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MASTER

Improving transfer of training

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Improving transfer of training

by

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Abstract

This master thesis project investigates the effect of learner, training, and work environment characteristics on the transfer of knowledge, skills, and attitudes (KSA) from a classroom situation to a work situation, also known as transfer of training. The study was carried out in the technical project-based company Vanderlande Industries (VI) and aimed to address the following research question: *'How to organize the input characteristics (i.e. learner characteristics, training characteristics, and work characteristics) in order to improve the application of learned KSA in the work setting?'*

This master thesis project tried to answer this question by empirical testing of the transfer process in a longitudinal and cross-sectional research design. Findings showed that the highest transfer performance is achieved when trainees participate in training programs with intensive feedback during training, interactive training methods and a longer training length. Before training, trainees should obtain realistic training expectations through clear specific goal setting and sufficient provision of training information in order to achieve good training outcomes and consequently better transfer results. Directly after the training program, trainees should be fulfillment in their training expectations and trainees should have the expectation that effort devoted to transferring learning will lead to changes in job performance. In addition, the support, involvement, and coaching from supervisor and colleagues after the training program play an important role in the applicability of learned knowledge and skills in the work setting.

Preface

This master thesis marks the end of the master degree program 'Operations Management and Logistics' at the Eindhoven University of Technology. The project was carried out for the department 'Vanderlande Academy' of the company Vanderlande Industries. I am pleased to end my study at this department, as I found the project challenging and a rewarding experience from which I learned a lot. The research asked for a somewhat different approach compared with the courses during my master study; whereas specific courses typically zoom in to one part of whole process, this master thesis includes all phases (preparation, problem description, analyses, and conclusion) and requires the student to maintain a general overview at all times. Therefore, the gained experience of this research has been valuable for the development of my skills and knowledge.

During this master thesis the support of a number of people was important for the progress in this study. I would like to thank my mentor of the 'Human Performance Management' department Ad Kleingeld for his extensive feedback, guidance, and cooperativeness during this research. I will remember our useful meetings that could take up several hours, while we only planned for not more than one hour. My thanks also go to Sonja Rispens for her assistance and feedback during the crucial decision points in the project. In addition, I would like to thank my company supervisor Dirk-Jan Verheijden and the Vanderlande Academy department for their support and commitment to the project and for providing me the opportunity to complete the master thesis project.

Finally, I want to thank my girlfriend, family and friends for their support, interest and necessary distraction when needed during my study.

Willem Elbers
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Management summary

Context

It is important for organizations to know how trainees transfers the learned knowledge after a training program to the job environment (Salas and Cannon-Bowers, 2001). Organization wants to know the extent to which trained knowledge, skills, and attitudes (KSA) will result in meaningful changes in the work setting and the extent to which new learned KSAs are applied and maintained on the job (Aguinis and Kraiger, 2009). This is 'transfer of training' and it is defined as '*the effective applicability of trained KSA in the appropriate work setting and maintenance of these trained KSA'*.

In this study, transfer of training and all relevant factors prior, during and after training that affect the transfer process within the company Vanderlande Industries (VI) are evaluated. As many other companies, VI had a lack of insight of the degree to which trained KSA actually transferred back to their work settings. Companies and researchers more and more notice the gap between training performance and the workplace performance as evident from learning investments that are necessary to improve training results and transfer results. In general, organizations want to know the extent to which trained KSA will result in meaningful changes in the work setting and which factors affect transfer to enhance the transferability of the training.

Research objectives

The purpose of this study was to investigate the effect of learner, training, and work environment characteristics on transfer of training from a classroom situation to a work situation. The central research question is defined as: '*How to organize the input characteristics (i.e. learner characteristics, training characteristics, and work characteristics) in order to improve the application of learned KSA in the work setting?'*

The regulative cycle of van Strien (1997) is set central in this study in order to improve this problem-situation with help of problem-directed theories. The objective is to diagnose the company' problem, provide insight in factors that influence successfully the transfer of training, and provide redesigns options. To achieve this objective and provide an answer to the central research questions, the project is guided by six research questions:

      1. 'What is transfer of training?'

      2. 'Which factors have a direct or indirect influence on transfer of training?',

      3. 'What are the most relevant transfer of training factors within VI context?'

      4. 'How are the relevant factors related to transfer of training at VI?'

5. 'What kind of changes with respect to trainee, trainer, training, and work environment characteristics will improve transfer at VI?'
6. 'How to implement these most important changes?'

Methodology

A quantitative research method is used to systematic empirical investigate the quantitative factors, phenomena, and their relationships. The whole transfer process with VI is examined with a longitudinal research design with three data collection points (i.e. before, directly after, and in work setting). The research sample of this trainee group consisted of N = 139 (74% overall response rate). To account for the possibility that the time lag for observing full transfer of training is too short, transfer of training process is also be investigated in a cross-sectional research design. The research sample of this trainee group 2 consisted of N = 98 (75% response rate). Trainer and supervisor groups are examined in order to explain whether there are any differences between the trainee-trainer and between the trainee-supervisor perspectives. These research samples of supervisors and trainers are respectively N = 46 (72% response rate) and N = 16 (76% response rate).

Results

Results showed that soft-skill training programs with a more interactive training design (i.e. feedback during training, practical cases, team work) and a longer training duration are positively related to transfer of training. Employees that participate in these soft-skill training programs achieve the highest training and transfer results in comparison with the technical and H&S training programs. Improvements within the feedback during training and transfer design are important to enhance the intermediate training outcomes transfer effort, motivation to transfer, and fulfillment expectations. Transfer effort is a significant predictor of transfer of training. This trainee's expectation that effort will lead to changes in their performance is the most important training outcome.

Before the training program (Time 1), the training expectations play a crucial role within VI. This factor is related with transfer of training and the intermediate training outcomes (i.e. transfer effort and fulfillment expectations). It can be concluded that, although the VI employees are to some extent motivated to learn, the extent to which employees are prepared to enter and participate in a training program is low. In the work setting, peer support, openness to change work environment, and performance-based coaching of trainees are significant predictors of transfer of training. Of these work environment characteristics, peer support has the highest relative influence on transfer of training within VI. Performance coaching within VI has a low mean value and due to the significant relationship with transfer of training performance coaching can be considered as one of the improvement factors.

Results of trainee group 2 showed that the motivation to transfer is the most important predictor of transfer of training in this study. Comparable with trainee group 1, transfer design, trainer support, and feedback during training are strongly associated with this intermediate outcome. Both trainee group 1 and trainee group 2 observe that feedback on training in the work setting is a crucial factor to enhance transfer of training. In addition, supervisor support is a significant predictor of transfer of training. The trainees judge the support of the supervisor as low and consequently the supervisor support in the work environment should be improved.

Results of the trainee-trainer comparison showed that the estimates of feedback during training significantly differ between the two depending groups. Internal trainers of VI should become aware of this difference in view and should adjust the feedback during the training program in such a way that it corresponds with the trainees' perspective. The variable 'openness to change work environment' does strongly differ between the trainee-supervisor group. Looking in-depth to this difference, a possible reason may be that, in comparison with trainees, supervisors observe it is harder to encourage the whole work groups' willingness to invest energy to change their work behavior.

Recommendations

For successful transfer of training it is important that within all learner, training, and work environment characteristics the conditions are available to obtain the highest learning and transfer performance. The practical recommendations of the study pertain to the whole transfer of training process (i.e. before, during, and after training). Below the general recommendations are listed in order of importance.

1. Develop interactive (technical) training programs (exercises, team work, cases) with longer duration and provide feedback during training
2. Stimulate coaching in work setting (focus on applicability)
3. Increase training expectations and emphasize training value for organization

Limitations and future research

Limitations that should be noted concern the time lag used, the generalizability of the study findings, and the independent measurement of the trainee-supervisor group. Future research may focus on examining different populations and personality characteristics in relation with transfer of training. In addition, the role of the trainer and supervisor within the transfer of training process can be expounded, especially towards learner characteristics and instructional designs and methods.

Glossary

Accountability	The degree to which the organization, culture, and/or management expects learners to use trained knowledge and skills on the job and holds them responsible for doing so (Kontoghiorghes, 2001)
Behavioral modeling	A logical, transfer-strategy-based research regarding self-efficacy (Bandura, 1997)
Career planning	The extent employees create and update specific plans for achieving their goals' (Burke and Hutchins, 2007)
Cognitive overload	Attempting to understand and interpret too much or irrelevant information at one time' (Burke and Hutchins, 2007)
Extrinsic motivation	The performance of an activity in order to attain some separable outcome (Deci and Ryan, 2000)
Goal	Explicit intention to attain a certain performance level or outcome, usually within a certain time limit.' (Locke, 1996)
Intrinsic motivation (person based)	To doing an activity for the inherent satisfaction of the activity itself (Deci and Ryan, 2000)
Job involvement	The degree to which an employee identifies with her job, actively participates in it, and considers job performance important to her self-worth' (Burke and Hutchins, 2007)
Job utility	The degree to which training can be useful in job performance.' (Nikandrou et al., 2009)
Mastery goals	Goals that are focused on the development of competence through task master (Elliot and McGregor, 2001).
Motivation to learn	The desire on the part of trainees to learn the training material' (Colquitt et al., 2000)
Motivation to transfer	The learner's intended efforts to utilize skills and knowledge learned in training setting to a real world work situation' (Noe, 1986)
Openness to change in work environment	The extent to which prevailing group norms are perceived by individuals to encourage the use of skills and knowledge acquired in training (Holton et al., 2000).
Opportunity to use learning	The extent to which trainees are provided with of obtain resources and tasks on the job enabling them to use skills taught in training (Holton et al., 2000).
Organizational commitment	An individual's involvement in and identification with an organization' (Colquitt, 2000)
Over-learning	Creating automatic responses that conserve a trainee's cognitive resources so that cognitive ability may be dedicated to solving novel or more complex tasks' (Burke and Hutchins, 2007)
Personal capacity	The extent to which individuals have the time, energy and mental space in the work lives to make changes required to transfer learning to the job (Holton et al., 2000).
Peer support	The extent to which peers reinforce and support use of learning on the job (Holton et al., 2000).
Performance-outcome expectations	The expectation that changes in job performance will lead to outcomes valued by the individual (Holton et al., 2000).
Performance Self-efficacy	The extent to which individuals feel confident and self-assured about applying new abilities in their jobs, and can overcome obstacles that hinder thye use of new knowledge and skills (Holton et al., 2000).
Self-efficacy	An individual's assessment of his or her ability to successfully master a specific task' (Bandura, 1984)
Supervisor support	The extent to which manager reinforce and support use of learning on the job (Holton et al., 2000).
Training expectations	The extent to which individuals are prepared to enter and participate in a training program (Holton et al., 2000).

Training feedback/ performance coaching	Formal and informal indicators from an organization about individual's job performance (Holton et al., 2000).
Training motivation	The intensity and persistence of efforts that trainees apply in learning-oriented improvement activities, before, during, and after training' (Tannenbaum and Yukl, 1992)
Transfer climate	The trainees' perceptions about characteristics of the work environment that influence the use of training content on the job'. (Colquitt, 2000)
Transfer design	The extent to which training has been designed to give trainees the ability to transfer learning to job application and the training instructions match the job requirements (Holton et al., 2000).
Transfer effort	The expectation that effort devoted to transferring learning will lead to changes in job performance (Holton et al., 2000).
Transfer of training	The effective applicability of trained knowledge, skills, and attitudes in the appropriate work setting and maintenance of these trained knowledge, skills, and attitudes.

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Introduction

When trainees participate in a training course, it is desired that they have learned from the training course and that they apply the learned knowledge, skills, and attitudes (KSA) in their work setting. In this context, the questions arise to which extent the trainees have learned from the training programs and to which extent do they apply and maintain the learned KSA? Latter aspect is referred to as transfer of training. Does the training program really have consequences for the trainees' behavior in the work setting and who is responsible for the trainees' transfer of KSA?

To maximize the return on training investment for organizations, it is essential to understand the factors that affect transfer of training. The majority of scientific articles about training and training effectiveness refer to the 'transfer problem' and the investments of companies in their training environment, training conditions, and training methods (Baldwin and Ford, 1988; Alvarez et al., 2004; Burke and Hutchins, 2007; Brown and McCracken, 2009). Studies conducted in the last decade reveal that the extent in which transfer occurs is between 10 and 60 percent (Burke and Hutchins, 2007). Two recent studies estimate that less than 50 percent of learned knowledge is actually transferred back on the job (Brown and McCracken, 2009; Hutchins, 2009).

In organizational practice, companies recognize the need for effective training and the transfer of learned knowledge, skills and attitudes (KSA) back to the job. They more and more notice the gap between training performance and the workplace performance as evident from learning investments that are necessary to improve training results and transfer results. Transfer of learned knowledge back to the work setting can fail in multiple ways and without frequent refresher trainings the usability of learned KSA may disappear over time (Baldwin and Ford, 1988). In general, organizations want to know the extent to which trained KSA will result in meaningful changes in the work setting and which factors affect transfer to enhance the transferability of the training.

Overall, both theorists and practitioners want to optimally transfer the learned new KSA towards the work organization and as a result enhance work performance. In this master thesis project more insight is provided in the transfer of training process and it identifies the effects of the input characteristics (i.e. learner, training, and work environment characteristics) on transfer of training. The study was carried out in the company Vanderlande Industries (VI) at request of the department Vanderlande Academy. As many other companies, VI and the department Vanderlande Academy had a lack of insight of the degree to which trained KSA actually transferred back to their work settings. As a result, the central research

question is defined as: *'How to organize the input characteristics (i.e. learner characteristics, training characteristics, and work characteristics) in order to improve the application of learned KSA in the work setting?'*

In order to improve this problem-situation with help of problem-directed theories, the regulative cycle of van Strien (1997) is set central in this study (Figure 1). First, decisions are made to select those factors that both are most relevant for VI context and relevant for scientific literature (i.e. problem definition of van Strien, 1997). The empirical testing of these factors (i.e. diagnoses/analysis) and the possible changes (e.g. redesigns) with respect to input characteristics that will enhance transfer at VI are the sequel steps in the cycle of van Strien (1997) and also completed in this study. Eventually, the objective is to diagnose the company' problem, provide insight in factors that influence successfully the transfer of training, and provide redesigns options.
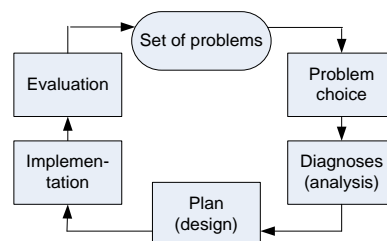
Figure 1: regulative cycle (van Strien, 1997)

To achieve this objective and provide an answer to the central research questions, the project is guided by six research questions.

1. What is transfer of training?
2. Which factors have a direct or indirect influence on transfer of training?
3. What are the most relevant transfer of training factors within VI context?
4. How are the relevant factors related to transfer of training at VI?
5. What kind of changes with respect to trainee, trainer, training, and work environment characteristics will improve transfer at VI?
6. How to implement these most important changes?

The research questions delineate the transfer of training field and are the main plot line in this report. In chapter 1, the answer is given to questions 1 and 2. Chapter 2 provides the answer to the question 3 and the chapters 3 and 4 give answer to question 4. The last chapter provides the changes and implementation and hence provides answer to the questions 5 and 6.

1.   Factors affecting transfer of training

In the last decades, a lot of conceptual and empirical research has been done towards the 'transfer problem' in training. Before exploring this problem that occurs between learning and workplace performance, the first two questions are addressed, regarding how transfer of training is defined and what the antecedents are of transfer of training.

1.1   Transfer of training definition and conceptual model

Aguinis and Kraiger (2009) define training in an organization as '*a systematic acquisition to affect KSAs (Knowledge, Skills and Attitudes) of individuals in order to improve the effectiveness of the individual, the team, and the organization*'. After the training program, it is important for the organization and the trainer to evaluate how the trainees judge the training program and how the trainee over a certain time transfers the learned knowledge to the job environment (Salas and Cannon-Bowers, 2001). Eventually the organization wants to know their benefit of employees' training. Thus, the extent to which trained knowledge will result in meaningful changes in the work environment and the extent to which new learned KSAs are applied and maintained on the job (Aguinis and Kraiger, 2009). This is what theorists and practitioners call 'transfer of training'. Transfer of training is defined as '*the effective applicability of trained KSA in the appropriate work setting and maintenance of these trained KSA*'.

