (2002) qualitative study revealed that in

many organizations *accountability*, the degree to which an organization expects learners to use trained skills on the job, was quasi non-existent as trainees possessed minimal expectations that the organization required them to transfer the training content in any specific way.

*Situational variables:* Research assessing the direct impact of situational variables on the transfer of training or incorporating them as moderator variables has been relatively rare in training literature. A few authors argue that training transfer may not be uniform and stable across (a) different *organizational types*, (b) *specific organizations* and (c) different *training types*. Holton et al. (2003) collected data from private, public and non-profit organizations and revealed that employees working in a non-profit organization had significantly higher levels of motivation to transfer and supervisor support than those working in a public or private organization. Chen et al. (2006) extended this finding by indicating that trainees who attended spiritual inspiration trainings perceived a stronger training transfer than all other training types. It is, consequently, safe to conclude that the trainee's motivation is a vital lever in predicting the strength of the training transfer.

#### **4. Discussion and development of a new training transfer portfolio**

Following the research framework in figure 1, we have analyzed the major effects of the three training input factors on the motivational factors and on the final transfer output. It became apparent that some authors studied the direct effect of these training input factors on the training transfer, whereas others focused on the indirect effect through the motivational dimension. Nevertheless, it seems adequate to look more precisely at the diverse nature of the analyzed studies within the framework that was developed at the beginning. Firstly, the type of organization in which the study was conducted also varied among the articles. The majority, however, was performed in private companies (N=36) followed by studies performed in a university environment (N=12). As we will argue later on, the use of student samples certainly raises doubts about the representativeness and the quality of the answers. However, we decided to keep them in the analysis as their findings were too vital to be ignored and as their results are derived from large sample sizes. Secondly, it has to be recognized that even within business firms, trained employees range from trainees via sales people and research scientists to managers, making it difficult to compare the results of the empirical studies and to develop trust in the recommendations that may be derived from those results for business practice.

Next, it seems appropriate to satisfy the calls in the literature for a more integrative transfer approach that encompasses all three training input factors (Colquitt et al. 2000; Scaduto et al. 2008). This is necessary for four major reasons: Firstly, the portfolio we developed in this manner reduces complexity as it integrates 39 transfer variables into 13 bigger subcategories. This classification allows HRD theoreticians and practitioners to better grasp and understand the ostensibly indefinite sum of transfer variables. Secondly, it acknowledges the broad and vague nature of some of the transfer variables (e.g. task cues), which was neglected in the review conducted by Cheng/Ho (2001). Thirdly, it includes all transfer variables that have been subject of empirical studies since 1998 and, therefore, goes beyond the review of

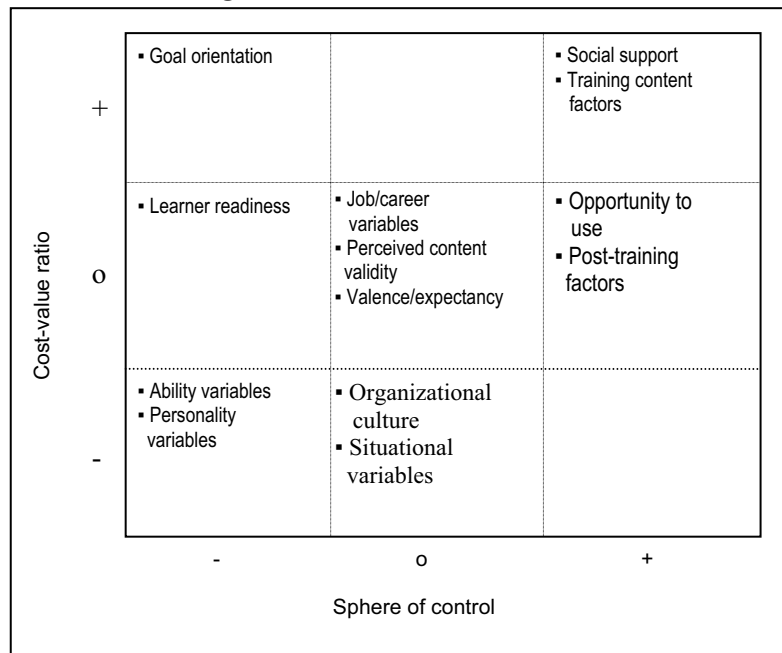
Cheng/Hampson (2008) which only included those variables that were considered to be important and could be classified under the category individual characteristics, training outcomes, job/career or situational variables. Fourthly, the portfolio acknowledges the multidimensional and interdisciplinary character of training transfer and may serve as an important instrument for a corporate controlling of further education. As the portfolio concentrates on the transfer of recently acquired skills and knowledge back to the job, it covers a major success index of advanced vocational training (Rouiller/Goldstein 1993; Georgenson 1982; Tannenbaum/Yukl 1992; Kozłowski et al. 2000). In its criterion of interest it differs from other existing approaches in the research field of (German) corporate controlling of further education, which concentrate e. g. on cost and/or risk control (Alewell/Koller 2002a; Alewell/Koller 2002b; Leber 2000), demand planning (Weiß 2005; Weiß 2003), learner satisfaction (Schwuchow 1994; Bank 1997; Olesch 1995) or determinants of vocational training (Brussig/Leber 2005; Alda/Bellmann 2002; Düll/Bellmann 1999; Gerlach/Jirjahn 2001). Our portfolio integrates the results of these studies and shares their concern for the need of cost/value measures. Due to the large number of transfer variables, this approach should be appreciated and enables more efficiency in the field of internal and external training sessions.

