Personnel
Review
30,1

102

Received June 1998
Revised January 1999
Accepted September
1999

RESEARCH NOTE

A review of transfer of training studies in the past decade

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Keywords *Training, Learning, Outcomes, Management learning, Skills*

Abstract *This article reviews some major studies that were conducted in the past decade (1989-1998) on the transfer of what employees learned from training programmes back to their jobs. A conceptual framework is developed for this article to better present the "popular" constructs that have been tested empirically. The achievement is twofold. First, this review paper highlights that some individual, motivational and environmental factors are related to transfer of training. Second, some directions for further studies have been suggested. For example, longitudinal study was highly recommended for measuring transfer outcomes. Some new individual (e.g. achievement striving), motivational (e.g. trainee-control-over-training) and environmental (e.g. transfer climate) constructs are recommended to be incorporated in newly created models. These models can then be examined using structural equation modelling. After extensive testing and refinement of these models, a set of critical constructs can be distilled. By that time, convergence of research efforts focusing on major themes can be achieved.*

Introduction

Training has been regarded as an expensive investment. Especially when we know that only 10 percent of total training expenditures could lead to positive transfer of training in the USA (Georgenson, 1982), we are more concerned about how to ensure the transfer of learned skills to the work situation.

It is clear that practitioners usually adopt a trial and error approach to manage training transfer, which can be costly and time-consuming and cannot deliver a desirable result. They do not have a thorough understanding of the underlying principles, and so they are often puzzled by the training transfer outcomes. Therefore, they need to rely on good transfer theories since a good theory that withstands rigorous empirical testing could offer valuable advice.

Although scholars have undertaken transfer of training research over decades and some published research findings are of value to management practitioners, there is still a long way to go in order to reach the mature stage. In fact, more efforts are expected to build a united and coherent research framework. The purpose of this paper is to review recently published articles on transfer of training. Our suggestions, which are based on major findings on training transfer, can complement the existing transfer literature and may form

Personnel Review,
Vol. 30 No. 1, 2001, pp. 102-118.

The authors would like to thank anonymous reviewers for comments on earlier versions of this article.

useful directions for undertaking transfer research. This review paper claims to have practical value; however, those who look for detailed practical guidelines for facilitating training transfer may refer to Quinones and Ehrenstein (1997), Ford and Kozlowski (1997) and individual articles quoted in this paper.

Transfer of training

Transfer of training can be defined as the application of knowledge, skills and attitudes learned from training on the job and subsequent maintenance of them over a certain period of time (Baldwin and Ford, 1988; Xiao, 1996). This definition broadens the traditional meaning of transfer that only concerns the effective learning in a training programme.

Despite the urgent need for a better understanding of the training transfer process, Baldwin and Ford (1988) realised that the extant literature on training transfer has very little value to practitioners to maximise positive transfer. Among early works on transfer of training, Noe (1986) and Baldwin and Ford (1988) are probably the most influential. Especially, the conceptual framework of the latter has attracted a lot of empirical studies to investigate how individual characteristics, job attitudes and work environment affect the transfer of training process (e.g. Baldwin *et al.*, 1991; Clark *et al.*, 1993; Facteau *et al.*, 1995; Ford *et al.*, 1992; 1998; Gist *et al.*, 1991; Martocchio, 1992; Mathieu *et al.*, 1992; Saks, 1995; Tannenbaum *et al.*, 1991; Tesluk *et al.*, 1995; Tracey *et al.*, 1995; Tziner *et al.*, 1991).

Focusing on these variables has its root in the concept of trainability. Trainability is defined by Noe and Schmitt (1986, p. 498) as "the degree to which training participants are able to learn and apply the material emphasised in the training programme". They expanded the Wexley and Latham's (1981) trainability notion (i.e. trainability as a function of ability and motivation) to include an environmental component. In other words, they described trainability as a function of ability, motivation and environmental favourability [Trainability = f(Ability, Motivation, Environmental Favourability)]. Their conceptual ideas have profound effect on training transfer research.