To fully understand the transfer process, it is necessary to understand all factors prior, during and after training that affect the process when trainees return to their work setting. Figure 2 represents all relevant elements of the training process and transfer of training. This integrated model is a combination of several conceptual models (Baldwin and Ford, 1988; Tannenbaum et al., 1993; Holton, Bates and Ruona, 2000; Alvarez et al., 2004; Salas et al., 1999), and was an outcome of a literature review (Elbers, 2010). As shown in Figure 2, there are three essential training inputs: training characteristics (1), learner characteristics (2), and work environment characteristics (3). All factors in each of the three categories are discussed in the following sections.
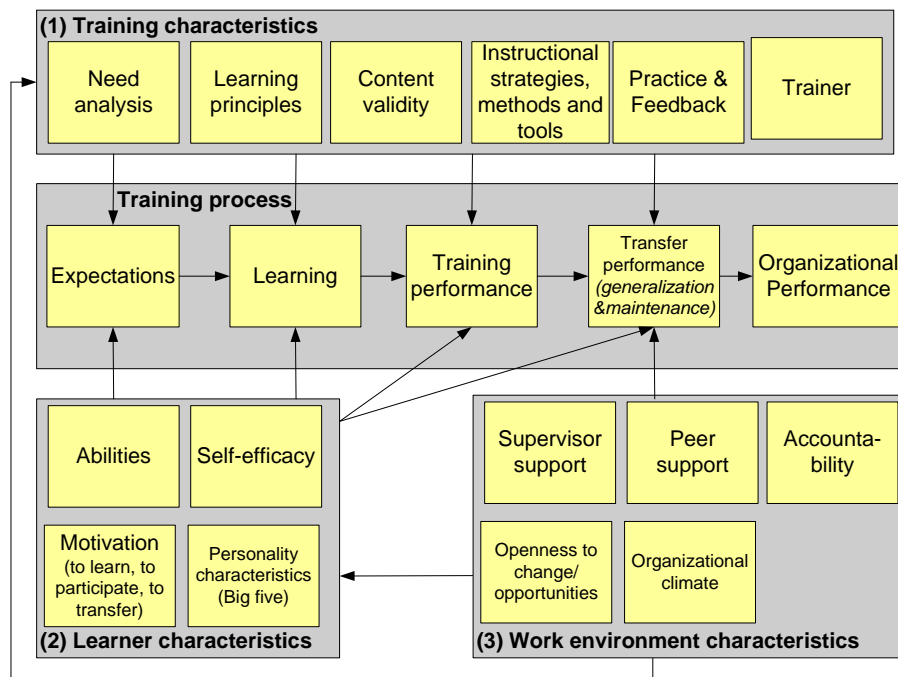
Figure 2: integrated conceptual model of transfer of training

1.2   Training characteristics

The training characteristics consist of six elements that are likely to influence the training process. Salas and Cannon-Bowers (2001) argue that the first critical step in training is the *need analysis*. An appropriate need analysis is necessary for deciding about what, where, when and who needs to be trained or should be trained (Salas and Cannon-Bowers, 2001; Burke and Hutchins, 2007). Therefore, the organizational climate, the job requirements, and the needed and desired KSA of every individual should be analyzed (i.e. personal development plan). Besides this required and desired knowledge, the need analysis should also include conditional knowledge to ensure that the employee knows when to use the learned skills. A need analysis is important for the effectiveness of training to ensure that it meets the trainee, task, and organization needs.

The training methods and strategies are essential for formulating the content relevance, the sort of training, and the set of tools for creating the instructional approach (Salas and Cannon-Bowers, 2001). The *content validity* of the training program is important to obtain a good training performance. An organization should be aware of the similarity between the training content and materials to those used in their regular job (Hutchins, 2009; Burke and Hutchins, 2007). Another training characteristic is the setting of clear and challenging *learning principles*. Clear goals that include the desired and required KSA after training are likely to result in transfer of training (Kontoghiorghes, 2001; Elliot and McGregor, 2001). Also, various kinds of examinations, *feedback and behavioral practices* have beneficial results in transferring learned knowledge and influencing training performance (Hutchins, 2009). For instance,

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obtaining feedback during and after the training program and to the examinations will also result in better transfer (Martocchio and Webster, 1992).

In the literature several *instructional strategies, methods, and tools* are investigated to enhance transfer. Although strategies as over-learning and active learning do not significantly predict higher transfer outcomes, some research show that error-based learning and behavioral modeling are likely to have a positive impact on transfer (Burke and Hutchins, 2007). To maximize learning and transfer, learning interventions should be developed to provide the most effective methods, techniques, and training approach for all skills and attitudes (Aguinis and Kraiger, 2009; Goldstein and Ford, 2002).

Besides the above outlined elements, Hutchins and Burke (2008) state that also the *trainers* have an important influencing factor. The trainers are involved during the whole training process and they play a crucial role in encouraging employees in the whole training process (i.e. training expectations/participation till the transfer performance)(Aguinis and Kraiger, 2009; Brown and McCracken, 2009). Hutchins (2009) concludes that the role of the trainer must be extended with a special focus towards the learner characteristics, and the instructional designs and methods that result in optimal transfer outcomes.

1.3   Learner characteristics

The learner category is the second characteristic in Figure 2 that influences the extent to which learned knowledge is applied and maintained in the job setting. In this category, self-efficacy, personal abilities, motivational factors, and personality factors are antecedents of the training process and transfer of training.

Self-efficacy is defined as 'an individual's assessment of his or her ability to successfully master a specific task' (Bandura, 1984), and is positively related to the maintenance and generalization of learned KSA from training back to the job (Colquitt et al., 2000). Also Colquitt et al. (2000) state that employees with an internal locus of control are more motivated to learn. However, the external locus of control is positively related to transfer of training. This indicates that trainees with an internal locus of control expected to display a higher level of motivation, and trainees with an external locus of control learned more and had higher transfer performance.

The *motivational factors* (e.g. intrinsic and extrinsic motivation, motivation to learn, motivation to transfer, and pre-training motivation) play a crucial role in the learner characteristics. Training motivation is defined as 'the intensity and persistence of efforts that trainees apply in learning-oriented improvement activities, before, during, and after training'

(Tannenbaum and Yukl, 1992). In the situation where employees are involved in the training decisions and have an opportunity to react on these decisions, the employees are likely to perform a higher level of training motivation and eventually transfer (Cheng and Ho, 2001). According to Aguinis and Kraiger (2009), the belief of individuals that performing a specific behavior will result to a certain outcome is one of the essential drivers of motivation to transfer.

Motivation to learn is defined as 'the desire on the part of trainees to learn the training material' (Colquitt et al., 2000). A trainees' motivation to participate in training and to learn have a positive effect on learning new KSA, and transfer (Martocchio and Webster, 1992; Salas and Cannon-Bowers, 2001). According to Brown and McCracken (2009), training participation and the motivational inputs of transfer of training will determine the extent to which transfer occurs. Intrinsic motivation has a direct relation with training participation and motivation to learn (Facteau et al., 1995). In contrast with this, the relation between extrinsic motivation and pre training motivation or transfer is not supported (Facteau et al., 1995). However, the outcomes of transfer of training are likely to be better in case the work environment had included extrinsic motivators, such as appreciation from peers and supervisor (Burke and Hutchins, 2007).

Burke and Hutchins (2007) argue that career and job attitudes, organizational commitment, and decision and reaction to training also can be categorized in this motivation element. Colquitt et al. (2000) have defined organizational commitment as 'an individual's involvement in and identification with an organization'. In their meta-analysis, the authors found that high employee identification with colleagues and organization is positive related to transfer of the gained knowledge**.** Career planning is the extent that employees create and update specific plans for achieving their goals (Burke and Hutchins, 2007). Employees that have an explicit career planning are more motivated to learn and are more involved with their job (Colquitt et al., 2000). Additionally, these employees want to achieve their career goals and notice the importance of learning and transferring new KSA to the work setting (Colquitt et al., 2000).

The background of the trainee with respect to experiences, educational level, *abilities* and *personality characteristics* is important for successful training outcomes. Colquitt et al. (2000) state that employees with a high intellectual ability will likely succeed in training and cognitive ability is positive related to transfer of training. According to Burke and Hutchins (2007), anxiety is a negative predictor of training outcome and training motivation. Employees with openness to experience and also employees with high social capabilities acquire more necessary KSA, which has a positive impact on transfer of training (Burke and Hutchins, 2007). The extroversion-transfer relationship is not confirmed in all organizational settings where

the training intervention and delivery differs, and more research is needed to validate this relationship.

The personality factor conscientiousness has a positive relation with transfer of training (Colquitt et al., 2000). Moreover, employees who strive for achievement are likely to achieve higher transfer of training. However, more investigation is needed to confirm this finding. Although conscientiousness is positive related with motivation to learn, it has a non-significant relationships with skill-acquisition and declarative knowledge (Colquitt et al., 2000). The final leaner characteristic factor mentioned by Burke and Hutchins (2007) is perceived utility. According to Ruona et al., 2002, this factor can influence the transfer design, the motivation to transfer, and the transfer effort.

1.4   Work environment characteristics

The third category of the integrated conceptual model of transfer of training (see Figure 2) is work characteristics. The *opportunity to perform* positively affects the transfer of new learned KSA (Burke and Hutchins, 2007). The *transfer climate* is defined as 'the trainees' perceptions about characteristics of the work environment that influence the use of training content on the job' (Colquitt, 2000). Colquitt et al. (2000) found that a supportive transfer climate has a positive impact on transfer of training. In contrast, an unsupportive transfer climate can have a negative influence (e.g. through learning participation) to the application and maintenance of new KSAs on the job (Aguinis and Kraiger, 2009). The support of colleagues and/or the supervisor is important for the transfer of training. Both *peer support* and *supervisor support* have a positive impact on the encouragement, coaching of trainees, and the transfer of training (Colquitt et al., 2000).

The last work environment factor is *accountability*. Accountability is defined as 'the degree to which the organization, culture, and/or management expects learners to use trained knowledge and skills on the job and holds them responsible for doing so' (Kontoghiorghes, 2002). The role of the trainee, trainer, supervisor, and top management is important throughout the training process. All stakeholders have to understand to what extent they are accountable for the transfer and what the positive and negative consequences are of their responsibility (Burke and Saks, 2009). More research is needed to discover the improvements of transferring training through the accountability of trainees, trainers, teams, and the organization (Burke and Hutchins, 2007).

2. Transfer of training characteristics within VI

The previous chapter contributed to the understanding of different parameters and their influence on transfer of training. Research had advanced in the field resulting in these numerous antecedents of transfer. However, this does not automatically mean that all these variables are important in the VI context. Some of these variables in the transfer models are perhaps trivial or of minor importance in impacting significant change in transfer of training within VI. The central challenge lies in locating and integrating information sources from several subfields (e.g. before, during, and after training) to eventually answer the question how the improve transfer of training. In this chapter, an answer is given to research question 3: What are the most relevant transfer of training factors within VI context? First of all, an overall picture of the company Vanderlande Industries (VI) and subsequently the department Vanderlande Academy is given. Next to this, the training process at VI (i.e. trainee, training, and work environment characteristics) is discussed. To acquire the necessary information, a number of interviews have been conducted with managers of different departments, trainers, and employees who are involved in training methodologies and/or the hiring of external parties for training delivery.

2.1 General company information

VI provides automated material handling systems and accompanying services. The company is active in the markets for baggage handling, distribution centers, parcel and postal sortation facilities, and related services. The company implements material handling systems from local sorting depots to the largest facilities. VI is a global player and it operates locally in many countries through customer centers that handle all key business functions and maintain contacts with customers. The mission of VI is defined as: *'to support our customers worldwide in significantly improving their competitive position by designing, implementing and servicing automated material handling systems'* (Vanderlande, 2009). VI has set the goal for 2010 to 'build reputation with customers'. To realize this goal, VI has defined six core values: drive to win, every day better, eager to learn, safe base, team play, and ownership (VI HR, 2009). In 2009, the world-wide manpower was 1.973 and a substantial part, 1.055 employees, are located in Veghel, the Netherlands.

VI aims at supplying products and services that distinguish themselves on the basis of quality, reliability, productivity, durability, functionality, and low-life cycle costs. Market-oriented innovation in systems and related services is a major tool for maintaining the company's competitive advantage. Mainly due to the appearance of new techniques, the market is dynamic and employees have to acquire new KSA while working with these technological changes. Moreover, the KSA of the employees and technology partners is of essential

importance for the company success. A strategic action of VI is to provide all employees opportunities for personal development.

Since September 2008, the Vanderlande academy is the educational portal within VI for all professional learning and development issues. The Vanderlande Academy offers technical and non-technical training opportunities to increase employees' career development possibilities and their proficiency at using the advanced VI technologies. Facilitating the personal development of new KSA of VI employees is the central mission of the Vanderlande Academy. The growth of these KSA is stimulated by various types of training programs. The Vanderlande Academy creates and maintains methodologies, tools, techniques, and skills in order to facilitate employee development in each organizational level (e.g. strategic level, tactical level, and operational level). Also, the Vanderlande Academy maintains contacts with educational institutes in the surroundings (e.g. ROC, applied science establishments, and university).

2.2   Training process within VI

The training policy of the Vanderlande Academy is aimed at the maximum support of career paths and the individual career plans by providing adequate internal and external training opportunities. Vanderlande Academy offers training programs that provide horizontal (e.g. maintenance, refresher courses, broadening) and vertical (e.g. new disciplines) growth and development. Moreover, two types of training methodologies can be distinguished; formal and informal. Formal learning is the type of learning that takes place within a trainer-trainee relationship. In contrast, informal learning is defined as all learning activities in which the planning and control mostly rest on the trainee. The focus in this master thesis is on classroom learning in groups (e.g. formal learning) because VI wants to know whether the trainer and which training method plays an influencing role in transfer of training within VI.

The type of training programs can be distinguished in soft-skill training programs, technical training, and health and safety (H&S) training programs. In 2009, the Vanderlande Academy offered trainees 20 different soft-skill training programs, 57 different technical training programs, and 11 different H&S training programs. Soft-skill learning within VI is training related to communication, language, leadership, problem solving and decision making, and effective cooperation. Soft skills complement hard technical skills which are the occupational requirements of a job and many technical activities. Quite naturally, technical training programs are IT trainings, mechanical trainings, and electrical trainings.

Investigation of the number of training programs the last two years shows that the number of persons that followed technical trainings at VI is much higher than the number of persons that followed soft-skill trainings. The main reason for this difference is the belief of VI that the

majority of technical trainings are essential for a good fulfillment of the job and that soft-skill training are merely desirable for the job. In sum, the companies' belief is that technical trainings add more value to the employee and consequently job performance.

The vision of Vanderlande Academy is to facilitate training programs that fulfill both the needs of the organization and employee. Within VI, an employee decides in consideration with his/her supervisor what kind of training program the employee will participate. Mostly, these decisions are made during a job evaluation conversation where the supervisor and the employee evaluate the performance of the employee (i.e. mid-year review form or assessment form). Both parties formulate a planning for the coming half year, set their (personal) goals, discuss what both parties desire, and the planning for training (CRF, 2009). Eventually, the supervisor decides whether the training is necessary to (a) fulfill the job requirements, (b) organizational and personal development and/or (c) for future desirable required KSA. Interviews reveal that more investigation is needed of the training expectations and the fulfillment of these expectations from the perspective of the trainee. Also more investigation is needed to clarify how and if employees set goals before the training program starts. As mentioned in the previous chapter, learning goals result in better transfer of training. VI has a lack of insight in whether and how specific, measureable, attainable, realistic, and timely (SMART) employees set their goals. Within VI, several forms (i.e. training application form, training catalogue, mid-year review form, and assessment form) can play an important role in setting goals, realistic expectations and get motivated for the training program.

The Vanderlande Academy is aware of the required similarity between the training content and the needs of the employees and the organization. In case of technical training, the trainer plays an important role in content relevance. The majority of trainers in technical training are employees of VI who have the best technical knowledge about the training content. As a result, the training program is very specific for VI trainees. In contrast with this type of internal training, not all training programs are developed within VI. Also, external training parties are hired in order to offer challenging training contents, surroundings, and objectives to fulfill the personal learning desirability's of the employees. Other types of trainings are custom-made trainings (e.g. external parties develop training programs for VI employees) and open trainings (e.g. VI employees that train outside VI). This last training type is not included in this study because VI is interested in the training process of the 'in-house' training programs.

As mentioned, trainers play a crucial role before, during, and after the training process. At VI, an internal trainer can be a training professional who has an educational background in teaching and educating people; however, the majority of the internal trainers are technical engineers who have the most technical knowledge about the training content. Latter group of

trainers is assigned or has volunteered to give the technical training. The variability of trainer' experience can greatly differ, from trainers who only once have taught a training program to trainers that give training on regular basis. Obviously, the external trainers, who deliver the soft-skill trainings, are experienced training professional.

The majority of employees have a technical background in engineering (e.g. mechanical, electrical, and industrial). It is important for a trainer to know the personality characteristics of the trainees to provide specific training that lead to good transfer performance. However, interviews reveal that these personality characteristics do not have a high priority in VI training programs because training has to be provided to every type (e.g. personality characteristics) of trainee group that is composed beforehand. In contrast, the influenceable variables such as self-efficacy, motivation to learn, and the motivation to transfer are important for VI. The motivational factors are important to determine whether the trainee has a sufficient level of motivation for training participation and whether the trainee is motivated to apply the learned KSA on the job. So, investigation is needed to clarify the motivational level of the employees.

VI states that the personal development in knowledge and competence of the employees and technology partners is of crucial importance ("master of your own destiny"; VI HR, 2009). A strategic action of VI is to provide all employees with opportunities for personal development. The employee is in a position to exert influence on his/her career development, career planning, educational goals, and work environment. Although the responsibility for education lies primarily with the employee himself, the supervisor is responsible for the eventual assignment of the employee to a training program. Employees and managers have to understand for what and to what extent they are accountable for the transfer and what the positive and negative consequences are of their responsibility.

VI state that peer support and supervisor support is a very important issue of the organization (VI HR, 2009). Twice a year, the supervisor and employee have a meeting in which they make an estimation of the growth perspective of the employee. The personal development and career opportunities at VI can stimulate employees to acquire more and more knowledge. After training, it is not visible in which extent the trainees obtain training feedback and transfer feedback from their supervisor. The extent of willingness to help colleagues is also an unknown support issue. In sum, the social support (e.g. from peers and supervisor) within VI requires clarification and it has to be investigated how these organizational climate factors influences the transfer.

