The effects of training design, individual characteristics and work environment on transfer of training

Raquel Velada, António Caetano, John W. Michel, Brian D. Lyons and Michael J. Kavanagh

This study aims to gain insight into some of the factors that determine the transfer of training to the work context. The present research examined the relationship between three types of predictors on transfer of training, including training design, individual characteristics and work environment. Data was collected at two points in time from 182 employees in a large grocery organization. The results indicated that transfer design, performance self-efficacy, training retention and performance feedback were significantly related to transfer of training. Contrary to expectation, supervisory support was not significantly related to transfer of training. These results suggest that in order to enhance transfer of training, organizations should design training that gives trainees the ability to...
transfer learning, reinforces the trainee’s beliefs in their ability to transfer, ensures the training content is retained over time and provides appropriate feedback regarding employee job performance following training activities.

Introduction

Organizations spend an immense amount of time and money on training in order to facilitate employees’ learning of job-related competencies (Cascio, 2000; Noe et al., 2006). According to Training Magazine’s ongoing industry report, US companies spend more than $50 billion annually on formal training (Dolezalek, 2004). Moreover, investment in training activities has increased all over the world in recent years. As a result of the financial investments organizations make in training, it is important to provide evidence that training efforts are being fully realized (Cascio, 2000; Dowling & Welch, 2005). In other words, it is important for organizations to ensure that training leads to desired work outcomes such as increases in job performance.

Research has demonstrated that training efforts are unlikely to result in positive changes in job performance unless the newly trained competencies are transferred to the work environment (see Baldwin & Ford, 1988; Montesino, 2002; Rouiller & Goldstein, 1993). As a result, there has been an increased effort to understand the antecedents and consequences of the transfer of training process.

Baldwin and Ford (1988) define transfer of training as ‘the degree to which trainees effectively apply the knowledge, skills, and attitudes gained in the training context to the job’ (p. 63). This suggests that transfer of training first requires a trainee to learn new job-related competencies (Velada & Caetano, 2007). By learning, we are referring to a relatively permanent change in knowledge, skills and behaviors of trainees (Weiss, 1990). After learning and retaining the training content, trainees should transfer the knowledge and/or skills accrued to the work context with the intention of improving job performance over time (Noe et al., 2006).

However, it has been estimated that only about 10 per cent of all training experiences are transferred from the training environment to the job (Baldwin & Ford, 1988). Although this is a lower-bound estimate, Wexley and Latham (2002) suggest that although approximately 40 per cent of content is transferred immediately following training, the amount transferred falls to 25 per cent after 6 months and 15 per cent after 1 year. This suggests that as time passes, trainees may be unable or less motivated to retain and use the information gained in the training program. Furthermore, this indicates that much of the time and money invested in training is never fully realized, because only a small percentage of the training effectively results in permanent transferability to the workplace. As a result, understanding and improving the transfer of training process has become a primary concern for training researchers and practitioners.

Although several studies have been conducted to understand the transfer of training process, conceptual models for understanding this process are limited. Kavanagh (1998) developed a multi-level multistage process to help understand the complexities of the transfer of training process. Specifically, he suggested that training transfer is influenced by several variables at different levels of analysis (e.g. individual, supervisor, workgroup and organization) and in different stages in the training process (e.g. pre-training, training and post-training). To date, the extant literature (e.g. Baldwin & Ford, 1988; Holton, 1996, 2005; Tracey et al., 1995) has identified three main determinants of training transfer: training design or enabling factors, individual factors or trainee characteristics, and work environment or transfer climate.

Holton et al. (2000) developed the Learning Transfer System Inventory (LTSI) to evaluate the specific factors on those dimensions affecting the transfer of training process. Based on the Human Resource Development Research and Evaluation Model (Holton, 1996), the LTSI includes 16 factors that either facilitate or inhibit training transfer. It has been argued that the LTSI is the only research-based instrument for...
assessing a comprehensive set of factors affecting transfer of learning (Chen et al., 2005; Holton et al., 2000). Whereas studies have been conducted to validate the LTSI measure (Chen et al., 2005; Holton et al., 2000; Khasawneh et al., 2006), little has been done to empirically demonstrate the relationship between LTSI measures and transfer of training. Additionally, the LTSI appears to exclude important individual difference variables such as cognitive ability, locus of control and training retention (e.g. Baldwin & Ford, 1988), and environmental factors such as continuous learning culture (e.g. Tracey et al., 1995).