Recent studies of transfer of training

Some authors (e.g. Baldwin and Ford, 1988) have suggested that early empirical research studying the effects of individuals' factors (e.g. trainee ability, personality, and motivation) and work environment on transfer of training are very few. Robertson and Downs (1979), after reviewing studies regarding trainability testing, suggested that trainees' ability might explain about 16 per cent of the variance in training effectiveness while Noe and Schmitt (1986) further stated that trainees' motivation and work environment might help explain another 15-20 per cent of the variance. Recently, more research has been done to explain individual, attitudinal and environmental impacts on the transfer process and outcomes where some of them have shown high value relatively. Their practical values warrant close scrutiny.

Baldwin and Ford (1988) reviewed the major empirical studies of training transfer that were done on or before 1987. Their framework highlights the importance of such training inputs as trainee characteristics (ability, personality, motivation), training design (principles of learning, sequencing, training content) and work environment (support, opportunity to use) on training outputs (learning, retention) and conditions of transfer (generalisation, maintenance). They further concluded that the samples, tasks, designs and criteria used in the extant literature have limited the understanding of the transfer process (Noe and Ford, 1992). In summary, there are four limitations (Ford and Weissbein, 1997), which are:

(1) The criterion problem of how training transfer is defined and operationalised, and when it has to be measured.

(2) The low complexity of the trained tasks used to examine the generalisability of results from training design studies.

(3) The lack of conceptual models to drive the choice of which trainee characteristics should be examined for their impacts on transfer.

(4) The lack of attempts made to conceptualise and operationalise work-environment factors that can influence transfer.

Some researchers have written updated reviews (e.g. Ford and Weissbein, 1997; Noe and Ford, 1992; Tannenbaum and Yukl, 1992) intending to extend the work of Baldwin and Ford (1988). Among these outputs, the review of Ford and Weissbein (1997) was a more updated one. Twenty recently published empirical articles were reviewed to investigate if the four limitations mentioned above have been addressed. In their review, they found that progress had been made to advance the understanding of the influence of work-environment variables on transfer outcomes. They further suggested that for deriving practical applications, more efforts have to be devoted to examining the relationships between work-environment factors with learning and transfer so as to develop intervening strategies by adjusting these factors to a favourable level.

However, other researchers may adopt alternative views on the transfer process (e.g. Holton, 1998; Kirkpatrick; 1987; Noe, 1986; Tannenbaum *et al.*, 1991). For dealing with training effectiveness, the taxonomy of Kirkpatrick would be particularly useful (Noe, 1986). Recently, some researchers have still used the Kirkpatrick's four-level taxonomy to evaluate the transfer of training (e.g. Olsen, 1998). The conceptual framework of this article is then mainly based on Kirkpatrick's (1987) views on training evaluation together with Tannenbaum *et al.*'s (1991) recommendations on training effectiveness. Trainee reactions, learning, behaviour and organisational results are four major indicators/measures to undergo training evaluation (Kirkpatrick, 1987). To explicate training effectiveness, it is crucial to identify and measure the impacts of individual and organisational constructs on training outcomes including learning and transfer (Mathieu *et al.*, 1993; Tannenbaum *et al.*, 1991). Although

the two models address different research questions (Kraiger *et al.*, 1993), the combination of them constitutes the four critical stages of the transfer process – pretraining motivation, learning, training performance and transfer outcomes. These four components generally represent what would happen in a transfer process. Therefore, this paper focuses on a narrower but more generic process that can specify the transfer of training to the workplace. It is expected to offer practitioners a frame of reference to easily conceive the process of transfer of training. The four stages are described below:

(1) Pretraining motivation refers to the intended effort towards mastering the content of a training programme.

(2) Learning is the process of mastering the content of a training programme.

(3) Training performance is the measurement of the extent of what a trainee has achieved in a training context.

(4) Transfer outcomes are those attainments made by the trainees when they apply what they have acquired in a training context back to the job, which can benefit both the trainees and the organisation. Some examples of such attainments are behaviour change, perceived posttraining attitudes, perceived transfer of training, job performance, skill maintenance, etc.