2.3 Relevant factors of transfer of training within VI

Table 1 summarizes all relevant factors that should affect the transfer of training within VI context and it provides an answer to the third research question: *What are the most relevant transfer of training factors within VI context?* Based on the interviews conducted at VI, a selection has been made of variables that may be relevant in the VI context. Factors for which strong scientific evidence exists for the relation with transfer of training and that can be influenced were retained, irrespective of the importance for VI expressed in the interviews. In this selection, a number of interesting science-based variables are included which have not a confirmed relationship with transfer of training (i.e. accountability, motivation to transfer, and motivation to learn). The chosen variables are outlined and investigated to establish the impact of these variables on the transfer of training.

In order to obtain a specific overview per input characteristic, the relevant factors will be acquired from the three stakeholders (trainees, trainers, and supervisor). Obviously, trainees observe all input characteristics and the outcome variable transfer of training. Trainers can expound the training characteristics and supervisors can describe the work environment in their department.

Learner characteristics	*Training characteristics*	*Work environment characteristics*
Self-efficacy	Feedback during training *	Feedback in work setting #
Career planning	Training design *	Supervisor support #
Training expectations	Trainer support and experience *	Peer support #
Learning goals		Transfer climate #
Motivation (to learn, to transfer, transfer effort, performance expectations)		Accountability #*
*: Trainers' perspective; #: Supervisors' perspective		

Table 1: Relevant transfer of training factors in VI context

2.4 Research questions guiding data collection and analysis

With respect to the cycle of van Strien (1997), the decisions are made to select those factors that both are most relevant (i.e. problem choice). To provide a good answer for the fourth research question (chapter 1.3; *how are the relevant factors related to transfer of training at VI?*), and based on the preceding discussion (e.g. priorities of VI and interesting science-based variables), research questions are derived to delineate the investigated research field.

The relevant learner characteristics self-efficacy and learning goals are commonly examined to impact the transfer of training. Research indicates that employees with high self-efficacy are more likely to benefit from training and apply the learned KSA in their job over a certain time period (Burke and Hutchins, 2007). Employees that want to achieve their career goals, have set clear training goals and expectations, notice the importance of learning and transferring new KSA to the work setting (Colquitt et al., 2000; Tannenbaum et al., 1993). The question

arises whether trainees at VI set goal and whether they have clear expectations. Furthermore, some studies suggest that the 'motivation to transfer variable' is related with motivation to learn, self-efficacy, and several work environment factors. However in these studies, motivation to transfer is an outcome variable that is affected by a certain variable. This is the reason that more research is needed to examine the linkages between motivation to learn and motivation to transfer, and the transfer performance. Hence, the following research sub-question (RQ 4.1) for VI context is formulated: *Which learner characteristics are positively associated with transfer of training and which learner characteristics explain a significant amount of variance of transfer of training at VI?*

Burke and Hutchins (2007) have reviewed strategies and methods to instruct and facilitate transfer of training. Various kinds of training designs and behavioral practices have beneficial results in transferring learned knowledge and influencing training performance (Hutchins, 2009). Also the interaction between the trainees and between the trainer and trainees should play an important role. VI wants to investigate and perhaps improve their training designs to the wishes of their employees in each type of training (i.e. technical, soft-skill, H&S). In literature, less data is used from trainers' perspective. This is an unexpected phenomenon because training professionals are involved prior, during and after the training and can affect the training' process (Burke and Hutchins, 2008). Hence, the following research sub-question (RQ 4.2) is formulated: *Which of the training characteristics are positively associated with transfer of training and which training characteristics explain a significant amount of variance of transfer of training at VI?*

The social support (e.g. peer and supervisor) in an organization positively influences the encouragement, coaching of trainees, and the transfer of training (Colquitt et al., 2000). Quite naturally, the transfer climate plays a crucial role and this is widely supported in transfer of training literature. The questions arise if VI employees have the opportunity to use the learning and if they feel free to change their way of working on behalf of the training program. In addition, the personal capacity is positively related to the effectiveness of training (Nikandrou et al., 2009). In contrast with transfer climate, more research is needed to discover the improvements of transferring training through the accountability of trainees, trainers, and the supervisors (Burke and Hutchins, 2007). The lack of this environmental factor appears to be a great obstacle in transfer. Burke and Saks (2009) state that all stakeholders should have personal control over the trainees' transfer of training and every stakeholder should understand to which extent he/she is accountable for the transfer. Hence, the following research sub-question (RQ 4.3) is formulated: *Which of the work environment characteristics are positively associated with transfer of training and which work environment characteristics explain a significant amount of variance of transfer of training at VI?*

In addition, VI is interested in the current condition of the learner, training, work environmental characteristics, and transfer of training. Therefore, the quality of the training process should be judged through the measuring the mean and standard deviation of each of the variables within the constructs. Hence, the following research sub-question (RQ 4.4) is formulated: *What is the quality and current status of the whole training process (e.g. input characteristics and transfer of training) within VI?*

In order to answer the research questions 4.1 - 4.4, the data is analyzed with the Pearson product moment correlations. As a result of mutual related characteristics, it is important to determine which input characteristics actually clarify a significant amount of variance of transfer of training within VI (i.e. regression analyses). Furthermore, this study will gather data from trainer to analyze experiences and thoughts of how trainers support transfer of training in organization. VI wants to know whether their trainers play an influencing role in transfer of training within VI. The perspective of trainers can provide an interesting view to the training process and this view can differ from the trainees' perspective. Hence, the following research sub-question (RQ 4.5) is formulated: *Is there a significant difference between the trainees and trainer perspectives with respect to the training characteristics 'training feedback', 'training design', 'trainer support', and 'trainer experience'?*

The perceptions towards the work environment characteristics can differ between the trainees and supervisor. With respect to possible differences in perspectives between these two stakeholders within VI context, the following research sub-question (RQ 4.6) is formulated: *Is there a significant difference between the trainees and supervisors perspectives with respect to the work environment characteristics 'peer support', 'supervisor support', and 'transfer climate'?*

The accountability for successful transfer of training falls into a grey area between trainees, trainers, and supervisors. Kopp (2006) stated that the trainer's degree of responsibility is most important. However, Esque and McCausland (1997) hold the management accountable for the trainees' transfer of learned KSA. Broad and Newstrom (1992) suggest that transfer of training should build into supervisors' performance standards. To delineate the degree of accountability of each stakeholder, all three perspectives should give more clarity about the accountability construct and the underlying structure must be investigated. Hence the following sub-research question (RQ 4.7) is formulated: *Is there a significant difference between the trainees-trainers and trainees-supervisors samples with respect to the work environment characteristic 'Accountability'?*

3. Data methodology and analyses

To answer the research questions formulated in section 2.4, a quantitative research method is used to systematic empirical investigate the quantitative factors, phenomena, and their relationships. This diagnoses/analysis phase in this report is the third step of the regulative cycle of van Strien (1997; Figure 1). This chapter discusses the data collection, the participants, the scales of the questionnaires, and it explores the data.

3.1 Data collection

From trainee perspectives, the research represents a longitudinal design with three data collection points (e.g. questionnaires). The reason for using three data points is to study development trends in transfer of training and to observe individual differences. The first point of data collection is just before the training program starts. The second data collection point is directly after the training program. Finally, the last data collection is administered two to six weeks after the training program, when the trainee has returned in the work setting. In comparison with other studies, the time interval after training when transfer of training is measured is very diverse. Axtell et al. (1997) measure transfer of training at intervals of one month and one year after training has taken place. Kontoghiorghes (2001) measures transfer of training after three and nine months after training. Nikandrou et al. (2009) collect data before training and one year after training. The time lag in this study was chosen because trainees may need some time (e.g. opportunity) to try applying the learned KSA on the job. However, this practical application must occur within the chosen time lag after training due to time restrictions of the master thesis project.

However, the time interval after the training program can influence the transfer of training (Baldwin and Ford, 1988). To account for the possibility that the time lag of two to six weeks is too short to observe full transfer of training, the dependent variable transfer of training is also be measured at training programs that were provided 8-32 weeks before the data collection of this study started. Thus, this data was collected from a second trainee group with one data collection point in the work situation.

Before and directly after the training program, trainees in the longitudinal study will receive the survey in the classroom. Back on the job these trainees received the survey by mail. Trainees in the cross-sectional study received the survey by mail. As mentioned, the perspectives of the trainers and supervisors are also important. Trainers were asked directly after the training about their background in training experience, training support, feedback, and accountability. The supervisors receive a questionnaire by mail about the subjects of support, transfer climate, feedback, and accountability in their work situation. To increase the

response rate and due to time restrictions of the project, the first two questionnaires were brought and picked from the training participants. To obtain a high response rate it was stressed before and during training, and in mail (e.g. memo-letters and electronic survey) that participation was strongly requested. In addition, a broad company-wide basis is created through several interviews with involved parties, and announcements on VI intranet and company-wide news updates.

3.2   Control variables

Although in this study the relevant factors (see section 2.3) that affect transfer of training in VI context are of main interest, several control variables may have a confounding effect on the results and are included in this study in order to control for their possible impact.

Age: Trainees differ in age and they can differently acquire information from the training program. Colquitt et al. (2000) state that age is negatively related with the motivation to learn. Consequently, these age differences can have an influence on the training methodology and the transfer of trained KSA.

Educational level: Trainees who have a higher educational level might acquire more information from the training program and this ability can be important for the application and maintenance of trained KSA (Burke and Hutchins, 2007).

Type of training: Three types of training are distinguished within VI; technical training, soft-skills training, and H&S training. The type of training that trainees participate can influence the training transfer back to the work setting. Quite naturally, a training type with a low content validity and low involvement within the training design lead to deficient transfer of training (Burke and Hutchins, 2007). In VI context, a soft-skill training program might be less job-related in comparison with the technical training programs and as a result less transfer of trained KSA may occur.

Content and job experience: Employees who are more experienced in their job may be more familiar with the training content than less experienced employees. Axtell et al. (1997) state that content relevance is related with employees' motivation and transfer.

Trainer: Two type of trainers can be distinguished in the training programs; internal trainers and external trainers. The trainer support and the trainer experience can be important factors for controlling the impact of the type of trainer (Hutchins, 2008).

Group size of training: The training groups at VI can be very different in size (approximately 3 to 20 participants). Learning in small groups can lead to more specific and individualistic trainee attention (e.g. involvement), and consequently to a higher level of training effectiveness (Olivera and Straus, 2004).

Length of training: The length of training differs between a half working day and a full working week. This length can influence the extent in which trainees acquire and remember learned KSA.

Reason to learn: The eventually decision whether an employee will participate in training is made together with the supervisor. The supervisor decides whether the training is necessary (a) to fulfill the job requirements, (b) for organizational and personal development and/or (c) for future desirable required KSA. The reason for learning may be important for the trainees' initiative to learn.

3.3   Translation and validation of questionnaires

The questionnaires are administered in two languages. It is important that the questions are sufficiently translated and both versions (Dutch and English) exactly ask the same. To guarantee the quality of both questionnaires, the majority of used scales are valid translated scales from literature. In case a valid scale was not available in literature, an English-Dutch translation was accomplished through two independent translators. The same procedure was followed for the reversed translation (Dutch-English). In case of small differences, a decision about the final translation of the item was made with respect to the purpose and meaning of the authors of the used scale. Thus, the definition of the scale was inspected and in particular the descriptions of the items that must be adjusted.

Quite naturally, there are some potential risks of administering questionnaires because one assumes that trainees will be capable of understanding and answering the questions, and that trainees will be honest and forthcoming in answering the questions. Some factors in this study are perception-based (e.g. motivation to learn, motivation to transfer, and transfer of training), and hence may be very difficult to measure objectively or by person other than the person themselves. To intercept the potential risks, a valid and reliable instrument was developed and the questionnaires were administered at a diverse group of participants and training programs. In addition, the questionnaires (in Dutch and English) were tested at a group of Dutch speaking people and English speaking people. As a result, it was ascertain that the instruction of the questionnaire, the questions, and the answers were clear for everyone.

3.4   Overview of scales

Table 2 represents an overview of items that were empirically investigated per data collection point in trainee group 1 (i.e. longitudinal study). The items are based on the relevant factors for VI in table 1.

Who	Trainee group 1	Trainee group 1	Trainee group 1
When	Before training (TIME1)	Directly after training (TIME2)	In work setting (TIME3)
Which scales	- Control variables - Self-efficacy - Motivation to learn - Learning goals - Clarity of training goals - Career planning - Training expectations	- Motivation to transfer - Achievement learning goals - Fulfillment expectations - Transfer design - Feedback (training and trainer) - Trainer support & experience - Performance self-efficacy - Transfer effort-performance expectations - Performance-outcome expectations	- Time period between training and questionnaire - Training feedback (supervisor/peers) - Peer support - Supervisor support - Accountability - Openness to change in work environment - Personal capacity for transfer - Opportunity to use learning (barriers) - Transfer of training
# questions	47	39	46

Table 2: overview of scales for trainee group 1

Table 3 represents an overview of items that were investigated in trainee group 2 (cross-sectional study). The majority of scales of trainee group 2 correspond to the scales of trainee group 1. However, the time of measurement is different and, as a result, scales that were specifically adjust for the training programs (i.e. 'training expectations', 'goal clarity', and 'fulfillment expectations') were not measurable at this data collection point.

Who	Trainee group 2	
When	In work setting	
Which variables	- Control variables - Self-efficacy - Learning goals - Motivation to transfer - Transfer design - Feedback (training, supervisor/peers) - Transfer of training - Personal capacity for transfer	- Time period between training and questionnaire - Career planning - Motivation to learn - Transfer effort-performance expectations - Support (supervisor, peer) - Trainer support & experience - Accountability - Openness to change in work environment - Opportunity to use learning (barriers)
# questions		103

Table 3: overview of scales for trainee group 2

Table 4 shows the items that were measured from the perspectives of trainers and supervisors. Hence, the trainer can influence the training characteristics and the supervisor can influence the work environment characteristics. As a result, each perspective that can (in)directly influence transfer of training is taken into account in this study.

Who	Trainers	Supervisors
When	In work setting	In work setting
Which variables	- Control variables - Transfer design - Feedback during training - Trainer support & experience - Accountability	- Control variables - Training feedback in work setting - Supervisor support - Transfer effort - Openness to change in work environment - Accountability
# questions	29	32

Table 4: scales of variables for trainers, and managers

3.5   Participants

The first and most important participants group consists of employees who start and finish their training in the project period. The research sample of trainee group 1 consisted of 188 trainees. At Time 1, 173 respondents returned the questionnaire (92% response rate). Of these respondents, 163 respondents returned the questionnaire at Time 2 as well (94% response rate). 141 respondents returned the third questionnaire at Time 3 (85 % response rate). The overall response rate was 74% (141/188). The non-responses of questionnaires 1 and 2 are strictly due to trainees who were not on time in the training program or due to trainees that left the training program at an earlier stage. The questionnaire at Time 3 was sent by mail and as a result the researcher had, in comparison with the first two questionnaires, less control over the response rate.

The population of trainee group 2 consisted of 164 persons. This trainee group is empirically investigated to better clarify the transfer of training within VI. However, potential respondents of trainee group 2 were excluded because they were already in the higher priority group 'trainee group 1'. As a result, towards 129 trainees in group 2 a questionnaire is sent. 98 respondents returned the questionnaire (75 % response rate).

The other participating groups in the research sample are the supervisors and trainers. The number of managers that supervise a trainee that participate in a training program during the study is 64. Of these supervisors, 46 respondents returned the questionnaire (72% response rate). In the time of investigation, 27 training programs were provided. Several trainers taught more than one training in this period and as a result the final research sample of trainers was 21. Of these trainers, 16 trainers returned the questionnaire (76% response rate).

In Figure 3 and Figure 4, background information about the training programs is presented. Furthermore, the employees characteristics in the research sample show that the mean age of the trainees was 36.83 years (SD=8.14). The mean job experience was 2.96 years (SD=2.62). The sample can be considered representative for the population within VI.
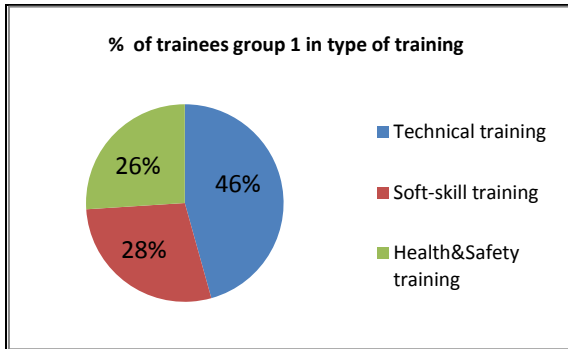
Figure 3: type of training (trainee group 1)
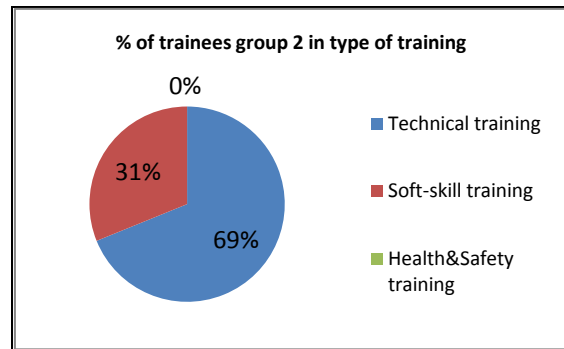
Figure 4: type of training (trainee group 2)

Table 5 shows that the duration of soft-skill training is much longer than the other two types of training. Also, the group size of the H&S training is larger than the technical training and soft-skill training. This general training information is taken into account when analyzing the results.