Based on a review of the transfer of training literature, Kavanagh (1998) concluded that there are significant gaps in the empirical literature for training design, individual variables and organizational environment factors. This suggests the need for studies to investigate the impact of these issues on the transfer of training process. Thus, considering the three main influences on transfer of training previously identified by Holton (1996, 2005), this study aims to contribute to the theory of training transfer by empirically analysing how different sets of variables simultaneously influence the transfer of training.

As depicted in Figure 1, we hypothesize that several variables related to training design, individual characteristics and work environment affect transfer of training. The following section provides a brief overview of the literature regarding the influence of training design, individual characteristics and work environment on transfer of training, giving special attention and theoretical justification to the relationships that will be tested in this study.

**Influences of training design on transfer of training**

According to the training literature, there are several training design factors that influence transfer of training: instructional techniques and learning principles (e.g. Alvarez et al., 2004); self-management and relapse prevention strategies (e.g. Tziner et al., 1991; Wexley & Nemeroff, 1975) and goal setting (e.g. Gist et al., 1990). Thus, organizations should design their training programs to include such factors that increase the likelihood of transfer. Accordingly, the LTSI measures such a factor, transfer design. Transfer design refers to the degree to which training has been designed and delivered in such a way that provides trainees the ability to transfer learning back to the job (Holton et al., 2000). Holton et al. (2000) argue that part of transfer design is the degree to which training instructions match job requirements. Trainees are more likely to transfer the training content to the work context when they perceive that the training program was designed and delivered in such a way that maximizes the trainee’s ability.
to transfer the training to the job (Holton, 1996; 2005). Consequently, when trainees have previous knowledge and practice on how to apply the newly learned knowledge and skills to the job and when training instructions are congruent with job requirements, an increased likelihood of transfer should exist. Based on these assertions, we hypothesized the following:

**H1** Trainees’ perceptions of transfer design will be positively related to transfer of training.

### Influences of individual characteristics on transfer of training

In addition to training design, there are several individual characteristics that affect the transfer of training process. Some of these characteristics include cognitive ability, locus of control, conscientiousness, achievement motivation, motivation to learn and to transfer, anxiety, self-efficacy, and valence (e.g. Colquitt et al., 2000; Mathieu et al., 1992; Noe, 1986). Others include job involvement, organizational commitment, organizational cynicism and job satisfaction (e.g. Mathieu et al., 1993; Tannenbaum et al., 1991; Tesluk et al., 1995; Velada & Caetano, 2007).

Of these characteristics, performance self-efficacy has been found to strongly relate to both learning (Gist et al., 1991; Mathieu et al., 1992; Quinones, 1995) and transfer of training (e.g. Ford et al., 1998). Additionally, some studies (e.g. Ford et al., 1998) have indicated that trainees with higher self-efficacy are more likely to transfer the training to the job. Holton et al. (2000) defined performance self-efficacy as an individual’s general belief that they are able to change their performance when desired. Hence, when a trainee feels confident in his or her ability to perform, the more likely he or she will transfer such knowledge and/or skill to the job. Thus, we hypothesized the following:

**H2** Performance self-efficacy will be positively related to training transfer.

As suggested before, trainees must have the ability to retain the knowledge instilled during the training program to facilitate the transfer process. Similar to cognitive ability, training retention is the degree to which trainees retain the content after training is completed. Baldwin and Ford (1988) argue that learning retention outcomes are directly associated with the generalization and maintenance of training effects on the job. They argue that in order for trained skills to be transferred, they first must be learned and retained. Although we were unable to find any previous research empirically demonstrating this relationship, we believe it is an important aspect in the transfer of training process. Therefore, we hypothesized the following:

**H3** Training retention will be positively related to training transfer.

### Influences of work environment on transfer of training

Work environment variables have been investigated less often than training design and individual characteristics (Alvarez et al., 2004; Baldwin & Ford, 1988; Holton et al., 1997; Tannenbaum & Yukl, 1992). However, a number of studies have shown that environmental factors are important for understanding the transfer of training process (e.g. Baldwin & Ford, 1988; Lance et al., 2002; Rouiller & Goldstein, 1993; Tracey et al., 1995).