The main idea of the new transfer portfolio is to facilitate the company's investment decision into transfer variables which can be influenced by the company itself (sphere of control) and which are worth the organizational and financial effort (cost-value ratio). In this context, the *sphere of control* is defined as the extent to which the HRD division can influence the transfer variable (e.g. through professional training), whereas the *cost-value ratio* is the quotient of organizational and financial effort (input) and the final training transfer (output). The ratio tries to capture whether the "implementation" of a particular transfer variable is worth the organizational and financial effort that it implies. To better illustrate this ratio, take the example of goal orientation. Even though goal orientation is seen as a personal trait (Smith et al., 2008, 56) and, consequently, difficult to influence by the company (sphere of control), it features a high cost-value ratio. Many companies have established a management by objectives in order to create a goal-oriented environment. This instrument can – when defined as a goal – therefore foster a high training transfer (output) without generating a huge financial burden (input). The portfolio is presented in figure 2.

According to this illustration, HRD should primarily focus on social support and training content variables as they can be influenced by the organization itself and feature a high cost-value ratio. Through flat hierarchies, for example, organizations can create an environment in which supervisor and peer support encourages the transfer of training to the job. The creation of a favorable transfer climate is, therefore, in the power of the organization and implies relatively small financial expenditures. Similarly, the training content is determined by the company and any adjustments involve relatively small financial investments. Ability and personality variables, on the other hand, can only be influenced marginally, while requiring the deployment of large quantities of scarce company resources. In psychology, some authors assumed that personality traits are largely determined by the age of five (Carver/Scheier 2007, 9). Despite its importance within the transfer process, organizations can hardly exert any impact on

these variables. Trying to change these personality variables may, therefore, be highly time-consuming and hardly possible.

**Figure 2: Portfolio of training transfer variables**



**5. Suggestions for further research and study limitations**

A number of suggestions for future research can be derived from our survey. Firstly, data should be gathered from an organizational rather than a student sample. This is important as students are often more familiar with lecture situations which prevail in training interventions and differ in cognitive ability as well as motivation. Secondly, researchers should move towards a longitudinal research design by collecting data at several times of the study in order to detect behavioral changes. In terms of data collection, many researchers (N=30) still gathered data at one particular point of time rather than at several times. Thirdly, authors should try to conduct experimental surveys that do not merely rely on self-report measures but also on behavioral measures. It is widely agreed that the use of self-report measures may inflate the correlations by introducing a common method variance and as three-quarters of all authors (N=44) based their studies on self-report measures from trainees, this suggestion should be taken seriously. A related problem that is very common in the training of international assignees is that employees are not required to undertake the training so that any assessment of a potential training transfer is only conducted on those employees who volunteered for training. Fourthly, as less than one half of the studies (N=26) were performed outside the US, researchers need to become more aware of the cultural differences that may emerge in the transfer process. In countries, for instance, where a strict hierarchy is still preserved, the opportunity to use is taken for granted and often

beyond consideration (Yamkovenko et al., 2007, 396). Nevertheless, future research should continue moving in this direction to find out whether, how and why transfer factors differ across cultures.

This study has some limitations that should be noted. The suggested cost-value ratio within the transfer portfolio in Figure 2 certainly needs further elaboration in two operational ways. First, further research should clarify how the organizational and financial effort for a particular transfer variable can be quantified. Secondly, the “criterion problem” (Ford/Weissbein 1997, 23) of how to capture training transfer still remains underdeveloped in the literature. Furthermore, within the research framework we did not make an attempt to study declarative knowledge (learning), individual and organizational performance as potential training outcome variables. For reasons of clarity, we decided to focus solely on training transfer but recommend that future researchers integrate these outcome variables into our research framework.

## 6. Conclusion

The estimate that only 10% of all training-related expenditures actually result in transfer of learned KSAs back to the job shows that the HRD division has neglected to consider the ROI of training investments. In order to overcome this transfer problem, the authors reviewed 58 empirical studies since 1998 and discussed major findings. This was essential for the creation of a new training transfer portfolio as the two latest reviews failed to study all transfer variables and, just to give an example, neglected to study the training design variables. The authors contribute a new training transfer portfolio to the evolving research that consists of 13 categories. This allows companies to focus their training investments on those transfer variables that are (1) within their sphere of control and (2) that feature a high cost-value ratio.

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## Appendix:

Year	Author/s (Journal)	Sample and training content	Variables studied	Key Findings
1998	Colquitt/ Simmering ( <i>Journal of Applied Psychology</i> )	103 undergraduate students in the US participated at a six-week management course.	<ul style="list-style-type: none"> <li>▪ Dependent Variable (DV): motivation to learn</li> <li>▪ Independent Variable (IV): conscientiousness and goal orientation</li> </ul>	Conscientiousness and learning orientation were found to be positively related to the motivation to learn, both initially ( $\beta_1=0.44^*$ , $\beta_2=0.47^*$ ) and after performance feedback ( $\beta_1=0.42^*$ , $\beta_2=0.47^*$ ). Performance orientation, in contrast, was discovered to be negatively related to the motivation to learn ( $\beta=-0.20^*$ ).
1998	Ford/Weissbein/ Smith/Gully/ Salas ( <i>Journal of Applied Psychology</i> )	93 undergraduate students in the US attended a psychology training course on two consecutive days.	<ul style="list-style-type: none"> <li>▪ DV: self-efficacy, knowledge and training transfer</li> <li>▪ IV: learning orientation, performance orientation and metacognition</li> </ul>	Learning orientation was positively related to self-efficacy ( $\beta=0.20^*$ ) and the metacognitive ability ( $\beta=0.22^*$ ) of the learner. Metacognitive activity was significantly related to self-efficacy ( $\beta=0.32^*$ ), which than was found to predict transfer of training ( $\beta=0.22^*$ ). The authors discovered that all of their three training outcomes predicted the final training transfer.
1998	Lee/Pucel ( <i>Perf. Improvement Quarterly</i> )	The study was conducted in the context of a managerial leadership program (N=78) within a large oil and chemical company from Korea.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: learning utility</li> </ul>	The study found that whenever supervisors or trainees perceived a training objective to be more important, they rated the actual training transfer relatively higher to that objective. It was also revealed that the types of reinforcement, trainees perceived to be most motivating, were the types their supervisors used most often.
1998	Seyler/Holton/ Bates/Burnett/ Carvalho ( <i>Int. Journal of Training &amp; Devel.</i> )	74 trainees from a large US petrochemical company participated in a computer based training (CBT).	<ul style="list-style-type: none"> <li>▪ DV: motivation to transfer</li> <li>▪ IV: various individual, situational and work environment variables</li> </ul>	Five different models were developed that explained 19.8% (Model 1) up to 60.5% ( $R^2$ ) (model 5) of the common variance of the pre-training-related motivation to transfer. Hierarchical, multiple regression analyses revealed that individual as well as environment variables explained most of the variance.
1999	Burke/Baldwin ( <i>Human Resource Management</i> )	78 research scientists from a large company in the US received different RP trainings.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: full, modified or no relapse prevention (RP) modules</li> </ul>	Results indicated that the full RP produced the greatest influence on the transfer performance in the sample's least supportive climate, while the modified RP tended to produce greater transfer rates in more supportive climates.
2000	Bates/Holton/ Seyler/Carvalho ( <i>Human Resource Devel. Int.</i> )	73 production operators in the US were required to undergo training and certification on 30-150 computer based training (CBT) modules.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: content validity, supervisor support/sanctions, peer support, change resistance and opportunity to use</li> </ul>	After controlling for learning and motivation to transfer, a hierarchical regression analysis showed that content validity, supervisor and co-worker support variables explained 43% ( $R^2$ ) of the variance of performance ratings. The results underscored the value of the valid training content and the supervisor/co-worker support for the transfer of training.
2000	Colquitt/LePine/ Noe ( <i>Journal of Applied Psychology</i> )	Meta-analysis that studied a total of 106 articles (1975-1998) from various journals.	<ul style="list-style-type: none"> <li>▪ DV: motivation to learn, transfer and job performance</li> <li>▪ IV: various individual, situational and work, environment variables</li> </ul>	Results indicated a partially (rather than a completely) mediated version of an integrative framework of training motivation. Personality, situational, job/career and ability variables were measured in their dependence on motivational and training outcome variables.
2000	Frayne/Geringer ( <i>Journal of Applied Psychology</i> )	60 salespeople from a life insurance company in the US attended a two hours' self-management training.	<ul style="list-style-type: none"> <li>▪ DV: self-efficacy, outcome expectancies and job performance</li> <li>▪ IV: self-management</li> </ul>	Participants who participated in the self-management training intervention significantly improved their objective as well as subjective job performance. Their performance improvement continued over time and was even noticeable after 12 months.
2000	Holton/Bates/ Ruona ( <i>Human Resource Devel. Quarterly</i> )	Questionnaires were administered to 1,616 people in a wide variety of organizations and training programs in the US.	<ul style="list-style-type: none"> <li>▪ DV: individual performance</li> <li>▪ IV: LTSI variables</li> </ul>	The authors developed the Learning Transfer System Inventory (LTSI) that unfolds 16 constructs including secondary influences, ability, environment and motivational variables. It was suggested to use the LTIS as a pulse-taking diagnostic tool in organizations to identify problem areas.
2000	Lim ( <i>Journal of Vocat. Education and Training</i> )	Ten HRD practitioners of the SK Group in Korea attended a HRD training program.	<ul style="list-style-type: none"> <li>▪ qualitative study</li> <li>▪ inhibiting and promoting training design and work environment factors</li> </ul>	Results revealed that overlearning, learning principles as well as varied practice were important training design features facilitating the training transfer. Opportunity to use was found to be the most important work environment factor.