In addition, nine independent factors are identified which were most commonly examined in the past decades. These factors are categorised as individual (locus of control, self-efficacy), motivational (career/job attitudes, organisational commitment, decision/reaction to training, posttraining interventions) and environmental (supports in organisation, continuous-learning culture, task constraints) variables.

More specifically, this review paper focuses on the major empirical studies that were undertaken to test the effects of individual, motivational and environmental factors on the process of transfer of training. It excludes technical reports and studies reporting qualitative or descriptive findings or meta-analysis results, using samples of secondary or primary schools' students and children and examining variables that were not included in this study. Major articles refer to those published in some major organisational behaviour journals such as *Personnel Psychology, Journal of Applied Psychology, Journal of Occupational and Organisational Psychology*, etc. and those works completed by some key contributors (mainly organisational behaviourists). Therefore, although some areas (e.g. educational psychology) were expected to be a source of transfer research, they were excluded in this study. Moreover, key contributors are those who have outputs published in major organisational behaviour journals or whose papers have been valued and quoted by other key contributors or are rated by the authors of this article as important.

Table I summarises the findings of the studies which were published in the last decade (from 1989 to 1998). The first horizontal row consists of the four

		Pretraining motivation	Learning	Training performance	Transfer outcomes
Individual variables	Locus of control	nt	nt	+(1)	+(1)
	Self-efficacy	+(2)	ns(1)	+(3)	+(6)/ns(3)
Motivational variables	Career/job attitudes	+(4)/ns(4)	nt	nt	nt
	Organisational commitment	+(1)	nt	nt	+(1)/ns(2)
	Decision/reaction to training	+(2)	+/ns(1)	+/ns(1)	+(3)/ns(1)
	Posttraining interventions[a]	+(1)	+(1)	+(1)	+(5)
Environmental variables	Supports in organisation	+(1)/–(2)/ns(1)	ns(1)	nt	+(10)/–(2)/ns(5)
	Continuous-learning culture	nt	nt	nt	+(1)
	Task constraints	–(1)/ns(1)	nt	nt	ns(1)
Dependent variables	Learning	+(1)/ns(1)			
	Training performance	+(1)/ns(1)	nt		
	Transfer outcome	+(3)	+(3)/ns(2)	+(2)/ns(1)	

Notes: + = significant and positive relationship between the two variables; – = significant but negative relationship between the two variables; ns = non-significant relationship between the two variables; nt = not tested; [a] Posttraining interventions affect subsequent learning. Numbers in parentheses are the total number(s) of the relationship that were tested in the reviewed empirical studies

Table I.
A summary of the findings of recent transfer studies

major stages (four dependent variables) in the transfer of training process. The first two vertical columns on the left-hand side of the table list the categories and the nine independent and three dependent variables respectively. The major findings of the studies of the relationships between individual, motivational and environmental factors and the transfer process (as shown in Table I) are described in the following sections.

Individual factors

Trainee characteristics (e.g. personality, trainee ability, motivation effects) were originally identified by training practitioners as factors affecting transfer of training (Baldwin and Ford, 1988). Notwithstanding, further empirical testing of these characteristics was very rare in earlier transfer studies. During the 1980s, the study of these characteristics had been increasing. This section will describe the effects of such major characteristics as personality and self-efficacy on training transfer while motivational factors will be identified in the next section under its own heading.

Among various personality variables, locus of control was hypothesised in many earlier studies to affect the transfer process (e.g. Baumgartel *et al.*, 1984; Noe and Schmitt, 1986). Locus of control is defined by Rotter (1966) as a generalised expectancy that organisational outcomes in terms of rewards and reinforcements in life are controlled either by an individual's own actions (internality) or by other forces (externality). In a training situation, trainees with a strong belief that they can control the provision of organisational

outcomes are more likely to facilitate the application of training content on their jobs. Such outcomes can be recognition, promotions, salary increases and job enlargement. The recent study of Tziner *et al.* (1991) indicated that those with an internal locus of control who benefited from a relapse prevention module exhibited higher levels of mastering the training contents. They were more likely to use trained skills and transfer strategies and were shown to transfer those trained skills to the workplace.