Two dimensions of the work environment that have received attention with regard to transfer of training include organizational culture and climate (e.g. Baldwin & Ford, 1988; Rouiller & Goldstein, 1993; Tracey et al., 1995) Tracey et al. (1995) stressed the importance of both transfer of training climate and continuous learning culture as work environment variables that have a significant impact on the post-training behaviors. Some indicators of transfer climate include performance feedback, peer support, supervisor support and supervisor sanctions (e.g. Baldwin & Ford, 1988; Holton et al., 2000; Tracey & Tews, 2005; Tracey et al., 1995).

Research has indicated that when employees perceive that the organizational climate is supportive, they are more likely to apply their new knowledge in the work environ-
ment (see Baldwin & Ford, 1988; Tracey et al., 1995). Performance feedback includes an indication from management about how well one is performing his or her job (Holton et al., 2000). Specifically, feedback regarding the newly learned knowledge and skills and how these relate to job performance increases the likelihood of its transfer to the work context (Reber & Wallin, 1984). Therefore, we hypothesized the following:

**H4** Feedback regarding the trainee’s performance after training will be positively related to training transfer.

Supervisor support can be described as the extent to which supervisors support and reinforce the use of newly learned knowledge and skills on the job (Holton et al., 2000). Although there is some contradictory evidence (e.g. Russell et al., 1985), the dominant literature suggests that when trainees perceive that their supervisors support the application of newly developed knowledge and skills, they are more likely to transfer these competencies back to the job (e.g. Bates et al., 2000; Brinkerhoff & Montesino, 1995; Colquitt et al., 2000; Noe, 1986; Tracey & Tews, 2005). Thus, we hypothesized the following:

**H5** Supervisor support for training transfer will be positively related to training transfer.

**Method**

**Procedure**

The initial sample consisted of 336 employees from nine stores of a grocery market company in Portugal. All training occurred in a classroom within each store, although the training content differed to reflect each store’s job composition. In a period of 1 month, participants attended one of the following training programs: customer service, environmental issues, security, prevention and hygiene in the workplace. In order to address all the training objectives and to facilitate the knowledge acquisition as well as behavior change, different training methods were used including lecture, discussion, simulations (e.g. role play) and audiovisual techniques (e.g. video tapes).

At the end of the training program, 336 trainees completed a self-report survey to assess perceptions of transfer design, performance self-efficacy and supervisor support (Time 1 data collection). Three months after the training sessions, surveys were sent to the trainees to complete and return (Time 2 data collection). These surveys measured the trainees’ perceptions of training retention, feedback and training transfer. Of the 336 surveys distributed, 219 were returned. This loss of 117 respondents over the 3-month period was due in part to the high rate of personnel turnover in these jobs. In addition, due to incomplete survey completion and incorrect coding, 37 more surveys had to be discarded, leaving a final sample of 182 matched pairs.

**Participants**

Of the 182 study participants, 62 per cent were female. The mean age for the participants was 30, with a range of 19–58. The average tenure of the participants in the company was 4.5 years with 46.6 per cent having been employed in the company for less than 1 year. In terms of education, 52.3 per cent had a high school degree while only 5.2 per cent had a college degree. Furthermore, 79 per cent of the participants were in non-supervisory roles.

**Measures**

The independent variables of transfer design, performance self-efficacy, supervisor support and performance feedback were measured with items from the LTSI (Holton et al., 2000). The measure of training retention was created specifically for this study.
The measure of the dependent variable, training transfer, was based on Tesluk et al.'s (1995) research. All variables were measured using a 5-point Likert scale.

**Transfer design**

Transfer design is defined as the ‘degree to which (1) training has been designed and delivered to give trainees the ability to transfer learning to the job, and (2) training instructions match job requirements’ (Holton et al., 2000, p. 345). Transfer design was measured with four items with an alpha of 0.78. A sample item is ‘The way the trainer(s) taught the material made me feel more comfortable I could apply it’.

**Performance self-efficacy**

Performance self-efficacy was defined as ‘an individual’s general belief that they are able to change their performance when they want to’ (Holton et al., 2000, p. 346). Performance self-efficacy was measured with four items with an alpha of 0.76. A sample item is ‘I am confident in my ability to use new skills at work’.