Year	Author/s (Journal)	Sample and training content	Variables studied	Key Findings
2000	Wood/Kakebeeke/Debowski/Frese ( <i>Applied Psychology</i> )	34 undergraduate students from Australia participated at an electronic search training program.	<ul style="list-style-type: none"> <li>▪ DV: intrinsic motivation and performance</li> <li>▪ IV: guided and enactive exploration</li> </ul>	Results revealed that trainees who participated at the enactive exploration mode (experimental group) showed higher levels of intrinsic motivation and performance after the training program than participants in the control group.
2001	Debowski/Wood/Bandura ( <i>Journal of Applied Psychology</i> )	48 US students participated at an electronic search training with guided and enactive exploration.	<ul style="list-style-type: none"> <li>▪ DV: self-efficacy, satisfaction and performance</li> <li>▪ IV: guided and enactive exploration</li> </ul>	Participants who participated in the guided exploration mode developed stronger self-efficacy, greater satisfaction and achieved higher levels of performance than those who participated in the self-guided exploration mode.
2001a	Kontoghiorghes ( <i>Perf. Improvement Quarterly</i> )	94 employees from various distribution, engineering and light manufacturing firms in the US were asked.	<ul style="list-style-type: none"> <li>▪ DV: motivation to learn</li> <li>▪ IV: several individual and work environment factors</li> </ul>	Task autonomy, extrinsic rewards and a work environment, within which people live up to high ethical standards, were found to be the most important predictors of the motivation to learn during the training program.
2001b	Kontoghiorghes ( <i>Int. Journal of Training &amp; Devel.</i> )	Data was collected from 264 professionals who were national members of the ASTD.	<ul style="list-style-type: none"> <li>▪ DV: training retention</li> <li>▪ IV: several individual, training design and work environment variables</li> </ul>	Supervisor support and encouragement for the application of newly learned skills ( $r=0.58^{***}$ ), a participative organization ( $r=0.51^{***}$ ), task cues ( $r=0.49^{***}$ ) and intrinsic rewards ( $r=0.34^*$ ) were found to be the most important factors which facilitate the transfer process.
2001	Richman-Hirsch ( <i>Human Resource Devel. Quarterly</i> )	267 employees from a large university of the US participated at a one hour post-training intervention.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: goal-setting and self-management interventions</li> </ul>	The findings revealed that goal-setting interventions improved the actual training transfer. Further, goal-setting and self-management interventions were found to be more effective in work environments that support skill acquisition.
2001	Tracey/Hinkin/Tannenbaum/Mathieu ( <i>Human Resource Devel. Quarterly</i> )	420 managers from 10 private organizations in the US participated at a basic managerial knowledge and skills training program.	<ul style="list-style-type: none"> <li>▪ DV: pre-training self-efficacy and motivation to learn</li> <li>▪ IV: job involvement, organizational commitment and work environment</li> </ul>	It was found that job involvement predicted the pre-training self-efficacy ( $r=0.22^*$ ) and the motivation to learn ( $r=0.29^*$ ). Accordingly, work environment correlated with the pre-training self-efficacy ( $r=0.22^*$ ) and the motivation to learn ( $r=0.17^*$ ). The authors suggested that pre-training self-efficacy acts as a mediator between the organizational commitment ( $r=0.16$ , $p<0.10$ ) and the motivation to learn ( $r=0.35^*$ ).
2001	Van der Klink/Gielen/Nauta ( <i>Int. Journal of Training &amp; Devel.</i> )	Data was collected from a 'handling complaining clients' and a 'legal aspects' training in a German as well as a Dutch bank.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: supervisor support</li> </ul>	In neither study was any convincing evidence for the impact of supervisory support on the training transfer. The results of the German bank revealed that the transfer performance was greater in the comparison group than in the experimental group. In the Dutch bank, supervisor support accounted only for a small amount of the explained variance ( $R^2=0.07$ ).
2002	Awoniyi/Griego/Morgan ( <i>Int. Journal of Training &amp; Devel.</i> )	Data from 293 trainees of the Neighborhood Reinvestment Training Institute (U.S./Puerto Rico) that took courses between 1996 and 1999.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: supervisor support, task autonomy, workload pressure, creativity and sufficient resources</li> </ul>	The results suggested that supervisor encouragement, sufficient resources, task autonomy, workload pressure and perceived worker creativity were all predictors for the training transfer. The authors concluded that individuals transfer their training to the job whenever their real environment matches their preferred ideal environment.
2002	Carter ( <i>Human Resource Devel. Quarterly</i> )	93 undergraduate students enrolled an introductory HRM course at a large university in the US.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: verbal comprehension ability and general reasoning ability</li> </ul>	Results indicated that knowledge gained in lecture-based training was significantly related to verbal comprehension ability and knowledge gained in case-study-based training was significantly related to general reasoning ability. The authors demanded a fit between trainees' abilities and methods.
2002	Clarke ( <i>Int. Journal of Training &amp; Devel.</i> )	Data was collected from 14 trainees in the UK who participated at a social care training.	<ul style="list-style-type: none"> <li>▪ qualitative study</li> <li>▪ factors affecting the transfer of training within a UK social services department</li> </ul>	The findings suggested that the opportunity to use training and social support were two key variables which affected the transfer process. In this particular context, a lack of organizational cues was disclosed. The company paid relatively little attention to the HRD division and their effects on the organizational performance.
2002	Foster/Hoff Macan ( <i>Human Performance</i> )	Data was gathered from 161 students who participated at a Lego® training program in the US.	<ul style="list-style-type: none"> <li>▪ DV: training transfer, immediate and delayed task performance</li> <li>▪ IV: attentional advice</li> </ul>	Results showed that those trainees who received attentional advice performed at higher levels on a transfer task than those who didn't. In addition, the same effect was discovered for an immediate and delayed performance task.