The effects of self-efficacy on transfer have been widely studied recently. Self-efficacy is defined as "people's judgements of their capabilities to organise and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). It is clear that trainees with a high level of confidence in attaining anticipated performance and behaviour change will be more likely to apply what they have learned from training on the jobs. Empirically, self-efficacy was shown to be positively related to pretraining motivation (Quinones, 1995), training performance in various training programmes (Gist, 1989; Gist *et al.*, 1991; Tannenbaum *et al.*, 1991) and posttraining behaviour (Latham and Frayne, 1989; Gist, 1989; Mathieu *et al.*, 1992; Saks, 1995; Tannenbaum *et al.*, 1991), transfer performance (Ford *et al.*, 1998) and skill maintenance (Stevens and Gist, 1997). Seyler *et al.* (1998) further found that trainees with a high level of confidence to training were more motivated to transfer the newly acquired knowledge and skills.

Motivational factors

Many motivational factors proposed to affect transfer of training were tested. This is because trainees with inadequate motivation are likely to be poor in mastering the training content and subsequent training performance. The following paragraphs will list the testing of such motivational variables that are grouped into four major dimensions: career and job attitudes; organisational commitment; decision and reaction to training; and posttraining interventions.

Career and job attitudes generally refer to the cognitive state of psychological identification with one's career and job. Actually, career and job attitudes have been tested separately in various conceptualisations and operationalisations. However, trainees who frequently engage in cognitive or environmental search activities are expected to have a better understanding of their strengths, weaknesses and interests (Noe, 1986; Noe and Schmitt, 1986). In fact, they recognise the importance of learning new skills and refining current skills (Facteau *et al.*, 1995) so that such skills can match with the requirements of the new job settings. Empirically, career and job attitudes were shown to affect pretraining motivation. Trainees who had both good career planning and a high level of job involvement were more likely to be motivated to learn (Mathieu *et al.*, 1992; Williams *et al.*, 1991).

Organisational commitment is originally defined by Porter *et al.* (1974, p. 604) as "the relative strength of an individual's identification with and involvement in a particular organisation". It represents the extent of an individual's belief in and acceptance of organisational goals and value, willingness to exert

considerable work effort and desire to maintain organisational membership (Mowday *et al.*, 1982). Tannenbaum *et al.* (1991) recognised that, in a training situation, the level of employees' organisational commitment affects their views on the usefulness of training, both to themselves and to the organisation, and the expected outcome of early training experiences. Two recent studies showed that commitment influenced pretraining motivation (Tannenbaum *et al.*, 1991) and the application of training on performing core job activities (Tesluk *et al.*, 1995). In fact, trainees with a high level of organisational commitment were more optimistic to perceive the likelihood of positive organisational change.

Additionally, employees being offered opportunities to provide input into the training decision were more likely to perceive the training as useful for their jobs which, in turn, resulted in higher levels of pretraining motivation (Baldwin *et al.*, 1991; Clark *et al.*, 1993; Mathieu *et al.*, 1992). The pretraining motivation was said to be related to actual learning in a training programme (Baldwin *et al.*, 1991; Mathieu *et al.*, 1992) and subsequent training performance (Mathieu *et al.*, 1992). Moreover, trainees' reaction to training was shown to affect their learning and subsequent training performance (Mathieu *et al.*, 1992; Martocchio, 1992). Specifically, trainees who perceived training as having high job and career utility were more likely to be motivated to learn (Clark *et al.*, 1993) and those who perceived training to be relevant had higher level of immediate skill transfer (Axtell *et al.*, 1997).