Type of training	Average group size	Average length of training
Technical training	7 trainees	8 hours
Soft-skills training	8 trainees	24 hours
Health and Safety training	13 trainees	4 hours

Table 5: training information trainee group 1 and 2

3.6   Examining the data of trainee group 1

Before analyzing the data, it is necessary to judge the reliability of the used scales, verify the data, check the missing data and outliers, and determine the underlying structure of scale that are modified from the transfer of training literature.

Reliability of scales: All scales were checked for reliability using the Cronbachs alpha (α) test which provides a measure for the internal consistency of a scale. In appendix A can be seen that most scales were found internally consistent with alpha's ranging from 0.602 to 0.836, exceeding the generally accepted lower limit (Hair et al., 2006). The exception was the scale 'training feedback' (i.e. α: 0.482). Deletion of one item in the scale would lead to a substantially more reliable scale. However, due to this deletion, the 'new' scale appears to measure the extent to which trainees receive assistance in their work environment when applying new KSA, rather 'training feedback'. Thus, the scale training feedback is renamed to 'performance coaching' and it includes three items. Furthermore, based on a factor analysis (see section factor analysis), the scale transfer of training was adjusted. Deletion of two items in this scale led to a higher internal consistency.

Missing data: Missing data were dealt with as follows in trainee group 1. For the dependent variable, only respondents with non-missing values were taken into account in order to avoid any increase in relations with independent variables (Hair et al., 2006). In case the missing data

was evident on summated scales and at least 70 percent of the items were filled in correctly, the missing data was estimated using the expectation-maximization algorithm (EM-algorithm). In case of missing data over 30 percent, all items of the corresponding scale were discarded (Hair et al., 2006). As a result, the research sample of trainee group 1 yields N= 139 trainees (e.g. 2 cases were discarded, i.e. the respondents with missing data on one or more scales).

<u>Outliers:</u> The number of univariate outliers was zero. Although a few multivariate outliers were found with a significant Mahalanobis D^2, inspection of the outliers raised no reason to discard outliers. Therefore, these outliers were retained in the analysis (i.e. MCAR test X2: p>.05).

<u>Factor analysis:</u> Factor analysis was used to investigate the factor structure of the two scales in this study that were partly new or modified from existing scales: 'transfer of training' and 'accountability'. Principle axis factoring (common factor analysis) was used because this method is most appropriate when the primary objective is to identify the latent dimensions or constructs, that are represented in the original variables, and the researcher has little knowledge about the amount of specific and error variance (Hair et al., 2006). Oblique rotation was used because this is the preferred method when the research objective is to obtain several theoretically meaningful factors or constructs (Hair et al, 2006). The included scales in this factor analysis were 'transfer of training' and 'accountability'.

The dependent variable 'transfer of training' was measured with six items. The factor analysis for the 'transfer of training' scale revealed one component. The factor loadings of the items must be exceeding 0.40 to be statistically significant (Hair et al., 2006). Four items of transfer of training exceed this value; however, two items were below this extraction ('Supervisors, peers, or subordinates have told me that my behavior has improved following a training course' and 'I am able to transfer the skills learned in training programs back to my actual job'). Discarding these two items led to a factor analysis that also produced one component and scale with a higher internal consistency. Moreover, a significant Barlett's test of sphericity indicated that there is likely enough correlation among at least a selection of variables included at the factor analysis (Hair et al., 2006). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy for transfer of training was 0.792. Thus, all assumptions necessary to proceed with a four-item scale for 'transfer of training' were met.
-   I incorporate skills learned in the training program into my daily work activities.
-   I have changed my job behavior in order to be consistent with the material taught in training courses.
-   My actual job performance has improved due to the skills that I learned in training courses.
-   I use the skills presented in training programs to help improve my job performance.

The factor analysis for the 'accountability' scale initially revealed four components, three of which measure the accountability of trainees, trainers, and supervisors in general. In contrast, the fourth component is one item that measures the degree in which the trainee him/herself is held accountable for applying the learned KSA from the training program. Therefore, this item is discarded of the analysis and three components are retained. The Barlett's test of sphericity was found significant and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy for accountability was 0.681. All items had statistically significant factor loading higher that 0.4 and thus all assumptions necessary to proceed with a three-factor solution were met. The internal consistency of these three accountability scales was acceptable with Cronbach's Alphas of 0.636, 0.736, and 0.863 for the accountability of the trainee, trainer, and supervisor. The three scales are included in this longitudinal study.

3.7   Data analysis trainee group 1

In order to proceed the data examination, first some assumptions should be checked to justify the use of the statistical techniques (Pearson product moment correlations, hierarchical multiple linear regression analysis). These assumptions are discussed in this section and afterwards, the data analyses used in this study are described. The assumptions of normally distributed variables and linear relations between the dependent and independent variables were checked. Based on the skewness, kurtosis, and probability plots, it was at first found that the normality assumption was not met for 10 variables, which had to be transformed (see Table 6).

Motivation to learn	(Reflect and logarithm)Reflect
Learning goals	(Reflect and square root)Reflect
Clarity goals	(Reflect and logarithm)Reflect
Transfer design	(Reflect and square root)Reflect
Performance self-efficacy	(Reflect and square root)Reflect
Transfer effort	(Reflect and square root)Reflect
Performance-outcome expectations	(Reflect and square root)Reflect
Peer support	(Reflect and logarithm)Reflect
Openness to change in work environment	(Reflect and logarithm)Reflect
Opportunity to learn	(Reflect and square root)Reflect

Table 6: transformation of variables

All variables were reflected twice such that these transformed variables can be interpreted as the other variables. After the transformations, the variables were normally distributed and the normality assumption was met. Based on the scatter plots the linearity assumption between the dependent variable and independent variables was also met.

Furthermore, dummy variables were created to acquire specific information about some control variables. For instance, different types of training (i.e. technical, soft-skill, or H&S) may be associated with different transfer of training results. As a result, two dummy's variables are made from these three training types (e.g. 'technical training' and 'soft-skill training'). In case one will explore the effect on transfer of training regarding who had taken the initiative to the trainees' participation in the training program (i.e. trainee or supervisor). All dummy variables and all other variables are included in the Pearson product moment correlations (see chapter 4.1) to discover the associations between the independent variables, and between the independent variables and the dependent variable 'transfer of training'.

In order to explain what variables predict transfer of training, the hierarchical multiple regression analysis was used. Multiple regression is the appropriate method of analysis when the research problem involves a single metric dependent variable that is related to multiple metric independent variables (Hair et al., 2006). Hair et al., (2006) recommend a sample size of at least 5 observations per independent variable, however the desired level is between 15 and 20 observations per independent variable. The ratio is above the desired level of observations per independent variable because data was analyzed with three hierarchical multiple regression analyses (see Figure 5) to partial out the effect of each data collection point (i.e. input characteristics).
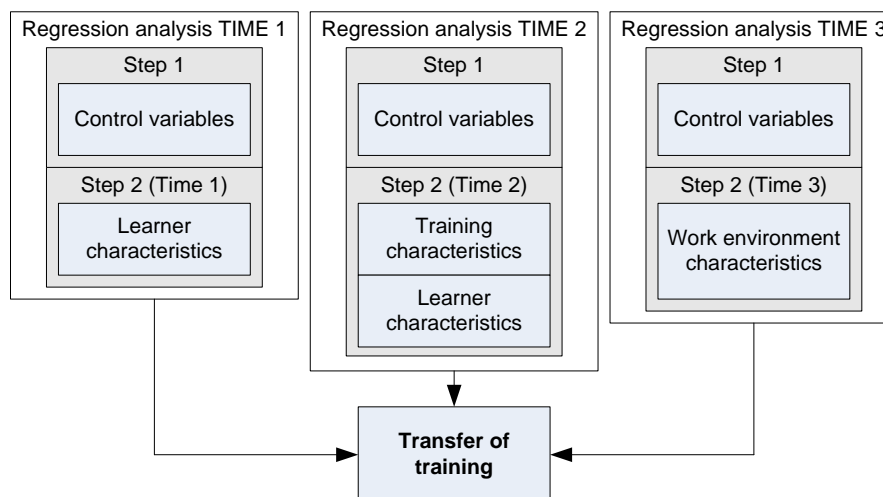
Figure 5: Hierarchical multiple linear regression analyses

The enter-method was used to enter all variables per step of the hierarchical multiple regression and the assumption of multicollinearity was checked. The first step in each of the three regression analyses adds the control variables. The second step of the first regression analysis adds the variables of Time 1 into the equation to partial out their effects. These variables are the learner characteristics (i.e. self-efficacy, motivation to learn, learning goals, goal clarity, career planning, and training expectations). The second step of the second

regression analysis adds the variables of Time 2. These variables are the training characteristics (i.e. transfer design, feedback during training, , trainer support and experience) and learner characteristics (i.e. motivation to transfer, goal mastery, transfer effort, fulfillment expectations, performance self-efficacy, performance-outcome expectations). The final regression analysis adds in the second step the work environment variables of Time 3 (i.e. feedback training, supervisor support, peer support, accountability, openness to change, opportunity to use learning, and personal capacity) into the equations. After adding each block, the included variable should significantly increase the R^2 and provide a significant regression model. The change in R^2 is a way to evaluate how much predictive power was added to the model by the addition of another variable in the sequel step. The causal relations between the input characteristics and transfer of training are supported if the R^2 change of the second step is significant.

To in-depth discover the effects and important variables in the transfer process within VI, a moderation analysis was used to examine learner characteristics on the effect of training and work environment characteristics resulting in transfer of training. A moderating effect is the effect of a third variable changing the relationship between two related variables. The relationship between two variables changes based on the amount of another variable added to the model (Hair et al., 2006).

3.8   Examining the data and data analysis trainee group 2

Data examination

Most scales were found internally consistent with alpha's ranging from 0.603 to 0.852. The scale 'opportunity to use learning' was below the generally accepted lower limit. As a result, this variable is not taken into account and discarded from the trainee group 2 analyses. In contrast to with trainee group 1, the scale 'training feedback' is internally consistent in trainee group 2. Thus, all four items remain in the analysis. Apart from these two exceptions, the reliability checks of scales in trainee group 2 correspond with trainee group 1.

Comparable with trainee group 1, only respondents with non-missing values of the dependent variable were taken into account. For the other variables, at least 70 percent of the items must be filled in correctly. As a result, the research sample of trainee groups 2 yields *N*= 92 trainees (e.g. 6 cases were discarded, i.e. the respondents with missing data on one or more scales).The number of univariate outliers was zero. Next, the multivariate outliers are checked and were found with a significant Mahalanobis D^2 (i.e. MCAR test X2: p>.05). Also in the 'trainee group 2 study', the 'new' scales 'transfer of training' and 'accountability' were tested with the factor analysis. The 'transfer of training' scale revealed one component; however one item was below the minimal factor loading of 0.4. Removing this item leads to a higher internal consistency. This

five-factor analysis found a significant Barlett's test of sphericity and a Kaiser-Meyer-Olkin Measure of Sampling Adequacy for transfer of training of 0.781. The five items exceed the factor loading of 0.40 and as a result the assumptions for the factor analysis were met. To use the same items of the dependent variable for both studies, a factor analysis is run with all respondents of group 1 and 2 (i.e. N= 231). As a result, the same pattern is noticeable as trainee group 1 (i.e. two item below the factor loading of 0.4). Therefore, the four-factor transfer of training scale is used in both studies to exactly measure the same.

The factor analysis of the 'accountability' scale found the same pattern as trainee group 1. First, the scale revealed four components; however, after deletion of one item the factor analysis revealed three components (trainee, trainer, and supervisor). Also a significant Barlett's test of sphericity is found and a Kaiser-Meyer-Olkin Measure of Sampling Adequacy for accountability was 0.641. The Cronbach's Alpha's of these three perspectives (trainee, trainer, and supervisor) are respectively: 0.673, 0.770, and 0.811.

Data analysis

The assumptions of normally distributed variables and linear relations between the dependent and independent variables are checked. Based on the skewness, kurtosis, and probability plots, it was at first found that the normality assumption was not met. As a result, two variables were transformed; 'trainer support' and 'opportunity to change work environment'. Based on the scatter plots the linearity assumption between the dependent variable and independent variables was also met.

In line with trainee group 1, dummy variables are created of the control variables 'training type' and 'reason to learn'. The dummy variables and all other variables are included in the Pearson product moment correlations (see chapter 4.4.1). To partial out the effect of the learner, training, and work environment characteristics on transfer of training, the same approach as trainee group 1 (see Figure 5) was used in the hierarchical multiple regression analysis.

3.9   Data analysis of trainers' and supervisors' perspective

To answer research sub-questions 4.5, 4.6, and 4.7 data is collected and analyzed from a trainer (N= 16) and supervisor group (N= 46). In order to proceed with the data examination, the assumptions for the dependence techniques (i.e. t-tests) must be checked to justify the use of a data analysis technique. The missing data was estimated using the EM-algorithm. No missing data was identified from both groups. The univariate outliers and multivariate outliers were investigated and no outcomes were discarded from the groups. Also, the assumption of multicollinearity for both research samples was checked.

In order to test whether there are any differences between the trainees and trainers perspectives, a paired-wised samples t-test was used. This test computes the difference between two variables for each dependent case and tests whether the average difference is significantly different from zero (Field, 2005). With respect to the trainers who give their opinion about the whole trainee group in training, the means of the trainees per training group of the included variables were taken. In other words, the aggregated level of the tests is per training program. The assumptions of normally distributed variables within the trainer-trainee dataset were checked and as a result, the 'transfer design' variable was transformed. With respect to the independence and homogeneity per trainee group in the training programs, the within-group interrater reliability was established (James et al., 1984). The within-group interrater reliabilities for a group of judgments on a single item or on mean scores estimate the proportion of variance that is systematic and nonbiased. These values suggest the proportion of true variance in the single item judgments and mean judgments (James et al., 1984). Overall, each participating trainee group reflected substantial agreement among the judgments made on the scales 'transfer design', 'trainer support', and 'feedback during training'. Thus, the within-group interrater reliability was met (i.e. average values of within-group interrater reliability are: $R_{wg(transfer\ design)}$= 0.89 ; $R_{wg(trainer\ support)}$= 0.92 ; $R_{wg(feedback\ during\ training)}$= 0.82).

In order to explain whether there are any differences between the two independent supervisor and trainee groups, an independent-samples t-test was used. The supervisors' judgments about the work environment in their working group were independently made of the trainees' judgments. Again, the assumptions were checked (independence, homogeneity of variance) and met the requirements. In both statistical comparisons between groups (trainee-trainer, trainee-supervisor) the accountability variable was included. To in-depth clarify the underlying structure in the accountability variable and in continuation of the factor analysis in trainee group 1 and trainee group 2, a confirmatory factor analysis (CFA) was used. The explorative factor analysis showed three factors (trainee, trainer, and supervisor) that each had three items. The CFA is a confirmatory test of the proposed relationship between the 9 observed accountability items and their three underlying latent constructs (i.e. accountability trainee, trainer, supervisor). Only respondents with non-missing values of accountability were taken into account of trainee group 1 and 2 (e.g. 226 cases). As a result, the requirement of sufficient sample size (e.g. 5-20 cases per item) is met (Hair et al, 2006).

CFA relies on several fit indices to determine the adequacy of model fit to the data. According to Hair et al. (2006), it is not necessary to report all indices due to the redundancy among them. Relevant fit indices of differing types (i.e. incremental indices, absolute indices, and badness of fit indices) are reported in Table 7.

Goodness of Fit Statistics					
		Incremental indices	Absolute indices		Badness-of-fit indices
Minimum Fit Function Chi-Square	Degrees of Freedom	Comparative Fit Index (CFI)	Goodness of Fit Index (GFI)	Adjusted Goodness of Fit index (AGFI)	Root Mean Square Error of Approximation (RMSEA)
36.016 (p=0.0547)	24	0.981	0.967	0.939	0.0432

Table 7: Goodness of Fit statistics

The overall model χ^2 is 36.016 with 24 degrees of freedom. The *p*-value associated with this result is non-significant. Thus, this χ^2 goodness-of-fit statistic indicates that the observed covariance matrix matches the estimated covariance matrix within sampling variance. The value of the RMSEA (.04) is below the .07 guideline for a model with 9 measured variables and a sample size of 226 (Hair et al., 2006), and indicates a good fit. The CFI indices is above the guideline (p<.97) and thus this result support the model as well. The GFI is comparable with CFI since the values range between 0 and 1 and higher values indicate a better fit. The analysis of the collected data confirms the model. In addition, the other index values are supportive and the overall conclusion is that the model fits.

4.   Results

4.1   Correlation analyses: Trainee group 1

Table 8 presents the Pearson product moment correlations, means, and standard deviations among the study variables. The cut-off values of statistical power analysis for behavioral sciences determined by Cohen (1988) were used to judge correlations (i.e. $r < .24$ weak correlation, $.24 < r \leq .37$ moderate correlation, and $r > .37$ strong correlation). With respect to the background variables, the length of the training is positively associated with the soft-skill training programs and the external trainer. As mentioned in chapter 3.5, the soft-skill training programs have a much longer duration in comparison with the two other training types and the majority of soft-skill training programs were provided by an external trainer. Inspection of the correlations between the control variables and transfer of training shows that the training duration, soft-skill training programs and an external trainer are positively associated with transfer of training. In contrast, both technical training programs and H&S training programs are negatively associated with transfer of training.

Trainees who have content experience to some extent and are less experienced in their job have positive associations with transfer of training. Trainees who learn at the initiative of their supervisor show less transfer of learned KSA than trainees who personally have chosen for the training program. In addition, trainees who set clear goal before the training programs have a higher expectation level. Both variables are also positively associated with transfer of training. Motivation to learn showed a significant positive correlation with transfer of training. It is surprising that the motivation to learn variable is positive associated with the technical training programs; however, motivation to learn shows no effect with the soft-skill training programs. This suggests that the engineers at VI have a higher motivation to participate in a technical training rather than soft-skill training. Nevertheless, trainees in a soft-skill training program show positive associations with transfer of training.