Year	Author/s (Journal)	Sample and training content	Variables studied	Key Findings
2002	Gumuseli/Ergin ( <i>Int. Journal of Training &amp; Devel.</i> )	20 sales representatives and 19 sales chiefs of a Coca-Cola settlement in Turkey attended a basic sales training program.	<ul style="list-style-type: none"> <li>▪ DV: job attitude, productivity, effectiveness and satisfaction</li> <li>▪ IV: manager reinforcement</li> </ul>	In general, the results of this study were mixed. The researchers found support of the impact of managers' reinforcement on changes on job attitudes and effectiveness, but failed to provide evidence of the impact on productivity and job satisfaction. Using experimental and control groups, the study was based on Kirkpatrick's four-level evaluation model.
2002	Herold/Davis/ Fedori/Parsons ( <i>Personnel Psychology</i> )	85 participants received a cockpit training to obtain their private pilot license in the US.	<ul style="list-style-type: none"> <li>▪ DV: declarative knowledge (learning)</li> <li>▪ IV: conscientiousness, emotional stability and openness to experience</li> </ul>	It was found that emotional stability ( $\beta=0.36^{**}$ ) and openness to experience ( $\beta=0.31^{**}$ ) were both positively related to learning in Phase II. Additionally, conscientiousness helped to compensate for poor earlier performance and emotional stability helped to maintain earlier good performance.
2002	Kontoghiorghes ( <i>Perf. Improvement Quarterly</i> )	256 employees working in the US health care insurance industry were asked, after they participated at an in-house training course.	<ul style="list-style-type: none"> <li>▪ DV: motivation to learn and to transfer</li> <li>▪ IV: individual, work environmental and job design variables</li> </ul>	Results indicated the development of an expanded conceptual framework of training transfer. Apart from trainee characteristics, job design, transfer climate as well as work environment variables were identified to impact the transfer process.
2002	Lim/Johnson ( <i>Int. Journal of Training &amp; Devel.</i> )	Ten workers of four different SK Groups in Korea were interviewed after a three-week HRD training program.	<ul style="list-style-type: none"> <li>▪ qualitative study</li> <li>▪ reasons for high/low transfer</li> <li>▪ work environmental factors affecting the training transfer</li> </ul>	Opportunity to use was found to be the major reason for high transfer. Accordingly, a lack of opportunity to apply new KSAs on the job was a crucial reason for low transfer. However, organizational commitment as well as supervisor's support were two other work environment factors that strongly affect the training transfer.
2002	Naquin/Holton ( <i>Human Resource Devel. Quarterly</i> )	239 participants from a US health insurance organization participated at several in-house training programs.	<ul style="list-style-type: none"> <li>▪ DV: Motivation to improve work through learning (MTIWL)</li> <li>▪ IV: conscientiousness, agreeableness, extraversion, openness to experience, affectivity and work commitment</li> </ul>	Extraversion ( $\beta=0.10$ ) and positive affectivity ( $\beta=0.44$ ) were both related to MTIWL. Work commitment acted as a mediator for conscientiousness ( $\beta=0.54$ ) and agreeableness ( $\beta=0.27$ ). 57% ( $R^2$ ) of the variance of MTIWL which was explained by PA, work commitment and extraversion (all t-values were above the required 1.96).
2002	Ruona/ Leimbach/ Holton/Bates ( <i>Int. Journal of Training &amp; Devel.</i> )	The LTSI sample size of 1,616 people from a wide variety of organizations in the US was used.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: LTSI variables</li> </ul>	A limited correlation between the participant reaction measures and predictors of the training transfer was found. However, the findings of this study continue to raise questions about the role and value of any reaction measures within the transfer process.
2003	Enos/Kehrhahn/ Bell ( <i>Human Resource Devel. Quarterly</i> )	84 local managers participated in a leadership training course in the US and answered a questionnaire.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: informal learning, co-worker support, supervisor and organizational support</li> </ul>	Results indicated that co-worker support ( $r=0.15$ ), supervisor support ( $r=0.11$ ) and organizational support ( $r=0.18$ ) displayed low but non-significant correlations with transfer. The authors found evidence that informal learning is predominantly a social process that is of special importance whenever there is a lack of organizational support.
2003	Heimbeck/Frese/ Sonnentag/Keith ( <i>Personnel Psychology</i> )	87 students from a German university participated at a software training program.	<ul style="list-style-type: none"> <li>▪ DV: training performance</li> <li>▪ IV: error-based and error avoidant training</li> </ul>	The researchers revealed that the final performance was superior for participants of the error-based training that included error management instructions, when compared with error avoidant training and training without error management instructions.
2003	Holton/Chen/ Naquin ( <i>Human Resource Devel. Quarterly</i> )	1,099 employees from eight different organizations in the US were asked after they had participated at nine different training types.	<ul style="list-style-type: none"> <li>▪ DV: organizational types, specific organizations and different training types</li> <li>▪ IV: LTSI variables</li> </ul>	The authors found that transfer system characteristics differed across organizational types, specific organizations and training types. Non-profit organizations, in particular, showed higher motivation to transfer training and higher levels of supervisor support. It is, therefore, concluded that a one-size-fits-all transfer system might be rather inefficient.