Finally, some posttraining interventions (i.e. feedback and relapse prevention) might influence trainees' motivation to transfer new acquired skills and knowledge back to their jobs. The study of Martocchio and Webster (1992) indicated that trainees receiving negative feedback resulted in less learning over time than those receiving positive feedback. Martocchio (1992), in his own study on a training intervention, supported that positive feedback could reduce posttraining computer anxiety which, in turn, helped trainees improve their training result. Quinones (1995) found that the training assignments (for either remedial or advanced purpose) could provide feedback concerning past performance and resulted in different attitudinal and motivational levels being incorporated into the actual training programme. The study of Tziner *et al.* (1991) revealed that a relapse prevention module included in a training programme helped increase the likelihood of the predictive power of internal locus of control and a supportive environment on the use of trained skills and transferring them to the job. More recent studies have supported the importance of posttraining interventions on skill transfer and maintenance. Burke (1997) found that relapse prevention, significantly, positively affected the trainees' ability to transfer and desire to transfer. Stevens and Gist (1997) further found that a posttraining programme that incorporated a performance-oriented intervention (e.g. goal-setting instruction) could improve the maintenance of trained interpersonal skills.

Environmental factors

Although practitioners stress the importance of the work environment in creating positive transfer, empirical research focusing on this dimension was

limited (Baldwin and Ford, 1988). Recently, more studies have been based on such work-environment variables as supports-in-organisation, continuous-learning culture and task constraints (e.g. Facteau *et al.*, 1995; Tracey *et al.*, 1995).

The supports-in-organisation variables come from the concept of social support that is said to be influential when employees believe that other client systems in the organisation (e.g. their supervisors and peers) provide them with opportunities for practising new skills and knowledge in the job settings (Noe, 1986). Opportunity to practise ensures that when trainees have plenty of chances to apply what they have learned to their jobs, a larger amount of training content can be transferred (Ford *et al.*, 1992). Some researchers have used the term "transfer climate" to represent the social supports from the organisation (e.g. Tracey, 1992). Basically, there are four major sources of social support – subordinate, peer, supervisor and top management (Facteau *et al.*, 1995).

Tziner *et al.* (1991) found that supportive environment alone could not influence trainees' use of trained skills. Rouiller and Goldstein (1993), using a sample of managers of fast-food restaurants to study the effect of transfer climate on posttraining behaviour, further found that transfer climate was not significantly related to learning. Yet, some authors' findings indicated that a positive transfer climate encouraged transfer of behaviour in the job setting (Olsen, 1998; Rouiller and Goldstein, 1993; Tracey *et al.*, 1995). Other studies showed that support from supervisors and peers moderately affected pretraining motivation (Facteau *et al.*, 1995) but significantly affected the perceived transfer of training (Xiao, 1996). Seyler *et al.* (1998) revealed that opportunity to transfer and peer support were related to motivation to transfer, while Axtell *et al.* (1997) found that trainees' motivation to transfer was a key predictor of both immediate (one month) and longer-term (a year) skill transfer. Moreover, subordinates' support (Facteau *et al.*, 1995) and management support (Brinkerhoff and Montesino, 1995) could facilitate transfer of training. Brinkerhoff and Montesino (1995) also found that strong relationships built by involved parties (i.e. trainers, trainees and managers) before, during, and after training could ensure a positive transfer.

Continuous-learning culture is defined as "a pattern of shared meanings of perceptions and expectations by all organisational members that constitute an organisational value or belief" (Tracey *et al.*, 1995, p. 241). Such shared meanings involve individual, task and organisational characteristics. In consequence, employees working in a continuous-learning environment share the perceptions and expectations that learning is essential to them and associated with their work. According to their empirical study, continuous-learning culture was directly related to posttraining behaviours.

Another major component of work environment is task constraints. Mathieu *et al.* (1992) found that task constraints were shown to be negatively, but only marginally, related to training motivation. Furthermore, the study of Facteau *et al.* (1995) revealed that manager's perceptions of task constraints in the

environment were not significantly related to their pretraining motivation and perceived training transfer.

Implications for transfer research

This article reviewed major empirical studies on transfer of training in the past decade. This review covers those studies that have components on testing the relationships between individual, motivational and environmental factors on the four-stage transfer process. Some suggestions for further research are made hereinafter.