**Supervisor support**

Supervisor support was defined as the ‘extent to which supervisors/managers support and reinforce use of training on the job’ (Holton et al., 2000, p. 345). The measure of supervisor support consisted of six items with an alpha of 0.89. A sample item is ‘My supervisor meets with me to discuss ways to apply training on the job’.

**Performance feedback**

Performance feedback was defined as ‘formal and informal indicators from an organization about an individual’s job performance’ (Holton et al., 2000, p. 346). The measure of performance feedback consisted of three items with an alpha of 0.72. A sample item is ‘After training, I received feedback from people on how well I am applying what I learned’.

**Training retention**

Because a measure of training retention could not be found in the literature, three items were created for this study ($\alpha = 0.70$). The three items included ‘I still remember the main topics that I have learned in the training course,’ ‘I can easily say several things that I have learned in the training course’ and ‘I had never thought again about the training content (reverse coded)’.

**Training transfer**

Tesluk et al. (1995) developed a three-item scale to measure the extent to which individuals transfer the knowledge and skills presented in training sessions to their core jobs ($\alpha = 0.87$). A sample item is ‘I have been using the skills presented in the training course to help improve my performance’.

**Results**

**Factor analysis**

In order to assess the extent to which each of the variables represents a separate construct, an exploratory factor analysis (EFA) was performed. An EFA is warranted because some of the items were adapted from previous research to correspond to the purposes of this study and, as a result, the dimensionality of the survey was not assured for this sample. A principal component analysis (PCA) followed by varimax rotation was performed on the 23 survey items. Two decision rules were imposed to ascertain the number of components and items comprised in the factor analytic model: (1) eigenvalues over 1.0 were retained and (2) components that discretely loaded from other factors in the screen plot were retained. As depicted in Table 1, six components were deduced from the 23 items and these components accounted for 55.43 per cent of the variance in the items.
Table 1: Item means, standard deviations and varimax rotated factor loadings

<table>
<thead>
<tr>
<th>Item</th>
<th>M</th>
<th>SD</th>
<th>Factor loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ways to apply training on the job</td>
<td>3.47</td>
<td>0.83</td>
<td>0.85</td>
</tr>
<tr>
<td>Problems in using training</td>
<td>3.56</td>
<td>0.84</td>
<td>0.79</td>
</tr>
<tr>
<td>Interest in the training learning</td>
<td>3.71</td>
<td>0.82</td>
<td>0.72</td>
</tr>
<tr>
<td>Feedback on performance after training</td>
<td>3.73</td>
<td>0.82</td>
<td>0.65</td>
</tr>
<tr>
<td>Performance goals based on training</td>
<td>3.63</td>
<td>0.82</td>
<td>0.63</td>
</tr>
<tr>
<td>Goals to apply training on the job</td>
<td>3.77</td>
<td>0.85</td>
<td>0.56</td>
</tr>
<tr>
<td>Transfer design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examples about ways to use learning on the job</td>
<td>4.13</td>
<td>0.59</td>
<td>0.77</td>
</tr>
<tr>
<td>Activities and exercises on how to apply learning</td>
<td>3.98</td>
<td>0.67</td>
<td>0.63</td>
</tr>
<tr>
<td>Teaching on how to apply learning on the job</td>
<td>3.84</td>
<td>0.70</td>
<td>0.61</td>
</tr>
<tr>
<td>Understanding of the training designers on how to use learning</td>
<td>3.98</td>
<td>0.69</td>
<td>0.54</td>
</tr>
<tr>
<td>Performance self-efficacy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to use newly learned skills on the job</td>
<td>3.99</td>
<td>0.64</td>
<td>0.80</td>
</tr>
<tr>
<td>Confidence in the ability to use new skills at work</td>
<td>4.00</td>
<td>0.61</td>
<td>0.71</td>
</tr>
<tr>
<td>Using learning even in difficult situations</td>
<td>3.98</td>
<td>0.61</td>
<td>0.51</td>
</tr>
<tr>
<td>Overcoming obstacles to use new skills or knowledge</td>
<td>3.95</td>
<td>0.64</td>
<td>0.40</td>
</tr>
<tr>
<td>Training transfer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using new skills to improve performance</td>
<td>3.76</td>
<td>0.71</td>
<td>0.75</td>
</tr>
<tr>
<td>Training helped to improve job performance</td>
<td>3.77</td>
<td>0.69</td>
<td>0.73</td>
</tr>
<tr>
<td>Incorporating learned skills into daily work activities</td>
<td>3.77</td>
<td>0.75</td>
<td>0.65</td>
</tr>
<tr>
<td>Performance feedback</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-training conversations with people about how to improve job performance</td>
<td>3.38</td>
<td>0.77</td>
<td>0.72</td>
</tr>
<tr>
<td>Feedback on how well was the training application</td>
<td>3.20</td>
<td>0.82</td>
<td>0.59</td>
</tr>
</tbody>
</table>
Overall, the results of the PCA were consistent with the extant literature. The first principal component (six items) was labeled ‘supervisor support’ (α = 0.89); the second principal component (four items) was labeled ‘transfer design’ (α = 0.78); the third principal component (four items) was labeled ‘performance self-efficacy’ (α = 0.76); the fourth principal component (three items) was labeled ‘training transfer’ (α = 0.87); the fifth principal component (three items) was labeled ‘performance feedback’ (α = 0.72); and finally, the last principal component (three items) was labeled ‘training retention’ (α = 0.70). Based on the results from the EFA, we used these 5-factor scores to test the aforementioned hypotheses.