Year	Author/s (Journal)	Sample and training content	Variables studied	Key Findings
2003	Huini/Saks ( <i>Human Resource Devel. Quarterly</i> )	174 students at- tended an executive M.B.A. program at a Canadian university.	<ul style="list-style-type: none"> <li>▪ quantitative/qualitative study</li> <li>▪ RP and supervisor support intervention</li> </ul>	The authors found no significant difference between RP and supervisor support intervention, although there was a trend in favor of the latter. In general, managers did not show a high acceptance of either the RP or the supervisor support intervention.
2003	Lievens/Harris/ Keer/Bisqueret ( <i>Journal of Applied Psychology</i> )	160 European man- agers participated at a cross-cultural train- ing that was held in 30 sessions.	<ul style="list-style-type: none"> <li>▪ DV: training perform- ance and language acquisition</li> <li>▪ IV: cognitive ability, the Big Five personal- ity variables and some other behavior dimensions</li> </ul>	Results indicated that the openness to experience was significantly related to the cross-cultural training performance ( $r_c=0.33^{**}$ ), whereas the cognitive ability was significantly correlated with the language acquisition ( $r_c=0.27^{**}$ ). The dimensions of adaptability, teamwork and communication provided incremental variance in both criteria.
2003	Machin/Fogarty ( <i>Journal of Busi- ness &amp; Psychol- ogy</i> )	137 trainees under- took advanced train- ing programs for a computerized infor- mation system (PO- LARIS) in Australia.	<ul style="list-style-type: none"> <li>▪ DV: pre- and post- training self-efficacy, learning during train- ing and transfer inten- tions</li> <li>▪ IV: Positive affectivity (PA), negative affectivity (NA) and com- puter self-efficacy</li> </ul>	As expected, the authors brought to light that PA and NA correlated both with the pre-training self-efficacy. Pre-training self-efficacy also significantly predicted the post-training self-efficacy and the trainees' level of learning during training. The results provided support for the developed model which was derived from the framework of Tayer and Teachout (1995).
2004	Bates/Holton ( <i>Human Resource Devel. Quarterly</i> )	1,079 individuals from a state Department of Transportation (DOT) in the US were asked to pass a reading and math test.	<ul style="list-style-type: none"> <li>▪ DV: LTSI variables</li> <li>▪ IV: pass math, fail math, pass read and fail read</li> </ul>	Results provided that the "Fall 1 or 2" group displayed higher levels of motivation-related variables than the "pass-both" group. Consequently, individuals with low literacy levels had higher levels of motivation and expectations about the value of the training but were less able to transfer new KSAs effectively.
2004	Cromwell/Kolb ( <i>Human Resource Devel. Quarterly</i> )	Over a period of twelve weeks, 63 su- pervisors of an American university completed an in-class training program.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: peer and peer network support, su- pervisor and organ- izational support</li> </ul>	The researchers found that trainees who received high levels of organization ( $r=0.57^{**}$ ), supervisor ( $r=0.61^{**}$ ) and peer support ( $r=0.60^{**}$ ) and those who participated in peer support networks ( $r=0.40^*$ ), reported higher levels of training transfer. One year after the training intervention, peer support network was the only factor that lacked statistical significance.
2004	Egan/Yang/ Bartlett ( <i>Human Resource Devel. Quarterly</i> )	245 employees from 13 different IT de- partments in the US completed surveys after they had partici- pated at various train- ing programs.	<ul style="list-style-type: none"> <li>▪ DV: motivation to transfer and turnover intention</li> <li>▪ IV: organizational learning culture and job satisfaction</li> </ul>	It was disclosed that the organizational learning culture mediated the trainees' motivation to transfer ( $\beta=0.28^*$ ) and their job satisfaction ( $\beta=0.68^*$ ). Turnover retention was found to be negatively influenced by the organizational learning culture ( $\beta=-0.16$ ) and the trainees' job satisfaction ( $\beta=-0.43^*$ ).
2004	Gaudine/Saks ( <i>Human Resource Devel. Quarterly</i> )	147 nurses in Can- ada attended a two- day training program on the McGill Model of Nursing.	<ul style="list-style-type: none"> <li>▪ DV: self-efficacy and transfer performance</li> <li>▪ IV: RP intervention</li> </ul>	Contrary to what was expected, the authors revealed that trainees who received RP training didn't show an improved self-efficacy or transfer performance when compared with the control group. It is argued that the success of post-training interventions mainly depends on the organizational context.
2004	Machin/Fogarty ( <i>Int. Journal of Training &amp; Devel.</i> )	137 trainees under- took advanced train- ing for a computer- ized information sys- tem (POLARIS) in Australia.	<ul style="list-style-type: none"> <li>▪ DV: pre-training self- efficacy and motiva- tion</li> <li>▪ IV: PA, NA, negative and positive enforce- ment, goal cues, so- cial and task cues</li> </ul>	The results showed that PA and NA effected the pre-training self-efficacy ( $\beta_1=0.42^{**}$ , $\beta_2=-0.28^{**}$ ) and motivation ( $\beta_1=0.35^{**}$ , $\beta_2=-0.28^{**}$ ) significantly. After controlling for PA and NA, pre-training self-efficacy was a significant predictor of the pre-training motivation but none of the transfer climate variables were significantly related to the pre-training self-efficacy.
2004	Pidd ( <i>Int. Journal of Training &amp; Devel.</i> )	220 employees par- ticipated at a work- place drug and alco- hol training program in Australia.	<ul style="list-style-type: none"> <li>▪ DV: attitudes, beliefs and consumption of alcohol</li> <li>▪ IV: workplace support and workplace identi- fication</li> </ul>	Results indicated that the influence of workplace social support on the training retention was moderated by the degree to which trainees identified with certain workplace groups. However, attitudes, beliefs and consumption of alcohol were significant lower with high social support than with low social support.
2005	Bates/ Khasawneh ( <i>Int. Journal of Training &amp; Devel.</i> )	450 employees from 28 different organiza- tions in Jordan par- ticipated at different training interventions.	<ul style="list-style-type: none"> <li>▪ DV: organizational in- novation</li> <li>▪ IV: learning culture as well as several trans- fer climate variables</li> </ul>	It was proven that the organizational learning culture predicted both, the organizational innovation ( $R^2=0.28^*$ ) and the transfer climate variables ( $R^2=0.10^*$ ). However, the author concluded that innovation does not only require an organizational culture but also a psychological climate.