Improvements in research methodology

Early studies were lacking a theoretical framework to guide the investigations (Baldwin and Ford, 1988). After Noe (1986) and Baldwin and Ford (1988) had presented their models, other researchers paid attention to systematic research that involves the development, testing and refinement of hypothesised models. Baldwin and Ford (1988) argued that it was important to identify and integrate relevant concepts, theories and research in training and development literature into new models of training transfer. However, some of the recent model testing papers do not report consistent outcomes and/or do not provide strong evidence for valid causality (see Table I). For example, organisational commitment was found to be related to training transfer in some studies (e.g. Tesluk *et al.*, 1995) but not in some others (e.g. Facteau *et al.*, 1995).

In addition, more effort should be placed on the research design to further advance training transfer research. The establishment of a model for empirical testing should be based on strong theoretical grounds. Researchers should also capitalise on the recent advancement of statistical tools such as structural equation modelling (SEM) which is a powerful statistical analysis to measure the path coefficients of a model. This technique offers advantages over other traditional statistical tools in that it explicitly takes measurement errors into consideration. It also facilitates testing of competing models and further model modification. This would help to build transfer theory that yields a unified and consistent way in examining transfer of training. There are some readily available commercial statistical tools that adopt structural equation modelling. For example, LISREL 8 is one of the popular tools which has been used in management and organisational research.

Moreover, researchers should undertake more tests of posited variables in various training contexts to ascertain the generalisation of their results. The generalisation of trained skills in a programme-controlled environment to the real job-settings is known to be critical. By testing the variables in different settings, a more consistent view of their functions on training transfer could be obtained. Other than focusing on the study of generalisation, long-term retention of trained knowledge and skills is also important to maintain individual and organisational performance. It is argued that trainees who show similar levels of transfer performance a short period after training may differ substantially in the long run (Ford and Kraiger, 1995). To examine the level of

newly acquired knowledge, skills or behaviour retained in the transfer settings after a longer period of time (or so called "far transfer") is therefore another major theme to transfer research (Ford *et al.*, 1998). For example, research should record the changes in terms of the levels of skill proficiency as a function of time after training.

The study of both generalisation and skill retention raises the use of real job context. This further implies the need for greater use of organisational personnel rather than college students as the subject for study for reflecting what would happen or have happened in the workplace. Noe and Ford (1992) suggested that current training studies have shown this trend in using working people to examine research hypotheses. This trend encourages researchers to develop co-operative relationships with organisations to design custom-made training programmes for their staff. Building a long-term co-operation benefits not only transfer research but also organisations themselves. However, the evaluation of the training and the transfer performance should be carefully dealt with. The organisations could not rely totally on the researchers for developing the evaluation criteria or methods but have to be involved and ensure that such criteria or methods can effectively measure the training and transfer performance. Transfer research, having long been queried with regard to its usefulness in the real work situation, can therefore improve its quality and value to organisations.

Furthermore, it has been argued that among all kinds of skills and knowledge, managerial and technical skills are relatively more crucial (Ford and Kraiger, 1995). Managerial skills (including interpersonal skills) are said to be transferable to various work settings, while technical skills are more specific in nature. Research focusing on managerial skills would have higher value to transfer literature, especially in the explication of conditions of transfer in terms of generalisation and retention.

Self-reported measures of transfer criteria at one time are widely used in transfer studies. Such a measure raises the question of its validity. For more rigorous testing of actual behaviour, in addition to self-reported data, data from other sources (e.g. trainees' supervisors, peers, etc.) should be collected (Facteau *et al.*, 1995). Researchers should consider that on-site observation of behaviour change or other posttraining attitudes is a viable alternative to measure the effectiveness of some skills-based training. Time management training is an example to illustrate the usefulness of on-site observation. For example, trainees' activities or tasks are recorded by observation before and after the training. Any deviation in the trainees' performance in their daily activities, such as the rate of the completion of activities, can reflect the transfer outcome. This measure is more objective than the use of a perceived rating scale.