Hypothesis testing

Means, standard deviations, intercorrelations and reliabilities of the variables are presented in Table 2. In general, results indicated that all independent variables of our study were positively and significantly related to training transfer. To determine the extent to which transfer design, performance self-efficacy, training retention, feedback and supervisor support affect transfer outcome, hierarchical regression analysis was performed (Cohen & Cohen, 1983). The independent variables entry was based on the logic of our hypothesized model. Additionally, demographic variables and the nature of the training were initially included in the analysis but were subsequently discarded because they did not significantly predict transfer of training. The results of the hierarchical regression analysis are presented in Table 3.

The results of step 1 showed that transfer design significantly predicted transfer of training (β = 0.31, p < 0.01), supporting our first hypothesis. In step 2, we entered the individual factors. Similarly to transfer design, both performance self-efficacy (β = 0.30, p < 0.01) and training retention (β = 0.30, p < 0.01) significantly predicted transfer of training, supporting our second and third hypotheses, respectively. Finally, in step 3 we entered the environmental variables. As shown in Table 3, only feedback significantly predicted transfer of training (β = 0.42, p < 0.01), providing support for our fourth hypothesis. Although the bivariate correlation between supervisor support and training transfer was positive and significant (r = 0.31, p < 0.001), the hierarchical regression did not support this hypothesis (β = −0.05, p = ns) Therefore, the fifth hypothesis was only partially supported. Overall, these variables explained 42 per cent of the total variance in transfer of training.

Table 1: Continued

<table>
<thead>
<tr>
<th>Item</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>People said things that helped to improve job performance</td>
<td>3.50</td>
<td>0.81</td>
<td>0.17</td>
<td>0.10</td>
<td>0.03</td>
<td>0.26</td>
<td>0.47</td>
<td>−0.08</td>
</tr>
<tr>
<td>Training retention</td>
<td>3.90</td>
<td>0.65</td>
<td>0.00</td>
<td>0.06</td>
<td>−0.07</td>
<td>0.08</td>
<td>0.08</td>
<td>0.99</td>
</tr>
<tr>
<td>Remember the main topics learned in the training</td>
<td>3.82</td>
<td>0.70</td>
<td>0.02</td>
<td>−0.01</td>
<td>0.09</td>
<td>0.10</td>
<td>0.05</td>
<td>0.67</td>
</tr>
<tr>
<td>Easily say several things learned in the training</td>
<td>3.98</td>
<td>0.87</td>
<td>0.05</td>
<td>−0.01</td>
<td>0.04</td>
<td>0.21</td>
<td>−0.12</td>
<td>0.37</td>
</tr>
<tr>
<td>Never thought again about the training contenta</td>
<td>3.98</td>
<td>0.87</td>
<td>0.05</td>
<td>−0.01</td>
<td>0.04</td>
<td>0.21</td>
<td>−0.12</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Note: Higher item loadings on each factor are underlined. A 5-point Likert response scale was used for all items.
a item was reversed coded.
n = 182.

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Discussion

The results of this research demonstrate the importance of training design, individual characteristics and the influence of the work environment on transfer of training.