Some correlations between the control variables and the variables measured at Time 2 are very strong. The training characteristics 'transfer design', 'trainer support', and 'feedback during training' are positively associated with the training duration and the soft-skill training programs. Likewise, the training characteristics have also strong significant correlations and all these variables within this characteristic are positively associated with transfer of training. Besides these training characteristics, the motivation to transfer and feedback expectations are also important factors that are correlated with transfer of training. These two variables have the strongest correlations with transfer of training and both variables explain that 17% of the variance is shared.

	N	Mean	Standard deviation	Length of training	Group size	Age	Job experience	Educational level	External trainer	Technical training	Soft-skill training	H&S training	Content experience	Own initiative to learn	Required competence	Initiative supervisor	Self-efficacy	Motivation to learn	Learning goals	Clarity goals	Career planning
Lenght of training	139	10,46	9,04	1,000																	
Group size	139	10,51	5,57	0,018	1,000																
Age	139	36,83	8,14	0,107	-0,087	1,000															
Job experience	139	2,96	2,62	-0,127	-,174*	,334**	1,000														
Educational level	139	4,03	0,72	0,106	-0,096	-,263**	-,352**	1,000													
External trainer	139	1,31	0,47	,807**	-0,096	,183*	-0,085	0,127	1,000												
Technical training	139	0,53	0,50	-,251**	-,551**	0,015	0,102	-0,044	-,249**	1,000											
Soft-skill training	139	0,20	0,40	,778**	0,071	-0,003	-,241**	,258**	,749**	-,541**	1,000										
Health and safety training	139	0,26	0,44	-,428**	,560**	-0,014	0,105	-,187*	-,404**	-,638**	-,303**	1,000									
Content experience	139	2,09	0,74	0,006	0,002	-0,023	0,055	-0,047	-0,023	-0,136	0,033	0,125	1,000								
Own initiative to learn	139	0,29	0,46	0,072	-,235**	0,051	0,097	-0,004	0,015	,215**	0,073	-,310**	-0,060	1,000							
Required competence on job	139	0,43	0,50	0,073	0,138	-0,087	-0,076	-0,118	-0,048	-,161*	0,071	0,117	,147*	-,558**	1,000						
Initiative supervisor to learn	139	0,28	0,45	-,155*	0,087	0,045	-0,015	0,134	0,038	-0,041	-,152*	,186*	-0,101	-,398**	-,539**	1,000					
Self-efficacy	139	3,87	0,32	-,196*	-,263**	,147*	0,065	0,061	-0,122	,248**	-,248**	-0,055	0,106	-0,033	-0,016	0,051	1,000				
Motivation to learn	139	3,96	0,39	0,033	-,243**	,184*	-0,019	0,072	0,026	,262**	0,005	-,301**	-0,089	,326**	-,151*	-,164*	,239**	1,000			
Learning goals	139	3,98	0,51	-0,099	-,206**	-0,099	-0,134	,303**	-0,013	,150*	-0,052	-0,123	-0,038	0,103	-0,092	-0,003	,339**	,308**	1,000		
Goal clarity	139	3,27	0,72	,188*	-,178*	,181*	-0,016	0,038	0,093	0,108	0,085	-,200**	,194*	0,053	-0,110	,243**	,256**	,145*	1,000	
Career planning	139	3,35	0,58	-,241**	-0,082	0,014	-0,012	0,086	-,154*	0,128	,185*	0,025	0,104	-0,062	0,057	0,000	,386**	0,134	,336**	-0,063	1,000
Training expectations	139	3,13	0,74	,224**	-,212**	,186*	0,007	-0,004	0,126	,194*	0,028	-,245**	,263**	0,050	0,042	-0,098	,220**	,235**	0,027	,639**	-0,057
Motivation to transfer	139	3,46	0,62	,429**	-,156*	0,121	-0,099	0,089	,457**	-,165*	,445**	-,220**	,234*	0,048	0,077	-0,134	0,068	0,090	0,125	,474**	-0,083
Goal mastery	139	3,99	0,50	,180*	-,318**	0,082	-0,095	,299**	,301**	0,080	,206**	-,279**	-0,230	0,120	-0,132	0,024	,318**	,299**	,393**	,305**	0,038
Fullfilment expect.	139	3,58	0,54	,279**	-,149*	-0,015	-,160*	0,125	,318**	-,176*	,382**	-,151*	,151*	0,036	0,063	-0,107	-0,008	0,085	-0,009	,247**	-0,001
Transfer design	139	3,61	0,63	,199**	0,006	0,061	-,170*	,183*	,209**	-,266**	,362**	-0,031	0,108	-0,026	0,038	-0,015	-0,113	0,068	-0,053	,259**	-0,042
Feedback during training	132	3,14	0,77	,538**	-,164*	,158*	-0,026	0,065	,606**	-,228**	,586**	-,299**	0,025	-0,023	0,003	0,020	-0,103	0,057	-0,045	0,133	-0,099
Trainer support	139	3,77	0,64	,489**	-,137	0,099	-0,129	,219**	,555**	-,259**	,539**	-,201**	0,061	-0,055	0,107	-0,063	0,009	0,060	0,079	,232**	-0,111
Performance self-efficacy	138	3,65	0,53	0,073	-0,126	,152*	-0,133	0,128	0,046	0,005	0,053	-0,055	,174*	0,068	0,041	-0,116	,401**	,154*	0,136	,462**	0,092
Transfer effort	139	3,77	0,45	,259**	-,243**	0,054	-,171*	,193*	,215**	,167*	,149*	-,326**	0,067	,177*	-0,078	-0,093	0,139	,353**	,239**	,322**	0,070
Performance outcome	139	3,56	0,49	,264**	-,290**	0,053	0,040	0,055	,179*	0,023	,222**	-,227**	0,054	0,120	-0,007	-0,115	,182*	0,013	0,125	,177*	-0,020
Time period after training	139	3,39	0,89	,395**	-0,014	0,020	-0,059	,143*	,319**	,184*	,162*	-,357**	-0,099	-0,032	0,062	-0,036	-0,066	-0,003	-0,055	0,133	-0,089
Performance coaching	137	3,21	0,63	0,048	0,052	-0,106	0,054	-0,030	-0,032	0,027	0,056	-0,082	0,124	0,038	0,069	-0,114	,236**	0,052	0,039	,254**	-0,038
Supervisor support	133	2,97	0,60	,221**	0,097	-0,027	-0,026	0,008	0,099	-0,036	,186*	-0,123	-0,008	-0,005	0,143	-,155*	-0,110	,146*	-0,023	,241**	-0,103
Peer support	137	3,41	0,60	-,188*	-0,029	-0,134	-0,078	-0,002	-,286**	0,136	-,206**	0,035	0,019	-0,087	0,090	-0,011	0,128	0,048	-0,019	0,050	0,075
Accountability trainee	137	4,31	0,53	-0,135	0,016	-,157*	0,078	0,137	-0,073	-0,009	-,142*	0,141	0,083	-0,015	-0,032	0,051	-0,074	-0,056	0,110	-,203**	-0,015
Accountability trainer	135	1,81	0,68	0,109	-0,010	-0,080	0,105	-0,142	0,016	0,034	-0,001	-0,037	0,096	0,079	0,077	-,165*	-0,001	-0,083	0,048	0,079	0,076
Accountability supervisor	136	2,90	0,98	-0,035	-0,020	-,163*	0,105	,156*	0,021	0,060	0,036	-0,101	-0,028	0,085	0,082	-,178*	0,060	0,006	0,110	,164*	0,105
Openness to change	137	3,72	0,54	-,271**	0,048	-0,087	-,145*	0,132	-,290**	0,048	-,254**	,178*	0,052	-0,062	0,009	0,052	0,079	-0,001	-0,105	-0,084	0,058
Opportunity to learn	135	3,63	0,64	-,171*	-0,022	-0,044	-0,097	0,141	-,164*	0,092	-0,059	-0,050	-0,039	0,100	-0,019	-0,080	0,123	0,138	-0,032	0,052	-0,006
Personal capacity	137	3,24	0,62	0,045	-0,121	0,026	-0,127	0,040	0,109	0,054	,164*	-,211**	0,096	0,002	0,028	-0,033	0,055	,153*	-0,083	0,053	-0,035
Transfer of training	139	3,02	0,64	,288**	-0,033	-0,037	-,146*	0,089	,188*	-,156*	,368**	-,161*	,153*	,162*	0,008	-,174*	0,021	,198**	0,022	,187*	0,017

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Table 8: Means, standard deviations, and intercorrrelations of variables (part I)

	Training expect.	Motivation to transfer	Goal mastery	Fulfillment expect.	Transfer design	Feedback training	Trainer support	Performance self-efficacy	Transfer effort	Performance outcome	Time period	Performance coaching	Supervisor support	Peer support	Accountability trainee	Accountability trainer	Accountability supervisor	Openness to change	Opportunity to learn	Personal capacity
Lenght of training																				
Group size																				
Age																				
Job experience																				
Educational level																				
Trainer																				
Technical training																				
Soft-skill training																				
Health and safety training																				
Content experience																				
Own initiative to learn																				
Required competence on job																				
Initiative supervisor to learn																				
Self-efficacy																				
Motivation to learn																				
Learning goals																				
Goal clarity																				
Career planning																				
Training expectations	1,000																			
Motivation to transfer	,408**	1,000																		
Goal mastery	,281**	,454**	1,000																	
Fullfilment expect.	,282**	,562**	,240**	1,000																
Transfer design	,164*	,449**	,285**	,511**	1,000															
Feedback during training	,116	,517**	,402**	,534**	,478**	1,000														
Trainer support	,263**	,551**	,355**	,570**	,552**	,581**	1,000													
Performance self-efficacy	,368**	,356**	,376**	,351**	,442**	,137	,379**	1,000												
Transfer effort	,390**	,409**	,423**	,314**	,265**	,319**	,281**	,372**	1,000											
Performance outcome	,133	,252**	,165*	,219**	,117	,275**	,206**	,231**	,347**	1,000										
Time period	,180*	,026	-,118	,052	-,117	,013	,095	-,048	,093	,033	1,000									
Performance coaching	,208**	,165*	,080	,048	,014	,046	,071	,017	,041	,206**	,116	1,000								
Supervisor support	,125	,031	,129	,001	,138	,090	,059	,068	,025	,075	,159*	,182*	1,000							
Peer support	,075	-,042	,125	-,053	,098	-,054	-,118	,133	,038	-,017	-,048	,191*	,338**	1,000						
Accountability trainee	-,089	-,013	-,053	,005	,028	,013	,035	-,022	-,028	-,012	-,005	-,066	,049		1,000					
Accountability trainer	,077	,062	,118	,056	-,012	,117	-,007	,040	,063	,162*	-,007	-,105	-,033	,070	-,208**	1,000				
Accountability supervisor	,062	,112	,056	,080	,078	-,050	-,009	,110	,073	,097	,026	-,003	,026	,049	-,006	,263**	1,000			
Openess to change	-,049	-,150*	,007	,060	,045	-,179*	,009	,120	-,047	-,209**	-,110	-,089	-,087	,095	-,051	,102	-,175*	1,000		
Opportunity to learn	-,076	-,019	,105	,002	,079	-,093	,046	,177*	,007	-,171*	-,024	-,015	,260**	,301**	-,085	-,064	,049	,273**	1,000	
Personal capacity	,000	,178*	,100	,275**	,154*	,216**	,061	,094	,108	,041	,010	,048	-,077	,039	-,088	-,182*	-,105	,040	,158*	1,000
Transfer of training	,286**	,411**	,228**	,417**	,380**	,355**	,366**	,207**	,301**	,225**	,015	,240**	,215**	,293**	-,016	,115	,114	,071	,131	,145*

**. Correlation is significant at the 0.01 level (1-tailed).
*. Correlation is significant at the 0.05 level (1-tailed).

Table 8: Means, standard deviations, and intercorrelations of variables (part II)

Performance coaching, supervisor support, peer support, and personal capacity are positively associated with transfer of training. The variables 'accountability', 'openness to change in work environment', and 'opportunity to learn' showed no significant correlations with transfer of training. Thus three of the four variables that measure the factor 'transfer climate' showed no associations with transfer of training.

Overall, 16 of the 24 independent variables from all three data collection points and all three input characteristics have significant associations with the transfer of training Also, the majority of control variables correlate with transfer of training. Specifically, the control variables soft-skill training programs, external trainer, and length of the training program are very strongly associated with each other and moderately associated with transfer of training. In chapter 4.3 tests are executed to in-depth discover the differences between the training types.

4.2   Hierarchical multiple regression analyses: Trainee group 1

Undoubtedly, research is advanced in the field resulting in numerous antecedents of transfer. However, it is possible that many of these variables in the transfer models are perhaps trivial or of minor importance in impacting significant change in transfer in VI context. In this section one will get insight in the predictors of transfer of training within VI. The main objective of the multiple regression analyses in this case was to determine the relative importance of each independent variable in the prediction of transfer of training (see chapter 2.4). For each of the three analyses, the tolerance values were checked for each regression model and exceeded the threshold values (Hair et al., 2006).

The longitudinal regression results of the first analysis are presented in Table 9. The regression between the control variables as predictors and transfer of training as an outcome shows that 'soft-skill training program' and 'own initiative to learn' make a significant contribution to the prediction equation. Both the control variables 'external trainer' and 'content experience' show a marginal significant relation with transfer of training. The other control variables (i.e. length of training, job experience, technical training, initiative supervisor to learn) make no significant contribution. Hence the relation between the control variables and transfer of training was supported: $R^2 = .206$, $p < .01$ (see Table 9; step 1).

Table 9: Regression analysis including control variables and learner characteristics (Time 1)

	Transfer of training				**Transfer of training**		
Variable	**B**	**SE B**	**β**	**Variable**	**B**	**SE B**	**β**
Step 1				*Step 2*			
Trainer extern	0,33	0,19	0,02 `	Trainer extern	0,44	0,19	0,28 *
Soft-skill training	0,94	0,22	0,51 **	Soft-skill training	1,04	0,22	0,57 **
Content experience	0,14	0,08	0,14 `	Content experience	0,11	0,08	0,10
Own initiative to learn	0,27	0,13	0,16 *	Own initiative to learn	0,17	0,13	0,10
				Motivation to learn	1,27	0,74	0,14 `
				Goal clarity	0,87	0,65	0,13
				Training expectations	0,28	0,1	0,27 **
R^2	0,206			R^2	0,273		
Adjusted R^2	0,182			Adjusted R^2	0,234		
Regression F	8,698**			Regression F	7,026**		
df	4 / 134			*df*	7 / 131		

`$p<.10$; *$p<.05$; **$p<.01$; $N=139$; $B=$ regression coefficient;
$SE\ B=$ standard error of regression coefficient; $β =$ standardized regression coefficient

In step 2, the learner characteristics are included in the regression equation (see Table 9; step 2). The regression results between the included variables and transfer of training show that 'training expectations' makes a significant contribution to the prediction equation. 'Motivation to learn' shows a marginally significant relation with transfer of training. The learner variable 'goal clarity' is not a significant predictor of training of training. Of the four already included

control variables soft-skill training and external trainer are still significant. Hence the relation between the included variables and transfer of training was supported: $\Delta R^2 = .067$, $p < .01$.

The longitudinal regression results of the second analysis are presented in Table 10. In step 2, all variables of the second data collection point (i.e. training and learner characteristics) are included in the regression equation. The variables 'fulfillment expectations' and 'transfer effort' make a significant contribution to the regression model. In addition, the variable 'feedback during training' increases the amount of variance of transfer of training. After adding the variable of Time 2, the control variables 'soft-skill training' and 'external trainer' are still significant. Hence the relation between the included variables and transfer of training was supported: $\Delta R^2 = .121$, $p < .01$.

Table 10: Regression analysis including control variables, training and learner characteristics (Time 2)

	Transfer of training				Transfer of training		
Variable	B	SE B	β	Variable	B	SE B	β
Step 1				*Step 2*			
Trainer extern	0,33	0,19	0,02 `	Trainer extern	0,52	0,20	0,32 **
Soft-skill training	0,94	0,22	0,51 **	Soft-skill training	0,78	0,22	0,43 **
Content experience	0,14	0,08	0,14 `	Content experience	0,13	0,08	0,12
Own initiative to learn	0,27	0,13	0,16 *	Own initiative to learn	0,20	0,13	0,12
				Fulfillment expectations	0,23	0,13	0,17 `
				Transfer effort	1,07	0,41	0,22 **
				Feedback during training	0,13	0,11	0,13
R^2	0,206			R^2	0,327		
Adjusted R^2	0,182			Adjusted R^2	0,286		
Regression F	8,698**			Regression F	8,421**		
df	4 / 134			*df*	7 / 131		

`$p<.10$; *$p<.05$; **$p<.01$; $N=139$; *B*= regression coefficient;
SE B= standard error of regression coefficient; β = standardized regression coefficient

The longitudinal regression results of the third regression analysis are presented in Table 11. This analysis includes all work characteristics in the regression model. The variables 'peer support', 'performance coaching', and openness to change the work environment make a significant contribution to the regression model. In addition, the variables 'personal capacity' and 'opportunity to learn' increases the amount of variance of transfer of training. Inspection of the control variables show that 'soft-skill training' and 'own initiative to learn' are still significant after adding the work environment characteristics. Hence the final relation between the included variables and transfer of training was supported: $\Delta R^2 = .165$, $p < .01$.