The use of appropriate measures or rating scales is then important to capture behaviour change. Behaviour anchored rating scales (BARS), behaviour observation methodology and work sample performance index are some well-known measurements to be recommended (Ford and Kraiger, 1995). Nevertheless, data gathered shortly after the completion of the training

programme may not reflect trainees' actual behaviour change. Other than cross-sectional study (i.e. data collected at one time), a longitudinal approach to research is crucial to track behaviour change accurately. Data should then be collected before training and at a certain period after training. Although longitudinal research in this area has been increasing, the choice of appropriate time for data recording after training is still controversial. The type of skills or knowledge acquisition can be considered for making the choice. Generally speaking, three months after training is likely to be a good performance checking point since this will let the trainees go through an "orientation" period to induce new behaviour. However, if the research is about maintenance issues (e.g. test of long-term retention or relapse prevention), a longer period of performance evaluation and several checking points within the period are needed. Hesketh (1997) also stressed that long-term evaluation is necessary when organisations and researchers want to determine which training methods best develop generic skills. In consequence, behaviour changes reported by trainees and other informants at more than one point in time are needed to capture the dynamics of behaviour.

Variables suggested for further studies

As shown in Table I, some relationships between the independent and the dependent variables have not been tested. For establishing a better strategy for training transfer to occur, these relationships have to be explored. In addition, more efforts should be put into examining those relationships with inconsistent findings as shown in Table I. Such diversified results may be due to several reasons:

(1) *Different samples*. Data collected from working people might be different from college students.

(2) *Different kinds of training*. Managerial training may be influenced by some variables that have no great impact on task skills training. For example, an MBA programme requires trainees to be more creative while cashier operation training requires trainees to be more tolerable in a monotonous environment. Thus, trainees with an internal locus of control may benefit more in an MBA programme.

(3) *Different model design*. The relationships specified in a model may affect the statistical results. It is common to see that a revised model may be needed to better represent the real situation. A revised model usually involves re-specification of some relationships in a model. Sometimes this involves the deletion of some variables that are shown to be irrelevant to other variables in the model.

(4) *Broad dimension of some variables*. As some variables stated in this paper have a broad meaning, their effects on the dependent variables may not be consistent, especially when they are measured in different scales. For example, support in an organisation can be support from management, supervisor, peer or even subordinates. These various

forms of support may have different magnitudes on their relationships with the training transfer process. Other variables with broad meanings are career and job attitudes, transfer outcomes, etc. It is noted that this is a major limitation of this paper, which raises our concern to propose a further refinement of the conceptual framework of this paper to better reflect the real world issues.

Due to these inconsistent findings, further testing of these variables is essential. The intention is to develop common variables that are critical to different training and transfer situations, including the establishment of common scales or instruments that can be used in different research settings.

It is useful to study variables developed in other areas which are shown to be influential in training transfer. For example, self-efficacy is derived from social cognitive theory (Bandura, 1991). As it was known to be associated with effort-performance expectancies (Noe, 1986), its effects on training practices (e.g. motivation to learn) were said to be worthy of study and have been examined ubiquitously. On top of those suggestions raised by Baldwin and Ford (1988), new constructs in terms of individual, motivational and environmental factors are proposed for examination.

By studying personal characteristics we hope to better understand how people function and behave. Individual differences are expected to exert considerable influence on transfer outcomes. Recently, researchers in cognitive and instructional psychology have been paying more attention to the applications of cognitive constructs to facilitate transfer (Ford and Kraiger, 1995). For example, the impacts of mastery (or learning) orientation and performance orientation on transfer of training should be examined as they exhibit different responses to failure situations. Mastery oriented individuals are willing to accept challenging tasks and retain a high level of competence under difficult conditions. Performance oriented individuals, however, want to escape from challenges and decline in performance in the face of obstacles (Button and Mathieu, 1996). The relationships of these two cognitive variables with learning outcomes (Button and Mathieu, 1996), learning strategies (Ford *et al.*, 1998), and skill maintenance (Stevens and Gist, 1997) have been tested. It is supported that mastery-oriented trainees are likely to benefit more from training (Gist and Stevens, 1998). For validating the results, further investigations are needed.