The results for H1 indicated that transfer design, which assessed how applicable the training was to the job, positively influenced transfer of training. These results reinforce the notion that organizations should be aware of how well the content of the training program, in terms of the use of activities, examples and exercises, is focused on the application of on-the-job learning.

The second and third hypotheses involving performance self-efficacy and the retention of the training content were also significantly related to transfer of training. Such results suggest that when trainees believe in their capabilities to transfer learning and when they retain training content, they are more likely to perceive that they have transferred the training to the work context.

The impact of the work environment in terms of feedback on transfer of training, as predicted in hypothesis 4, was also supported in this research, indicating that the feedback from others in the organization regarding the trainee’s performance after training influences perceptions of training transfer. Contrary to what was predicted, however, hypothesis 5 was not supported. In this instance, supervisor support did not significantly predict transfer of training.
One strength of this research was that it allowed us to compare the results of transfer of training research using two different methodologies. One methodology assumes that in order to evaluate transfer of training, one must have evaluations of changes in job performance as measured by persons (sources) other than the trainees (Lance et al., 2002; Tracey et al., 1995). These other persons could include supervisors, co-workers and customers. However, it is usually difficult to gain access to and collect data from persons other than the trainees. The other methodology used in this study is to collect all data on the research variables from the trainees. Despite the fact that some argue against the use of self-report ratings of job performance, it is likely that the trainees are the most important and valid source of the measurement of job performance as their perceptions will drive their motivation and performance. Whereas using data collected from other sources (i.e. supervisors, peers and customers) may provide slightly different ratings, data collected using only a trainee self-report method can provide similar results as demonstrated in the present research. Furthermore, because it is so important to measure transfer of training in order to assess the practical and financial aspects of training effectiveness (Cascio, 2000), using this latter paradigm may be simpler and less expensive for human resource and managerial professionals. The important point is that it may influence more organizations to evaluate transfer of training with empirical data rather than assuming that transfer always occurs.

Theoretical and practical implications

Results from this study have potentially important implications for future research and practice. In general, the results of this research argue for examining all aspects of the training process when conducting research on transfer of training. Hence, these results provide empirical evidence to the aforementioned theoretical models (e.g. Baldwin & Ford, 1988; Holton, 1996, 2005; Kavanagh, 1998) suggesting that transfer of training is impacted by the training design, characteristics of the trainee and contextual factors such as feedback regarding post-training job performance. Future research should examine pre-training factors in a similar study in order to determine if the combined factors provide better prediction of transfer of training. As indicated earlier, without the effective transfer of training from the training context to the organizational environment, the costs and time spent in training is simply wasted.

More specifically, this study supports the theoretical literature (e.g. Holton, 1996, 2005) that suggest the importance of a transfer design that maximizes the trainee’s ability to transfer in enhancing training transfer. The present study also extends Baldwin and Ford’s (1988) work by demonstrating empirically that for training to be transferred, the training content should be retained over time. Finally, the results of this study reinforce the role of performance self-efficacy (Ford et al., 1998) and performance feedback (Reber & Wallin, 1984) on the explanation of training transfer.

However, results of this study do not support the dominant literature (e.g. Bates et al., 2000; Brinkerhoff & Montesino, 1995) that indicate that supervisory support is a critical variable in transfer of training. The results regarding the hypothesis in which it was predicted that supervisor support would affect transfer of training could seem puzzling at first because the previous literature has typically supported this relationship (Baldwin & Ford, 1988; Lance et al., 2002; Rouiller & Goldstein, 1993; Tracey et al., 1995). However, some gaps persist in the literature regarding the specific supervisory factors that influence transfer. Like in the prevalent literature, this study considered only the post-training supervisory dimensions like meetings and feedback. Perhaps supervisory interventions in pre-training and during the training could have the stronger impact on transfer of training. Clearly, this is an avenue for future research.

An interesting aspect of the findings of this study is a comparison with previous research using a different methodology (Baldwin & Ford, 1988; Lance et al., 2002; Rouiller & Goldstein, 1993; Tracey et al., 1995), as well as using participants from a country other than the United States. Most of the cited transfer of training research has used pre-post designs using a sample from the United States, whereas this study used a post-test design with a sample from Portugal. Thus, the different results generated...
with the supervisor support variable could also be attributed to these methodological and cultural differences. More important, however, are the similarities in findings between this study and those done in the United States.