Table 11: Regression analysis including control variables and work environment characteristics (Time 3)

	Transfer of training				Transfer of training		
Variable	B	SE B	β	Variable	B	SE B	β
Step 1				*Step 2*			
Trainer extern	0,33	0,19	0,02 `	Trainer extern	0,16	0,18	0,10
Soft-skill training	0,94	0,22	0,51 **	Soft-skill training	0,94	0,20	0,54 **
Content experience	0,14	0,08	0,14 `	Content experience	0,06	0,07	0,06
Own initiative to learn	0,27	0,13	0,16 *	Own initiative to learn	0,20	0,12	0,12 **
				Performance coaching	0,14	0,08	0,13 `
				Peer support	2,46	0,57	0,35 **
				Personal capacity	0,08	0,09	0,07
				Opportunity to learn	0,08	0,28	0,02
				Openness to change	1,33	0,57	0,19 *
R^2	0,206			R^2	0,371		
Adjusted R^2	0,182			Adjusted R^2	0,324		
Regression F	8,698**			Regression F	7,924**		
df	4 / 134			*df*	9 / 129		

`$p<.10$; *$p<.05$; **$p<.01$; $N=139$; *B*= regression coefficient;
SE B= standard error of regression coefficient; β = standardized regression coefficient

In sum, two control variables (i.e. soft-skill training and own initiative to learn), two learner characteristics (i.e. 'training expectations' and 'transfer effort'), and two work environmental characteristics (i.e. 'peer support' and 'openness to change the work environment') make a significant contribution to the prediction equation. In addition, the variables 'trainer extern', 'content experience', 'motivation to learn', 'fulfillment expectations', and 'performance coaching' show a marginally significant relation with transfer of training.

Based on the correlation analysis and hierarchical multiple regression analysis, research sub-questions 4.1, 4.2, and 4.3 can be answered. Research sub-question 4.1 stated '*which learner characteristics are positively associated with transfer of training and which learner characteristics explain a significant amount of variance of transfer of training at VI?* The learner variables 'motivation to learn', 'motivation to transfer', training expectations', 'fulfillment expectations, 'transfer effort', and 'goal clarity' showed positive and significant associations with transfer of training. The regression analysis showed that the learner characteristics 'motivation to learn', 'training expectations', 'fulfillment expectations', and 'transfer effort' are (marginally) significant predictors of transfer of training.

Research sub-question 4.2 stated '*which of the training characteristics are positively associated with transfer of training and which training characteristics explain a significant amount of variance of transfer of training at VI?'.* All training variables (i.e. 'transfer design', 'feedback during training', 'trainer support and experience') are significantly associated with transfer of training and in the right direction. The regression analysis showed that none of these training characteristics is a significant predictor of transfer of training.

Research sub-question 4.3 stated '*which of the work environment characteristics are positively associated with transfer of training and which work environment characteristics explain a significant amount of variance of transfer of training at VI?.* Based on the correlation findings, 'performance coaching', 'peer support', 'supervisor support', and personal capacity showed positive and significant effects. All three accountability scales (trainee, trainer, and supervisor), openness to change, and opportunity to learn were not associated with transfer of training. The work environment characteristics 'peer support', 'openness to change work environment' and 'performance coaching' are (marginally) significant predictors of transfer of training.

4.3 Overview of findings for trainee group 1

Successfully transferring the learned KSA back to the work setting is not solely determined by any one factor. The motivation and expectations of the trainee are important determinants of the trainees' learning outcomes (Machin, 2002). This section more in-depth clarifies the transfer process per training type and moderation effects.

4.3.1 Type of training group differences

In table 12 the means of the relevant variables of Time 1, Time 2, Time 3, and transfer of training are compared per type of training. To test the differences between the three training types, an one-way Anova is used. An Anova determines whether samples from two or more groups come from populations with equal means (one dependent measure). Scheffe's follow-up tests were used to test this single-step multiple comparison of all training types among the means of the included variables.

Table 12: mean values per type of training program (trainee group 1)

		Mean values								
		Time 1			Time 2					
Training type	N	Motivation to learn	Goal clarity	Training expectations	Transfer design	Trainer support	Feedback during training	Motivation to transfer	Fulfillment expectations	Transfer effort
Technical	74	4.05[a]	3.36[a]	3.27[a]	3.46[a]	3.62[a]	2.97[a]	3.36[a]	3.48[a]	3.83[a]
Soft-skill	30	3.99[b]	3.35	3.15	4.04[a,b]	4.42[a,b]	4.00[a,b]	4.01[a,b]	3.99[a,b]	3.90[b]
Health&safety	35	3.75[a,b]	3.03[a]	2.83[a]	3.59[b]	3.57[b]	2.72[b]	3.22[b]	3.43[b]	3.51[a,b]

		Time 3						
Training type	N	Performance coaching	Supervisor support	Peer support	Opportunity to learn	Openness to change	Personal capacity	Transfer of training
Technical	74	3.23	2.96	3.47	3.68	3.87[a]	3.27	2.92[a]
Soft-skill	30	3.28	3.18[a]	3.21	3.58	3.47[a]	3.44[a]	3.56[a,b]
Health&safety	35	3.13	2.85[a]	3.43	3.57	3.73	3.01[a]	2.79[b]

* Training programs that share superscript in a column, have significantly different values (p<.05) for the variable

A one-way Anova revealed significant differences in transfer of training between the three training types. The post-hoc comparison (i.e Scheffe follow-up tests) revealed a significant difference in transfer of training between the soft-skill training and technical training (p<.01) and between the soft-skill training and H&S training (p>.01). Transfer of training did not differ between the technical and H&S training.

Just like transfer of training, the soft-skill training program scores substantially higher on all variables of Time 2. These variables significantly differ between the soft-skill training programs, and technical and H&S training programs. The technical and H&S training programs do not significantly differ in their training characteristics and transfer performance. Time 1 variables score highest on technical training programs, and all these scores significantly differ between the technical and H&S training programs. The correlation matrix showed that trainees do not participate in a H&S training program on their own initiative. The work environment variables showed different results along the training types. Noticeable are the significant differences supervisor support and personal capacity between the soft-skill and H&S training. The support of the supervisor scores substantially higher on soft-skill training programs and after the soft-skill training programs trainee have more time, energy and mental space in their work to make changes required to transfer learning to the job. Moreover, there is a significant difference in openness to change between the soft-skill training programs and technical training programs. Thus, trainees perceived more encouragement from their working group when they use acquired skills and knowledge from technical training programs.

4.3.2 Moderation effects of transfer process

Regarding the results of the Pearson product moment correlations and regression analysis, a model for transfer of training to test moderation effects is explored and presented in Figure 6. This figure represents a model with all independent variables included in the study that could direct or indirect influence the training outcomes and/or transfer of training.
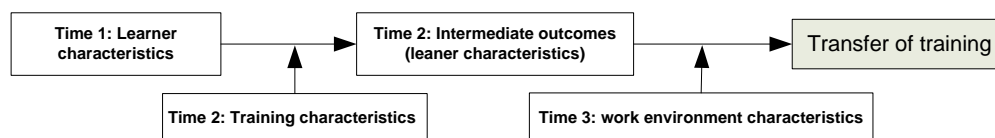
Figure 6: Research model for moderation analysis

Results of the training characteristics moderations showed moderation effects of feedback during training on the effect of self-efficacy resulting in performance self-efficacy (see Table 13). The effect of self-efficacy on performance self-efficacy is stronger when the feedback during training is high. Especially, trainees with low self-efficacy will benefit from feedback during training. Performance self-efficacy also shows a significant direct relation with transfer of training (i.e. without interaction effect).

Dependent variable: Performance self-efficacy			
Variable	B	SE B	b
Step 1			
Self-efficacy	0,22 **	0,04	0,42
Feedback during training	0,04 *	0,02	0,19
Step 2			
Self-efficacy	0,63 **	0,19	1,19
Feedback during training	0,56 *	0,24	2,52
Self-efficacy * feedback during training	-0,13 *	0,06	-2,34
ΔR2	0,03		

Dependent variable: Transfer of training			
Variable	B	SE B	β
Step 1			
Transfer effort	1,49 **	0,41	0,30
Accountability trainer	0,05	0,09	0,05
Step 2			
Transfer effort	4,09 **	1,16	0,82
Accountability trainer	-2,10 *	0,90	-1,95
Transfer effort * Accountability trainer	-1,47 *	0,62	-2,05
ΔR2	0,04		

Table 13: Coefficients of moderation analysis

Table 13 also shows the result of the work environmental characteristics moderation. The moderation effect is found of trainers' accountability on the effect of transfer effort resulting in transfer of training. The effect suggests that when the accountability of the trainer is low, transfer of training will significantly benefit from high transfer effort. According to the method of Aiken and West (1991), the interaction effects are graphically represented in Figure 7. Other found training moderation effects of part I (i.e. training moderations) are described and depicted in appendix A. In addition, each step of the moderation model was in-depth illustrated and all significant interaction effects were graphically represented.
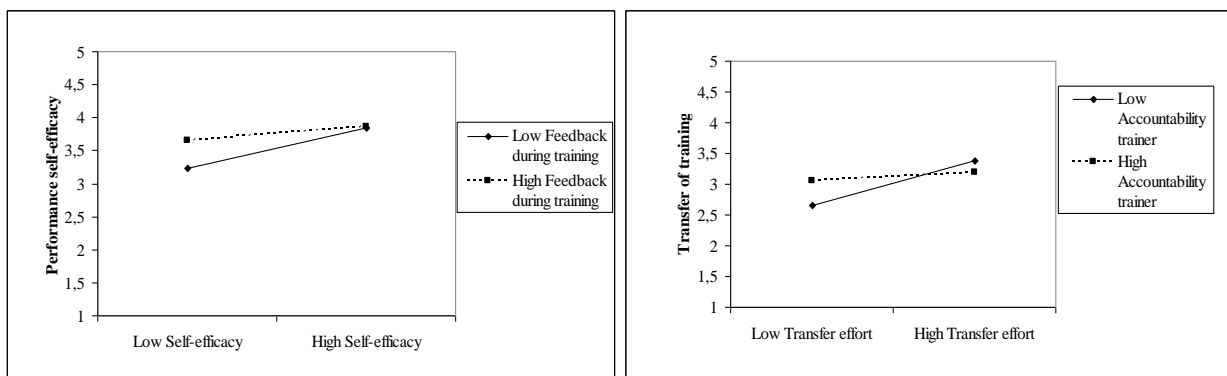

Figure 7: Graphically representations interaction effects

4.4 Results trainee group 2
In this section the data analysis for the cross-sectional study is discussed.

4.4.1 Correlation analyses: Trainee group 2
Table 14 presents the Pearson product moment correlations, means and standard deviations among the study variables. With respect to the type of training, no H&S training programs are included in this study. Comparable with trainee group 1, the length of the training is very strongly associated with the soft-skill training programs and the external trainer. In addition, it must be noted that the time period after the training program is for soft-skill training programs much longer than for technical training programs.

Inspection of the correlations between the control variables and transfer of training shows that the length of the training program, group size and the external trainer are positively associated with the dependent variable. Just like trainee group 1, technical training programs are negatively associated with transfer of training and in contrast soft-skill training programs with larger group sizes are positively correlated. Furthermore, trainees who participated in the training program at their own initiative are more motivated to learn and show better transfer results. Inspection of the correlations between the independent variables shows the strong correlations between the training characteristics variables and motivation to transfer.

	N	Mean	Standard deviation	Length of training	Group size	Age	Job ex-perience	Education al level	External trainer	Soft-skill training	Content experience	Own initia-tive to learn	Required competence	Initiative supervisor	Transfer period
Lenght of training	92	17,91	17,05	1,000											
Group size	92	7,51	3,61	,445**	1,000										
Age	92	37,45	8,43	-0,162	-0,069	1,000									
Job experience	92	3,65	3,33	-0,169	-0,013	,497**	1,000								
Educational level	91	3,86	0,91	,202*	,279**	-,233*	-0,125	1,000							
External trainer	92	1,27	0,45	,600**	0,151	-0,088	-,209*	,231*	1,000						
Soft-skill training	92	0,34	0,48	,815**	,558**	-0,137	-,175*	0,136	,598**	1,000					
Content experience	92	2,13	0,77	0,108	0,110	0,077	0,069	-0,101	0,055	0,118	1,000				
Own initiative to learn	92	0,33	0,47	0,102	0,075	0,060	-0,088	0,162	-0,112	0,093	0,153	1,000			
Required competence on job	92	0,34	0,48	-0,129	-,236*	-0,109	-0,099	-0,168	0,081	-0,119	-0,121	-,496**	1,000		
Initiative supervisor to learn	92	0,34	0,48	0,028	0,161	0,050	,186*	0,007	0,030	0,027	-0,031	-,496**	-,508**	1,000	
Time period after training	92	14,00	5,32	,605**	,289**	-0,105	-0,141	-0,045	0,083	,591**	,195*	,237*	-,248**	0,013	1,000
Self-efficacy	92	3,85	0,33	0,061	-0,086	,194*	0,032	0,003	,188*	0,006	0,086	0,074	-0,086	0,013	-0,035
Motivation to learn	92	3,97	0,35	0,146	0,103	-0,029	-0,117	0,142	,182*	0,112	0,076	,198*	-0,144	-0,051	0,085
Learning goals	92	4,11	0,48	0,082	0,140	-0,036	,186*	,305**	0,133	0,074	-0,169	-0,026	-0,077	0,103	-0,012
Career planning	92	3,30	0,50	0,161	-0,074	0,055	-0,014	0,109	,200*	0,082	-0,094	-0,020	0,077	-0,057	-0,050
Motivation to transfer	91	3,61	0,68	,318**	0,127	-0,136	-0,084	0,156	,424**	,238*	0,100	-0,092	0,102	-0,011	0,092
Transfer design	92	3,78	0,62	,316**	,231*	-,182*	-0,090	0,056	,306**	,317**	0,083	-0,102	0,120	-0,020	,199*
Trainer support	91	4,02	0,63	,383**	0,065	0,107	0,048	0,003	,219*	,314**	-0,052	-0,081	0,112	-0,033	,327**
Transfer effort	92	3,68	0,55	0,128	-0,039	0,026	-0,044	-0,027	0,152	0,086	-0,026	-0,125	0,069	0,055	0,061
Training feedback	91	3,10	0,64	0,134	-0,105	-0,154	-,185*	-0,027	,178*	0,103	-0,059	0,025	0,057	-0,081	0,050
Supervisor support	92	2,94	0,60	,338**	,272**	-0,073	-0,016	0,135	,323**	,300**	,241*	-0,011	0,122	-0,111	,209*
Peer support	92	3,37	0,56	-,331**	-,200*	0,080	0,013	-,293**	-0,125	-,328**	-0,048	-,197*	,193*	0,003	-0,122
Accountability trainee	92	4,18	0,51	0,003	0,005	0,002	0,019	0,046	-0,006	0,012	0,077	0,021	0,057	-0,078	,210*
Accountability trainer	91	1,94	0,66	-,181*	-,242*	0,020	0,141	-,238*	-0,083	-,206*	0,072	0,108	0,053	-0,161	-,199*
Accountability supervisor	91	2,78	0,88	-0,089	-,317**	-0,047	0,064	-0,013	-0,067	-,232*	-0,133	-,179*	0,101	0,076	-0,036
Openess to change	90	3,78	0,47	0,076	-0,012	0,008	0,101	-,203*	-0,079	0,084	0,134	0,114	0,087	0,024	-0,119
Personal capacity	89	3,58	0,58	,204*	0,124	-0,151	-0,077	,237*	,209*	0,172	-,269**	-0,084	-0,052	0,135	-0,001
Transfer of training	92	3,02	0,70	,280**	,221*	-0,109	-0,009	0,048	,348**	,264**	-0,018	,194*	0,104	0,088	0,108

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Table 14: Means, standard deviations, and intercorrrelations of variables (part I)

	Self-efficacy	Motivation to learn	Learning goals	Career planning	Motvation to transfer	Training design	Trainer support	Transfer effort	Training feedback	Supervisor support	Peer support	Accounta-bility trainee	Accounta-bility trainer	Accountability supervisor	Openess to change	Personal capacity
Lenght of training																
Group size																
Age																
Job experience																
Educational level																
Trainer																
Soft-skill training																
Content experience																
Own initiative to learn																
Required competence on job																
Initiative supervisor to learn																
Time period after training																
Self-efficacy	1,000															
Motivation to learn	,162	1,000														
Learning goals	,076	,048	1,000													
Career planning	,054	,073	,055	1,000												
Motivation to transfer	,135	,119	,220*	,101	1,000											
Transfer design	-,043	-,092	,056	-,011	,517**	1,000										
Trainer support	,000	-,114	,352**	,052	,243*	,539**	1,000									
Transfer effort	,108	-,086	,162	,091	,454**	,367**	,339**	1,000								
Training feedback	,105	,049	-,078	-,141	,270**	,296**	,101	,142	1,000							
Supervisor support	,029	,081	-,029	,078	,463**	,346**	,082	,044	,162	1,000						
Peer support	,015	-,078	-,111	-,189*	,209*	,217*	-,064	,109	,222*	,171	1,000					
Accountability trainee	,113	,160	,142	,035	,278**	,056	,069	,290**	-,097	,298**	,037	1,000				
Accountability trainer	,028	,094	-,139	-,020	,082	-,130	-,157	,127	,285**	,013	,181*	,015	1,000			
Accountability supervisor	,123	,077	,015	,002	,185*	-,195*	-,063	,015	-,017	,083	,334**	,232*	,191*	1,000		
Openess to change	,041	-,098	,013	-,025	,167	,044	,101	,055	,004	,165	,194*	,149	-,072	,159	1,000	
Personal capacity	-,095	-,038	,320**	,048	,051	,173*	,161	,074	,099	,096	,000	,004	-,338**	-,053	-,068	1,000
Transfer of training	-,054	-,157	,097	,113	,588**	,482**	,287**	,361**	,280**	,403**	,187*	,168	,101	,003	-,030	,279**

**. Correlation is significant at the 0.01 level (1-tailed).
*. Correlation is significant at the 0.05 level (1-tailed).

Table 14: Means, standard deviations, and intercorrrelations of variables (part II)

In addition, it can be seen that in comparison with the longitudinal study all training characteristics correlate with transfer of training. With respect to the work environment characteristics, it is noticeable that the correlations between the variables in this category are lower that within training characteristics. Both supportive factors (i.e. peer and supervisor) have a significant positive correlation with transfer of training. Remarkable is that peer support is significantly associated with the technical training programs and that supervisor support is significantly associated with the soft-skills training programs. Also personal capacity is positively associated. Just like trainee group 1, the variables 'accountability', 'openness to change in work environment', and 'opportunity to learn' showed no significant correlation.