Another cognitive dimension is achievement striving. It is a kind of Type A personality which is defined as a block of behaviours (such as competence, aggressiveness, need for high achievement and work involvement) governed by the interaction of an individual's action and emotion (Friedman and Rosenman, 1974). Individuals with high achievement striving treat work seriously, perform actively and have high ambition to succeed (Bogg and Cooper, 1995). It is therefore proposed to be related to positive personal consequence, such as training performance (Lee, 1992) or transfer outcomes.

With respect to motivational variables, some widely studied factors are worth continuing study. Reaction in training is one example. Alliger *et al.* (1997), in their meta-analysis of training criteria, argued that the utility-type reaction measures had been found to be stronger correlates of learning and transfer performance than affective-type reaction measures. In addition, utility-type reaction measures were shown to be more strongly related to transfer than were measures of immediate or retained learning. These findings echo what Warr and Bunce (1995) emphasised on the use of reactions in training.

Other new constructs have to be proposed. For example, trainee-control-over-training has shown to be related to motivation to learn in skills-based training (Baldwin *et al.*, 1991) and improve learning in computer-based instructions (Milheim and Martin, 1991), but its effects on other training methods and applications have not been understood. It is considered that trainees' individual needs and preferences are likely to affect learning and transfer. Specifically, greater trainee-control-over-training may influence trainees to learn more complex knowledge and skills and apply these more effectively back to the workplace (Ford and Kraiger, 1995). Additionally, self-regulatory activities (e.g. metacognition) are expected to be effective learning strategies leading to greater knowledge and skill acquisition and transfer (Earley *et al.*, 1989; Ford *et al.*, 1998).

Recent increases in the study of work-environment variables have resulted in a more mature understanding of the impact of work environment on training transfer. Relevant publications include the operationalisation of the meanings of work environment (e.g. dimensions as transfer climate and continuous-learning culture by Tracey (1992)) and the study of construct validation of work-environment measures (e.g. the development of a transfer climate instrument by Holton *et al.* (1997)). On the other hand, Tracey *et al.* (1995) examined the impacts of transfer climate variable on transfer outcomes using a sample of supermarket managers, while Rouillier and Goldstein (1993) used a sample of managers of fast-food restaurants. The relationships of these constructs deserve more tests to ascertain their generic validity in other training programmes for managers in order to identify the key characteristics of climate and culture to support the positive transfer of supervisory or managerial skills.

The variables mentioned above are proposed to influence the process of transfer of training. Notwithstanding, it is likely that there are some factors affecting these proposed variables. For example, antecedents to the performance and mastery orientations are recommended to study as these antecedents may affect the adoption of particular goal orientations. Stevens and Gist (1997) recently found that low self-efficacy trainees performed more poorly than high self-efficacy trainees in the performance-oriented but not the mastery-oriented post-training condition. Moreover, self-efficacy and management support may not only impact directly on transfer of training but also influence perceived training utility, which in turn influences training transfer (Guthrie and Schwoerer, 1994). Trainee's reaction to training is also a predictor of

organisational commitment (Tannenbaum *et al.*, 1991) which is expected to affect the transfer process. The critical antecedents have to be identified so that a more useful process model for transfer of training can be developed.

Conclusion

This article has been written to highlight some recent major studies on transfer of training. A conceptual framework is developed for better understanding the relationships between nine popular independent variables and the four-stage training transfer process. The intention is twofold. First, to summarise what has been done in the field provides a roadmap for future research. The paper revealed that some individual, motivational and environmental factors were found to be related to transfer of training. Second, some implications for further studies have been suggested. For example, longitudinal study is highly recommended for measuring transfer outcomes. Some new individual (e.g. achievement striving), motivational (e.g. trainee-control-over-training) and environmental (e.g. transfer climate) constructs are recommended to be incorporated in newly created models. These models are recommended to be examined using structural equation modelling. After extensive testing and refinement of these models, a set of critical constructs will be distilled. By that time, convergence of research efforts focusing on major themes can be achieved. Transfer of training is not a trivial topic. It is not only a core element of training research but also provides a field for cross-fertilisation of interdisciplinary research endeavours. As such, more resources and efforts are needed for a cross-discipline understanding of transfer of training.

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