Year	Author/s (Journal)	Sample and training content	Variables studied	Key Findings
2005	Brown ( <i>Human Resource Devel. Quarterly</i> )	72 federal and provincial Canadian government employees were enrolled in a university-based professional training program.	<ul style="list-style-type: none"> <li>▪ DV: self-efficacy and training transfer</li> <li>▪ IV: do your best, distal outcome goals and proximal plus distal outcome goals</li> </ul>	Participants who were urged to do their best and those who set proximal plus distal goals had increased their training transfer six weeks after the training intervention relative to those who set outcome goals. The researchers did not find significant differences in the transfer level of participants urged to do their best and those who set proximal plus distal goals.
2005	Chiaburu/Marinova ( <i>Int. Journal of Training &amp; Devel.</i> )	186 employees from a work organization in the US attended a one-day corporate information training.	<ul style="list-style-type: none"> <li>▪ DV: motivation to learn and skill transfer</li> <li>▪ IV: supervisor/peer support, learning/performance goal orientation and self-efficacy</li> </ul>	It was found that individual dimensions such as learning goal orientation ( $r=0.66^*$ ) and training self-efficacy ( $r=0.34^*$ ) were positively related to the motivation to learn. Also, environmental factors, such as peer support, predicted both the motivation to learn ( $r=0.11^*$ ) and the skill transfer ( $r=0.65^*$ ), while supervisor support was unrelated to both, motivation to learn and skill transfer.
2005	Chiaburu/Tekleab ( <i>Journal of Europ. Industrial Training</i> )	Data was gathered at a large American organization in which 119 trainees attended various training programs.	<ul style="list-style-type: none"> <li>▪ DV: Four different outcome variables</li> <li>▪ IV: continuous learning culture, supervisor support and goal orientation</li> </ul>	Results supported the relationship between continuous-learning culture ( $\beta=0.28^{**}$ ) and supervisor support ( $\beta=0.64^{***}$ ) and training motivation. Although the training motivation was only directly related with the training maintenance ( $\beta=0.35^*$ ), it interacted with the performance goal orientation in affecting the training transfer and generalization.
2005	Keith/Frese ( <i>Journal of Applied Psychology</i> )	55 university students in Germany were trained to create overhead slides with a particular software.	<ul style="list-style-type: none"> <li>▪ DV: training transfer, emotion control and metacognitive ability</li> <li>▪ IV: error-based training and error avoidant training</li> </ul>	Results indicated that error management and error management training supplemented with a metacognitive module that led to a better training transfer than error avoidant training did. In addition, it was found that emotional control and metacognitive ability mediated the transfer differences.
2006	Chen/Holton/Bates ( <i>Perf. Improvement Quarterly</i> )	583 responses were collected from Taiwanese employees who attended at different training programs.	<ul style="list-style-type: none"> <li>▪ DV: various situational and demographic variables</li> <li>▪ IV: LTSI variables</li> </ul>	The main finding was that demographic variables made only a marginal contribution to predicting the transfer system characteristics when compared to the situational variables that were subject of the study. The authors concluded that a one-size-fits-all transfer intervention may be inefficient considering the differences of distinct transfer systems.
2006	Kirwan/Birchall ( <i>Int. Journal of Training &amp; Devel.</i> )	112 nurse managers from the health service in Ireland took part in a 12 days' management development program.	<ul style="list-style-type: none"> <li>▪ DV: motivation to transfer</li> <li>▪ IV: LTSI variables</li> </ul>	Even though the results indicated that the model of Holton adequately represented the effects of the transfer factors, a slight revised model was presented. The new model emphasized the central role of the learners' personal capacity for training transfer and their motivation to transfer.
2006	Lim/Morris ( <i>Human Resource Devel. Quarterly</i> )	81 trainees from a Korean conglomerate attended a financial training program. Data was collected at three different times.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: job function, immediate training needs and a couple of instructional and organizational factors</li> </ul>	A trainee's job function and his/her immediate training needs was identified as an influential variable for the perceived learning and training transfer immediately after the training ( $t_2$ ) and three months later on ( $t_3$ ). A number of proposed instructional and organizational factors were tested in their influence on the perceived learning.
2006	Nijman/Nijhof/Wognum/Veldkamp ( <i>Journal of Europ. Industrial Training</i> )	179 trainees and 32 supervisors in the Netherlands participated at four different on-the-job training programs.	<ul style="list-style-type: none"> <li>▪ DV: motivation to transfer and transfer outcomes</li> <li>▪ IV: supervisor support, transfer climate and transfer design</li> </ul>	The results indicated an indirect relationship between supervisor support and training transfer performance by means of both, the trainees' motivation to transfer ( $\beta=0.20^*$ ) and the transfer climate ( $\beta=0.43^*$ ). Learning outcomes were shown to be the strongest predictor of the training transfer.
2006	Saks/Belcourt ( <i>Human Resource Management</i> )	Data was collected from 150 members of a large training and development society in Canada.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: training activities before, during and after training</li> </ul>	The authors found that 62%, 44% and 34% of the employees applied training content immediately, six months and one year after the training. It was found that training activities before ( $R^2=0.21$ ), during ( $R^2=0.20$ ) and after training ( $R^2=0.24$ ) were significantly related to the transfer of training.
2007	Devos/Dumay/Bonami/Bates/Holton ( <i>Int. Journal of Training &amp; Devel.</i> )	328 participants from six companies located in the French-speaking part of Belgium were conducted.	<ul style="list-style-type: none"> <li>▪ DV: training transfer</li> <li>▪ IV: LTSI variables</li> </ul>	16 of the original LTSI factors were replicated with seven factors displaying a statistically significant correlation with the training transfer. However, the study showed low reliability scales for supervisory sanctions.