An overall comparison between trainee group 1 and trainee group 2 shows one difference in the correlations between the independent variables and transfer of training. In contrast with the longitudinal study, the 'motivation to learn' variable has no significant association with transfer of training in the cross-sectional study. As a result, 8 of the 17 independent variables from all input characteristics have a significant association with transfer of training.

4.4.2 Hierarchical multiple regression analysis: Trainee group 2

In this section insight is provided of the predictors of transfer of training within the second trainee group. For each regression model the tolerance values are checked and exceeding the threshold value (Hair et al., 2006). The cross-sectional regression results of the first analysis are presented in Table 15. The regression results between these control variables and transfer of training show that only the control variable 'trainer extern' makes a significant contribution to the prediction equation. The control variables 'group size' and 'own initiative to learn' show a marginal significantly relation with transfer of training. Hence the relation between the control variables and transfer of training was supported: R^2 = .180; p <.01 (see Table 15, step 1).Including the learner characteristics self-efficacy, career planning, learning goals, and motivation to learn show that only motivation to learn has a significant relation with transfer of training. As a result, the control variable 'own initiative to learn' is not significant anymore. Hence the relation between the included variables and transfer of training was supported: ΔR^2 = .042; p <.05.

Table 15: Regression analysis including control variables and learner characteristics

Transfer of training				Transfer of training			
Variable	B	SE B	b	Variable	B	SE B	b
Step 1				*Step 2*			
Group size	0,04	0,02	0,19 `	Group size	0,04	0,02	0,20 *
Trainer extern	0,47	0,15	0,30 **	Trainer extern	0,54	0,15	0,34 **
Own initiative	0,26	0,14	0,17 `	Own initiative	0,19	0,15	0,13
				Motivation to learn	0,43	0,20	0,21 *
R^2	0.180			R^2	0.222		
Adjusted R^2	0.152			Adjusted R^2	0.187		
Regression F	6.455**			Regression F	6.224**		
df	3 / 88			*df*	4 / 87		

`p<.10; *p<.05; **p<.01; *N*=92 ; *B*= regression coefficient;
SE B= standard error of regression coefficient; β = standardized regression coefficient

The cross-sectional regression results of the second analysis are presented in Table 16. The variables 'motivation to transfer' and 'transfer design' make a significant contribution to the regression model. After adding these training characteristics and motivation to transfer, only the control variables own initiative to learn is still marginally significant. Hence the relation between the included variables and transfer of training was supported: ΔR^2 = .244, p <.01.

Table 16: Regression analysis including control variables, training and learner characteristics

Transfer of training				Transfer of training				
Variable	***B***	**SE *B***	**b**	**Variable**	***B***	**SE *B***	**b**	
Step 1				*Step 2*				
Group size	0,04	0,02	0,19 `	Group size	0,02	0,02	0,12	
Trainer extern	0,47	0,15	0,30 **	Trainer extern	0,12	0,14	0,07	
Own initiative	0,26	0,14	0,17 `	Own initiative	0,12	0,14	0,07	`
				Transfer design	0,22	0,11	0,20	*
				Motivation to transfer	0,44	0,10	0,43	**
R^2	0.180			R^2	0.424			
Adjusted R^2	0.152			Adjusted R^2	0.391			
Regression F	6.455**			Regression F	12.675**			
df	3 / 88			*df*	5 / 86			

`$p<.10$; *$p<.05$; **$p<.01$; *N*=92 ; *B*= regression coefficient;
SE B= standard error of regression coefficient; β = standardized regression coefficient

The final regression analysis includes in step 2 all work characteristics in the regression model. The variables 'training feedback' and 'supervisor support' have significant relations with transfer of training. Hence the relation between the included variables and transfer of training was supported: ΔR^2 = .224, $p <.05$.

In sum, two learner characteristics (i.e. motivation to learn and motivation to transfer), one training variable ('transfer design'), and two work environment characteristics (i.e. training feedback and supervisor support) are significant predictors of transfer of training. In addition, the control variables group size, trainer extern, and own initiative to learn are significantly related to transfer of training.

Table 17: Regression analysis including control variables and work environment characteristics

Transfer of training				Transfer of training				
Variable	***B***	**SE *B***	**b**	**Variable**	***B***	**SE *B***	**b**	
Step 1				*Step 2*				
Group size	0,04	0,02	0,19 `	Group size	0,03	0,02	0,16	`
Trainer extern	0,47	0,15	0,30 **	Trainer extern	0,28	0,15	0,18	`
Own initiative	0,26	0,14	0,17 `	Own initiative	0,28	0,14	0,19	*
				Training feedback	0,25	0,10	0,23	*
				Supervisor support	0,30	0,12	0,26	**
R^2	0.180			R^2	0.304			
Adjusted R^2	0.152			Adjusted R^2	0.264			
Regression F	6.455**			Regression F	7.512**			
df	3 / 88			*df*	6 / 85			

`$p<.10$; *$p<.05$; **$p<.01$; *N*=92 ; *B*= regression coefficient;
SE B= standard error of regression coefficient; β = standardized regression coefficient

It is not surprising that the relative impact of the significant variables is different between the longitudinal study (i.e. trainee group 1) and the cross-sectional study (i.e. trainee group 2). Obviously, different perceptions occur due to the different time of measurement. First of all, one control variable (i.e. 'soft-skill training') is a significant predictor of transfer of training in trainee group 1; however, it is not a predictor in trainee group 2. In this latter group, the group size variable plays a important role. It must be noted that group size is strongly related with the soft-skill training programs in trainee group 2. Second, the intermediate training outcomes 'transfer effort and fulfillment expectation play a crucial role in longitudinal study. Based on the cross-sectional analysis, the intermediate outcome 'motivation to transfer' is a very important factor for predicting transfer of training. A remarkable comparison can be made between the intermediate outcomes of both studies (i.e. motivation to transfer, transfer effort, and fulfillment of expectations) because all three variables have moderate/strong correlations with all training

characteristics. Overall, this suggests that the training characteristics indirectly play an important role in the training outcomes. The third difference between the regression models arises from the work environmental characteristics. In the longitudinal study, 'peer support' is a significant predictor of transfer of training and in the cross-sectional study supervisor support is a significant predictor of transfer of training. Noticeable is that in both studies, supervisor support positively correlates with the transfer period (i.e. the time period after the training program till the data collection point).

4.5   Overview trainee group 2

In table 18 the means of the relevant variables of the transfer process for trainee group 2 are shown per type of training. Regarding transfer of training a t-test revealed a statistically significant difference between the two types of training ($t_{(90)}$=2.60, p<.05, technical training: mean=2.89, soft-skill training mean=3.27). Although mean values transfer of training for both training programs are lower in comparison with trainee group 1, soft-skill training programs achieve better transfer results. Comparable with trainee group 1, all training characteristics and supervisor support, score significantly higher for the soft-skill training programs.

Training type	N	Motivation to learn	Transfer design	Trainer support	Feedback during training	Motivation to transfer	Transfer effort	Training feedback	Supervisor support	Peer suppor	Openness to change	Personal capacity	Transfer of training
Technical	61	3.94	3.64	3.89	3.15	3.49	3.65	3.05	2.81	3.50	3.81	3.50	2.89
Soft-skill	31	4.02	4.05	4.29	3.91	3.83	3.74	3.18	3.19	3.11	3.72	3.71	3.27
Difference		n.s.	p<.01	p<.01	p<.05	p<.05	n.s.	n.s.	p<.01	p<.01	n.s.	n.s.	p<.05

Table 18: mean values per type of training program (trainee group2)

Returning on research sub-question 4.4 (i.e. *what is the quality and current status of the whole training process (e.g. input characteristics and transfer of training) within VI?*), it is observable that in comparison with trainee group 1, the means of the majority of independent variables and transfer of training in trainee group 2 stay somewhat the same. The variable 'personal capacity' has the largest mean difference between the trainee groups, and scores higher in trainee group 2. The reason for this difference may be that trainees in the longitudinal study did not have the opportunity (e.g. work pressure, other priorities) to apply the learned KSA in their work setting within the transfer period. Just like trainee group 1, the mean values show that the soft-skill training programs score significantly higher on the training characteristics, motivation to transfer, transfer effort, and transfer of training. In addition, the regression results show that variables belonging to all training characteristics have significant relations with motivation to transfer, and that motivation to transfer is the largest significant predictor of transfer of training. Just like trainee group 1, especially improvement opportunities of training characteristics are necessary within the technical training programs. In addition, the feedback on the training in the work setting and the supervisor support should be stimulated to enhance transfer of training. It must be noted that trainee group 1 provides a better overall view of the transfer of training process due to the longitudinal research design. However, cross-sectional study of trainee group 2 is important to notice the differences and similarities between the studies.

4.6   Group differences: trainers' and supervisors' perspective

As outlined in the data analyses and methodology section, data is also gathered from trainers. This data collection is accomplished in order to analyze the training characteristics (e.g. 'trainer support', 'feedback during training', and 'training design') from trainers' perspective. The work environment characteristic 'accountability' is included in the study to investigate the degree to which trainers find themselves responsible for the eventually transfer of the learned KSA and to what degree trainers find the other stakeholders responsible. In order to explain whether there are any differences in the perspectives of trainees and trainers, a paired samples t-test was used (Table 19).

		Mean	N	Std. Deviation	Std. Error	t	Sig. (2-tailed)
Pair 1: transfer design	According to trainers	3,41	16	0,562	0,140	-1,7712	0,097
	According to trainees	3,69	16	0,432	0,164		
Pair 2: feedback during training	According to trainers	3,35	16	0,588	0,147	1,824	0,088
	According to trainees	3,14	16	0,637	0,159		
Pair 3: trainer support	According to trainers	3,53	16	0,664	0,166	-1,546	0,143
	According to trainees	3,81	16	0,561	0,140		
Pair 4: accountability trainees	According to trainers	4,44	16	0,574	0,143	0,795	0,439
	According to trainees	4,33	16	0,276	0,069		
Pair 5: accountability trainer	According to trainers	2,09	16	0,704	0,176	1,748	0,101
	According to trainees	1,75	16	0,287	0,072		
Pair 6: accountability supervisor	According to trainers	2,82	15	0,846	0,218	-0,432	0,673
	According to trainees	2,94	15	0,546	0,141		

Table 19: Paired Samples Statistics and test

To answer research sub-question 4.5 (i.e. *is there a significant difference between the trainees and trainer perspectives with respect to the training characteristics'?*), one observes the values that are depicted in the last two columns. The paired sample t-test show that feedback during training and transfer design are judged differently by trainees and trainers with slightly lower estimates provided by the trainees (p<.10). To discover whether the effects are substantive, the effect sizes are determined (Field, 2005; Cohen, 1988). Using the benchmarks for effect sizes (i.e. weak<.3; moderate<.5; strong<.8), the effect size of feedback during training represents a moderate effect (d=.35) and the effect size of transfer design showed a weak effect (d=.13). Other variables represent non-significance and these variables showed no statistical meaningful difference between the groups.

In the supervisor perspective, the two independent estimates of the variance for the included variables are compared. The used statistical test is the independent-sample T-test. The test statistics are depicted in the last two columns of table 20 and provide answer to research sub-question 4.6 (i.e. *is there a significant difference between the trainees and supervisors perspectives with respect to the work environment characteristics?*). It is clear from the significance values that there are no differences between the trainee and supervisor group on six of the seven variables. The variable 'openness to change work environment' does differ between the supervisors and trainees perspectives. To discover whether the effect is substantive, the effect size for this independent sample t-test is determined (Cohen, 1988). The effect size represents a strong effect (d=.966).

		Group Statistics			T-test for Equality of Means	
		N	Mean	Std. Deviation	t	Sig. (2-tailed)
Supervisor support	Trainees	134	2,97	0,60	-1,58	0,12
	Supervisors	46	3,14	0,62		
Transfer effort	Trainees	137	3,76	0,46	-1,31	0,19
	Supervisors	46	3,87	0,51		
Opennes to change work environment	Trainees	137	3,72	0,53	6,54	0,00
	Supervisors	46	3,14	0,49		
Performance coaching	Trainees	135	3,04	0,55	0,71	0,48
	Supervisors	46	2,98	0,52		
Accountability trainees	Trainees	137	4,26	0,50	0,88	0,38
	Supervisors	44	4,18	0,58		
Accountability trainers	Trainees	136	1,80	0,68	-0,71	0,48
	Supervisors	44	1,88	0,67		
Accountability supervisors	Trainees	136	2,90	0,98	-0,94	0,35
	Supervisors	44	3,05	0,89		

Table 20: Independent-samples t-test: results supervisor-trainee group

The three accountability constructs showed non-significance in the paired-sample t-test (trainee-trainer) and the independent t-test (trainee-supervisor). In addition, the CFA provides a clear view about the underlying structure of the accountability variables (chapter 3.9). Overall, the answer to research sub-question 4.7 is (i.e. *is there a significant difference between the trainees-trainers and trainees-supervisors samples with respect to the work environment characteristic 'Accountability'?*) that there is no difference between both trainee-trainer and trainee-supervisors samples on accountability. The three stakeholders (i.e. trainees, trainers, and supervisors) agree that the trainees' transfer of training should be in personal control of the trainees. In addition, the three stakeholders allocate some extent of accountability towards the supervisors and the trainers are practically not responsible for the trainees' transfer of training.

Both principle component factor analysis and the confirmatory factor analysis confirm that the tested accountability variable consist of three construct (i.e. trainees, trainers, and supervisors) with each three items. Each construct is internal consistent and these constructs can be used to discover the possible impact of 'accountability' within a different organizational settings. Furthermore, no noticeable difference was found in case the accountability variables were classified to the three training types.

5. Conclusions and discussion

5.1 Overview of results

The purpose of the study was to diagnose the company problem within transfer of training process, to provide insight in factors that influence successfully the transfer of training, and to provide redesign options. With respect to the regulative cycle of van Strien (1997), the first three steps (e.g. problem definition, problem choice, and diagnoses/analysis) have been completed. First, the transfer of training literature has been investigated to obtain a good theoretical foundation about transfer of training within work organizations and to delineate the whole transfer of training research area. Second, a selection has been made of variables that may be relevant within VI context. In addition, these variables have been empirically investigated from different perspectives in order to provide good insights in the factors that influence transfer of training at VI. The correlation analysis discovers the associations among leaner, training, and work environment characteristics and transfer of training. The longitudinal and cross-sectional regression models revealed significant predictors of transfer of training within VI. Furthermore, the moderation analyses investigated the leaner characteristics on the effect of the training and work environment characteristics resulting in transfer of training. In order to explain whether there are any differences between the trainees and trainers perspective and between trainees and supervisors, t-tests were used. Moreover, an one-way Anova was used to investigated whether there are any difference between the technical, soft-skill, and H&S training programs. Overall, these statistical analyses provide opportunities to improve transfer of training within VI and after having successfully executed these analyses, we draw up the following conclusions.

The positive and significant correlations between the independent variables and transfer of training are comparable with the meta-analysis of Colquitt et al. (2000) and the literature review of Burke and Hutchins (2007). The differences with this study are that the variables 'self-efficacy', 'career planning', and 'learning goals' showed non-significant associations with transfer of training within VI. In contrast with learning goals, it must be noted that 'goal clarity' was positive associated with training outcomes and transfer of training. Thus, setting specific clear goals for a training program is important to obtain higher training expectations, fulfillment of these expectations and transfer outcomes.
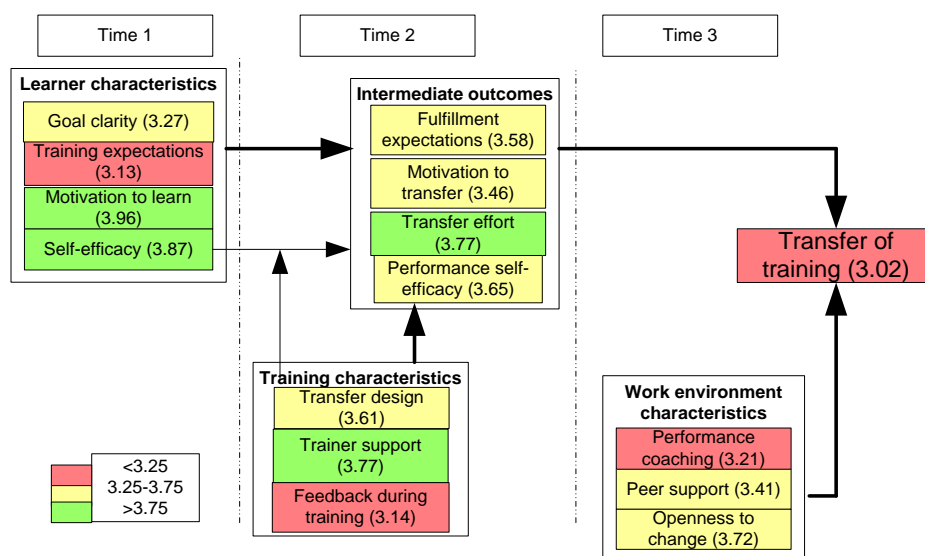

Figure 8: Transfer process model longitudinal study

Based on the regression and moderation results of the longitudinal study (trainee group 1), the important significant variables for all training types in this transfer process are illustrated in

Figure 8. The cut-off values in Figure 8 (i.e. low, moderate, high) are determined through conversations with VI managers and training literature (Holton et al., 2000; LTSI). Moreover, the thickness of the arrows correspond with that strength of the relationships.