Regarding psychometric implications, the results from this study provided some criterion validation evidence for the LTSI measure. As noted in the hypotheses testing, the results of this study found strong relationships between some LTSI dimensions and transfer of training.

Based on the results of this study, we can argue that for organizations to maximize their return on investment with regards to training and development, they need to focus on all three determinants of transfer of training: training design, individual characteristics and work environment. First, organizations need to ensure that training is designed such that it matches the ability level of trainees. This will help ensure that trainees have the ability to (1) learn the training material and (2) utilize the knowledge and skills accrued during training outside of the learning environment. Second, organizations can improve transfer of training by ensuring that trainees believe that they have the capabilities to successfully learn the new material and utilize their new knowledge, skills and abilities (KSAs) on the job. This can be improved by (1) showing trainees that other employees who have received the training have successfully improved their job performance, (2) providing trainees the opportunity to experience mastery of the training material in the training environment and (3) modeling the appropriate behaviors so that trainees can conceptualize how the KSAs can be utilized outside of the training context. Organizations should also conduct follow-up assessments after the training to ensure that the training content is retained over the time.

Finally, it is important for organizations to create environments that support the transfer of newly trained KSAs to the work environment. In other words, trainees should feel that they will receive the support and feedback necessary regarding their performance from the organization, supervisor and co-workers in order to effectively transfer the training. One way this can be accomplished is by creating a climate in which all employees perceive that training is an important aspect of organizational life that will help employees become productive members of the organization (Baldwin & Ford, 1988; Tracey et al., 1995).

Limitations

Several limitations of this study should be noted. First, common method variance could be an issue as data on the predictor and criterion variables were collected from the same source. However, we controlled for common method bias using both statistical and procedural methods. Statistically, we conducted Harman’s single-factor test and examined the unrotated factor solution (Podsakoff et al., 2003). Results of the EFA demonstrated that no single factor accounted for the majority of the covariance among the measures. Procedurally, we controlled for common method bias by collecting our predictor variables at time 1 and our criterion variables at time 2 as suggested by Podsakoff et al. (2003).

A second limitation is that transfer of training was measured by self-report rather than actual behavior and this may have influenced the pattern of results. Nevertheless, in addition to the above-mentioned argument for using self-report performance ratings, utilizing specific items and anonymous and confidential surveys might have enhanced the accuracy of the self-report data. Also, previous research has used similar self-report measures of training transfer (e.g. Chiaburu & Tekleab, 2005; Facteau et al., 1995; Tesluk et al., 1995), showing evidence that trainees can accurately self-report their levels of training transfer. Finally, as mentioned before, the results of this research using self-report data are in fair agreement with previous transfer of training results using both self-report and supervisor evaluations of performance (Lance et al., 2002; Tracey et al., 1995). This convergence of results using different research paradigms provides evidence that self-report data, collected anonymously, may be adequate for the evaluation of transfer of training. However, for future research, we do suggest the use of additional measures collected from several sources (e.g. supervisors, peers and
subordinates) in order to reinforce the trainee’s ratings or, when possible, the use of direct and objective measures of the trainee’s on-the-job performance.

A third limitation is the attrition rate of our sample between the two points of data collection. However, our final sample of 182 participants yielded passable statistical power to conduct our hypotheses testing.

Finally, because we collected data from only one organization, these results may not generalize to other organizations or industries. This may be especially relevant for the findings regarding supervisor support. It is likely that in other organizational environments, supervisory support will have a larger impact on transfer of training as evidenced by previous research (Baldwin & Ford, 1988; Lance et al., 2002; Rouiller & Goldstein, 1993; Tracey et al., 1995). Consequently, future research should examine the generalizability of our results in different organizational contexts.

Conclusions

Training practitioners and researchers have not yet extensively studied the empirical and simultaneous effects of the three major determinants (training design, individual characteristics and work environment) of transfer of training. This study attempted to fill this gap by analysing the influence of these determinants on training transfer. The findings indicated that transfer design, performance self-efficacy, training retention and performance feedback were significantly related to transfer of training over time. This suggests that it is important that training researchers and practitioners examine all aspects of the training process when conducting research on transfer of training.

References