Year	Author/s (Journal)	Sample and training content	Variables studied	Key Findings
2007	Pattni/Soutar/ Klobas ( <i>Human Resource Devel. Quarterly</i> )	164 employees from five retail banking or- ganizations in the US participated at a self- management training.	<ul style="list-style-type: none"> <li>▪ DV: learning, self- efficacy and perform- ance</li> <li>▪ IV: self-management</li> </ul>	Results revealed that the self-management training in- tervention enhanced the trainees' learning and self- efficacy. In terms of performance, the authors found a small but statistically significant improvement in the cus- tomer service performance scores.
2007	Rowold ( <i>Human Resource Devel. Quarterly</i> )	94 trainees who worked in a call cen- ter in Germany took part at a training pro- gram in 2004.	<ul style="list-style-type: none"> <li>▪ DV: motivation to learn and to transfer</li> <li>▪ IV: introversion, insta- bility, agreeableness, conscientiousness and openness to ex- perience</li> </ul>	The results indicated that only introversion mediated both the motivation to learn ( $\beta=-0.29^{**}$ ) and to transfer ( $\beta=-0.21^*$ ). Agreeableness only mediated the motivation to learn ( $\beta=0.20^*$ ) and emotional instability only the mo- tivation to transfer ( $\beta=-0.26^{**}$ ). These three variables explained 25% ( $R^2$ ) of the variance in motivation to learn and 33% ( $R^2$ ) of the variance in motivation to transfer.
2007	Velada/Caetano ( <i>Journal of Europ. Industrial Train- ing</i> )	185 Portuguese teachers were con- ducted nine month after they attended a professional training program.	<ul style="list-style-type: none"> <li>▪ DV: perceived training transfer</li> <li>▪ IV: occupational satis- faction, affective and utility reactions</li> </ul>	The results indicated that occupational satisfaction, af- fective reactions as well as utility reactions were associ- ated with the perceived training transfer ( $\beta_1=0.34^{**}$ ; $\beta_2=0.30^{**}$ ; $\beta_3=0.33^{**}$ ). However, perception of learning only partially mediated the relationship between both af- fective and utility reactions and the perceived learning transfer.
2007	Velada/Caetano/ Michel/Lyons/ Kavanagh ( <i>Int. Journal of Training &amp; Devel.</i> )	182 employees from nine stores of a gro- cery market company in Portugal attended different training pro- grams.	<ul style="list-style-type: none"> <li>▪ DV: transfer perform- ance</li> <li>▪ IV: transfer design, performance self- efficacy and perform- ance feedback</li> </ul>	It was found that transfer design ( $\beta=0.31^{**}$ ), perform- ance self-efficacy ( $\beta=0.30^{**}$ ) and feedback ( $\beta=0.42^{**}$ ) were significantly related to the training transfer. How- ever, the researchers failed to prove that supervisory support was related to the training transfer.
2008	Keith/Frese ( <i>Journal of Ap- plied Psychology</i> )	Meta-analytical study that included 24 stud- ies (N=2,183) from 1987 to 2007.	<ul style="list-style-type: none"> <li>▪ DV: training transfer, adaptive transfer and performance feed- back</li> <li>▪ IV: error-based and error avoidant training</li> </ul>	It was demonstrated error-based training led to better post-training transfer performance ( $d=0.44$ ) and that feedback was an important precondition of error-based training. Both, active and error management instructions, were found to be effective elements in error manage- ment training.
2008	Liebermann/ Hoffmann ( <i>Int. Journal of Training &amp; Devel.</i> )	213 trainees from the German financial sec- tor participated at a training program in social and interactive skills.	<ul style="list-style-type: none"> <li>▪ DV: transfer motiva- tion and training transfer</li> <li>▪ IV: perceived practical relevance and super- visor support</li> </ul>	As hypothesized, the authors revealed that the higher the degree of supervisor support, the higher the transfer motivation ( $\gamma=0.28$ ). Even though the results didn't prove a direct correlation between the practical relevance and the transfer motivation, the authors found an indirect ef- fect on the transfer motivation (effect=0.613) and the transfer performance (effect=0.566).
2008	Scaduto/Lindsay/ Chiaburu ( <i>Int. Journal of Training &amp; Devel.</i> )	495 employees from a large American or- ganization attended professional devel- opment training courses.	<ul style="list-style-type: none"> <li>▪ DV: training transfer, training maintenance and training generali- zation</li> <li>▪ IV: leader-member exchange (LMX)</li> </ul>	The authors discovered that the LMX correlated moder- ately with the training transfer ( $r=0.16^{**}$ ), the transfer maintenance ( $r=0.16^{**}$ ) and the transfer generalization ( $r=0.13^{**}$ ). Training motivation mediated the relationship between LMX and training transfer.
2008	Smith/ Jayasuriya/ Caputi/Hammer ( <i>Int. Journal of Training &amp; Devel.</i> )	Over a two-month pe- riod 90 employees from a non-profit or- ganization in Austr- lia were scheduled to attend several train- ing courses.	<ul style="list-style-type: none"> <li>▪ DV: self-efficacy</li> <li>▪ IV: learning and per- formance goal orien- tation</li> </ul>	It was found that learning and performance goal orien- tation explained 33.2% ( $R^2$ ) of the common variance of va- lence and 39.4% ( $R^2$ ) of the common variance of expect- ancy. Results indicated that goal intentions mediated the relationship between proximal antecedents and train- ing outcomes.