Results showed that soft-skill training programs with a more interactive training design (i.e. feedback during training, practical cases, team work) and a longer training duration are positively related to transfer of training. Employees that participate in these soft-skill training programs achieve the highest training and transfer results in comparison with the technical and H&S training programs. The technical and H&S training programs have a shorter duration and are less interactive in their training designs.

Also Hutchins and Burke (2007) stated that practice and feedback during training have a positive influence on the training outcomes and consequently on transfer of training. Improvements within the feedback during training, transfer design, and trainer support (i.e. especially for technical and H&S training programs) are crucial to enhance the intermediate training outcomes transfer effort, motivation to transfer, and fulfillment expectations. The most important training outcome is transfer effort. This trainee's expectation that effort will lead to changes in their performance is a significant predictor of transfer of training.

Before the training program (Time 1), the training expectations play a crucial role within VI. This factor is related to transfer of training and the intermediate training outcomes (i.e. transfer effort and fulfillment expectations). Comparable, Martocchio and Webster (1992) state that training expectations of trainees have a positive effect on learning new KSA and the applicability of new KSA on the job. Based on the results, it can be concluded that, although the VI employees are to some extent motivated to learn, the extent to which employees are prepared to enter and participate in a training program is low.

Furthermore, results showed that trainees with low self-efficacy will benefit from a strong transfer design resulting in fulfillment expectations. The transfer design plays a less important role as the self-efficacy of the trainee is high. This effect between self-efficacy and transfer design is also found resulting in motivation to transfer. In addition, results showed that setting clear goals have a stronger effect on fulfillment expectations when transfer design is high. Also Kontoghiorghes (2001) suggested that clear goals that include the desired and required KSA after training are likely to result in higher training outcomes. Furthermore, the effect of self-efficacy on performance self-efficacy is stronger when the feedback during training is high. Especially, trainees with low self-efficacy will benefit from feedback during training.

Brown and McCracken (2009) state that the two most mentioned barriers for employees to transfer learned KSA are a lack of time and an unsupportive organizational culture. Within VI, the lack of time is not a main item in relation with transfer of training, however, the support in the work setting is important and should be improved. Peer support, openness to change work environment, and performance-based coaching of trainees are significant predictors of transfer of training. Of these work environment characteristics, peer support has the highest relative influence on transfer of training within VI. Also, Colquitt et al. (2000) state that the social support in an organization positively influences the encouragement, coaching of trainees, and the transfer of training. Performance coaching within VI has a low mean value and due to the significant relationship with transfer of training performance coaching can be considered as one of the improvement factors. Furthermore, results showed that in case trainees judge the trainers' accountability for the transfer of training as low, transfer of training will significantly benefit from the their expectation that effort devoted to transferring learning will lead to changes in job performance.

Although it can be concluded that the soft-skill training programs have strong correlations with feedback during training, transfer design, and transfer of training, the technical training

programs have positive correlations with self-efficacy, motivation to learn, and training expectations (i.e. variables of Time 1). A possible reason may be that although employees at VI are technically oriented, the technical training programs with a shorter duration and less interactive training design result in less transfer performance. The H&S training programs showed the lowest results on the motivational factors, intermediate training outcomes, and transfer of training. It must be noted that these training programs have a short training duration (3 till 8 hours) and the majority of trainees that participate in this training program are present on supervisor initiative.

Based on the hierarchical regression of the cross-sectional study (trainee group 2), the important significant variables for all training types in this transfer process are illustrated in Figure 9. It must be noted that trainee group 1 provides a better overall view of the transfer of training process due to the longitudinal research design.
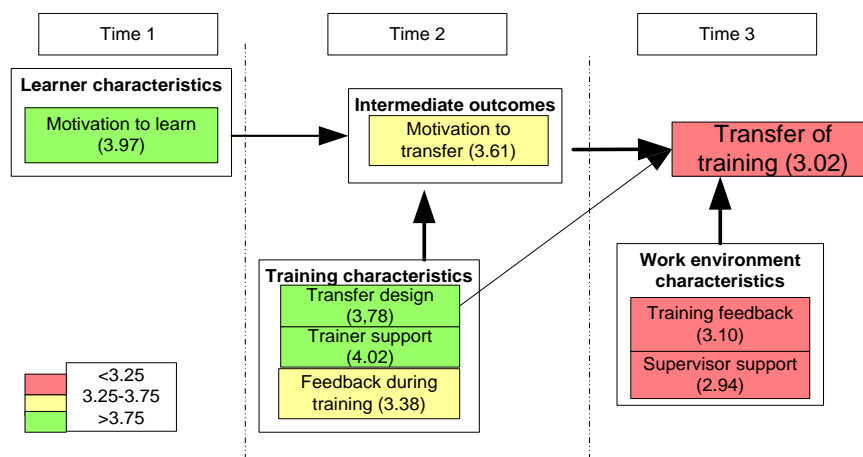
Figure 9: model transfer process cross-sectional study

Results showed that the motivation to transfer is the most important predictor of transfer of training in this study. Comparable with trainee group 1, transfer design, trainer support, and feedback during training are strongly associated with the intermediate training outcome. However, in this study transfer design is also directly related to transfer of training. Just like trainee group 1, improvement opportunities are necessary in the feedback during training for especially technical training programs.

Due to the measurement of transfer of training a longer time period after the training program, it is interesting to observe the outcomes of transfer of training and work environment characteristics. Both trainee group 1 and trainee group 2 observe that feedback on training in the work setting is a crucial factor to enhance transfer of training. In trainee group 2, supervisor support is a significant predictor of transfer of training. The trainees judge the support of the supervisor as low and consequently the supervisor support in the work environment should be improved. Although, trainee group 2 observes a lower transfer of training within both the technical and soft-skill training programs than trainee group 1, this comparison must be made with care due to the different measurement of transfer of training and input characteristics (learner, training, and work environment).

From trainers' and supervisors' perspective respectively the training and work environment characteristics are investigated. Results of the trainee-trainer comparison showed that the estimates of feedback during training and transfer design (marginally) significantly differ between the two depending groups with especially difference for feedback during training. A possible reason may be that trainers who observe at the group as a whole notice more interactions and feedback conversations during the training program in comparison with the

trainee who observe the trainer and trainee group in feedback conversations with himself/herself. Another reason may be an overestimation of the trainers due to giving feedback to a part of the training group. In sum, internal trainers of VI should become aware of this difference in view and should adjust the feedback during the training program in such a way that it corresponds with the trainees' perspective. In addition, Hutchins (2008) suggests that trainers should be aware of the alignment of training and personal goals of the trainees.

For the majority of work environment variables, it can be concluded that both trainees and supervisors similarly interpret the work setting. Only the variable 'openness to change work environment' does strongly differ between the groups. Looking in-depth to this difference, a possible reason may be that, in comparison with trainees, supervisors observe it is harder to encourage the whole work groups' willingness to invest energy to change their work behavior. This result must be taken into account when implementing the practical recommendations in the work setting because the supervisor can influence the extent of transfer back to the appropriate setting (Holton, 1996).

Overall, the results of this study provide opportunities to improve the learner, training, and work environment characteristics and practical recommendations in every time period (before, during, and after training) are made to improve transfer of training within VI.

5.2 Recommendations and implications

In this section, the opportunities to improve are discussed and the answers are given to the research question 5 and 6 (What kind of changes with respect to trainee, trainer, training, and work environment characteristics will improve transfer at VI?; How to implement these most important changes?).

5.2.1 Practical recommendation for VI

For successful transfer of training it is important that within the learner, training, and work environment characteristics the conditions are available to obtain the highest learning and transfer performance. Learning and transferring must be seen as a process and therefore before, during, and after the training process practical actions should be taken to make the training program more beneficial (Aguinis and Kraiger, 2009). Based on the preceding analysis and overview of results, recommendations are derived to improve transfer of training within VI.

1. Develop interactive (technical) training programs (exercises, team work, cases) with longer duration and provide feedback during training

Interventions during training programs should focus on the training characteristics and eventually on the intermediate outcomes motivation to transfer, transfer effort, and fulfillment expectations to improve learning and expertise. The interventions are especially important for technical and H&S training programs that should provide more feedback and be more interactive in their training design/methodology (i.e. cases, role play, exercises, team work). In the training design, it is important that the training can be outlined and applied across a range of problems or situations. The trainer should capture the trainee's attention, such as presenting job-related problems that trainees have written down in their training application form or provide exercises that trainees must executed within teams (Giangreco et al., 2009). In this case, the trainer can provide more feedback about the accuracy of the trainee's knowledge structures (i.e. this provides the trainee an awareness of their training needs), and direct the trainee's attention to similar examples in order to make connections across different situations. These practical cases during the technical and H&S training programs lead to more feedback between the trainer and trainees, and mutually between the trainees. It must be noticed that the trainee-trainer comparison showed a difference in perspective between these two groups. Trainers should be made aware that they must provide feedback to every trainee in the trainee group.

Just before the training program starts, the trainers should ensure that all trainees have clear, short-term learning goals for the training program and longer-term goals that focus on the applicability and maintenance of the training content. To improve the transfer effort and motivation to transfer, the trainer can stimulate the trainees to ask about their transfer intentions. Questions like 'what is the first thing you are going to apply when you return on the job' and 'what specific goals do you have for the maintenance of your skills' (Machin, 2002). These transfer intentions are important for all training types (i.e. soft-skills, technical, and H&S training programs).

A side-effect of improving the training characteristics (feedback during training) and intermediate training outcomes (transfer effort, motivation to transfer) may be a longer training length. In this moment in time, the technical and H&S training programs have a short duration (3 till 8 hours). However, results showed that training programs with a longer duration are positively associated with transfer of training and the shorter training programs have far less transfer results within VI. As a result, one can stated that VI should reduce the number of technical and H&S training programs with short training duration and VI should develop technical training programs with longer duration and including practical cases to provide more feedback and an interactive training design. As a result, the motivation to transfer and the expectation that effort devoted to transferring learning will lead to changes in job performance.

2. Stimulate coaching in work setting (focus on applicability)

Post-training interventions should focus on performance coaching and support of peers. The involvement of the working group is important in the applicability of learned KSA. This group can be supportive thorough reducing the situational constraints (i.e. lack of time or opportunity to perform the learned tasks) that may prevent trainees from transferring their training and the group can be supportive thorough helping or listening to the trainees' training experiences. In this case, the working group needs to be aware of the fact that a group member has participated in a training program or the other way around, the trainee should tell the working group whether the training program was or was not useful for him/her and thus, whether the training program was useful for the colleagues. The trainer can indirectly play a role in stimulating the working group. Trainers can ask questions trainees in the end of training about how trainees will involve their colleagues in their applicability of learned KSA.

Also, the involvement of the supervisor in the trainees' transfer of training is an important factor to increase performance coaching and peer support. For instance, a supervisor can ask 'which skills presented in the training program have helped you to improve your job performance' and 'in which way you have changed your job behavior in order to be consistent with the material taught in training courses' (Machin, 2002). These interventions of training feedback and supervisor support can be stimulated in short evaluation conversations between both groups. Also, the mid-year review form and the assessment form can be helpful to check the profitability of the training program for the trainee. In these forms (i.e. conversations), the above-outlined questions can be asked and consequently supervisors find out the trainees' reactions to previous training program they have participated (Tannenbaum et al., 1993).

VI must be aware of the fact that a perceived lack of management support for the transfer of training process or a perception that the transfer of trainees' training is of little value to the organization, will result in little incentives for trainees to invest the effort required to master the content of the training (Machin, 2002). In addition, supervisors should be aware that the estimates of openness to change the work environment suggest that the working group is more willing to invest energy to change their work behavior than supervisors themselves observe.

Furthermore, a trainees' checklist can be developed to follow the progress of the applicability and maintenance of the learned KSA. In this way the organization support the employee to think

about their transfer of learned KSA (i.e. how often trainees practice the tasks) (Machin, 2002). Obviously, refresher trainings help the trainee with the usability of learned KSA that may disappear over time. A refresher meeting stimulates the trainees again the think about transfer of training and provides trainers the opportunity to become aware of their training transfer and possible practical improvements of the training program (Baldwin and Ford, 1988). In addition, the organization can provide positive reinforcements to those trainees who demonstrate better performance through the transfer of their training, and making a link between trainees' transfer of training and their access to further training as well as their future job success (Machin, 2002).

3. <u>Increase training expectations and emphasize training value for organization</u>

The important factors before the training starts are the goal setting variables, training expectations, and motivation to learn. Where possible, trainees should be consulted and assisted by the Vanderlande Academy and their supervisor about decisions regarding their attendance, goal setting, and motivation in the training courses. As suggested by Machin (2002), these decisions should include whether they need to attend, why the course is suitable for them, why the course is important for the organization, what they can expect, and what the benefits will be in terms of their work performance. These decisions should be made in the personal development plan of each VI employee. In addition, trainees should be allowed to develop their own practical case for specific job-related training program. This practical case is important for the trainees' involvement in the training program. An organization must be aware of the similarity between the training content and materials to those used in their regular job (Hutchins, 2009).

Furthermore, the provision of information about the nature of the training programs should help trainees to develop realistic expectation, to set clear learning goals, and to get motivated to learn. Within VI, several forms (i.e. training application form, training catalogue, mid-year review form, and assessment form) can play an important role to support employees to think about their goal setting, motivation, and training expectations. In these forms questions like 'how training would enhance trainees' personal skills that are essential to their performance at work' and 'how training would increase the trainees' control over their work demands, or give trainees greater flexibility in how they perform their main tasks' should increase pre-thinking about the training content (Machin, 2002).

The role of supervisors is important in assisting prospective trainees to establish realistic expectations, set clear goals, and get motivated to learn for the specific training (Machin, 2002). The forms within VI should help supervisors to judge whether the trainee will participate in the training that is needed at that time, whether the training fits the job-related developments, and whether the trainee set clear goals and have realistic expectations (i.e. to master each component skills taught in the training program, to actively practice new skills at the first opportunity, and to keep looking for opportunities to apply the skills across a range of settings). To enhance the pre-training variables, the job application form that is filled in by the prospective trainee and his/her supervisor should be controlled and judged whether the trainee had seriously considered the training choice.

In Appendix C, the practical actions for VI to enhance transfer of training are listed per time period (before, during, and after training) and per stakeholder (trainees, trainers, supervisors, and Vanderlande Academy. Based on the conclusions and practical recommendations, an answered is provided on the central research question (i.e. '*how to organize the input characteristics (i.e. learner characteristics, training characteristics, and work characteristics) in order to improve the application of learned KSA in the work setting?*'). In short, one can state that the training expectations and goal setting variables should be improved before training program starts for every training program, the training characteristics should be improved especially for technical and H&S training programs to enhance trainees' transfer effort and motivation to transfer, and the supportive work environment characteristics (i.e. peer support

and performance coaching) should be improved for every training type. The degree of feasibility of the recommendations is different along the input characteristics. Obviously, adjustments within the several VI forms of these forms are 'easy' to implement. However, there is less control over the employees who fill in these forms. Due to controlling, judging, and even sending back the filled in forms to the sender can result in positive transfer changes. Changes within the training and work environment characteristics are harder to implement due to the involvement of a lot of different people. The trainers should together with the Vanderlande Academy redesign the shorter and less interactive training programs. Although this redesigning of the training programs will take time and effort, making trainers aware of the fact that they should more focus on the transfer of training process and the less performing variables during training should be easier. Improving the supportive work environment characteristics should be the hardest implementation issue because it is hard to control and involve whole working groups and supervisors with the trainees' transfer of training process. Nevertheless, this involvement can be stimulated through practical actions in the work setting (see Appendix C).

5.2.2 Quick scan for future analyses about the transfer process

To assess whether transfer of training and the relevant input characteristics have improved after implementing the recommendations, to become aware of more development trends within VI, or to measure transfer of training over time, a quick scan is developed. The quick scan is helpful to determine what kind of changes with respect to trainee, training, and work environment characteristics have occurred or have not occurred after implementing the practical recommendations. This quick scan specially focuses on the relevant independent factors in the transfer of training process within VI (Table 21) and includes all factors that should change due to implementing the practical recommendations. All included variables have significant relationships with respectively the intermediate outcomes transfer effort, motivation to transfer, and fulfillment expectations as well as transfer of training.

Time 1	Time 2	Time 3
Control variables - Type of training - Length of training - Reason to learn - Content experience **Learner characteristics** - Training expectations - Learning goals - Goal clarity - Motivation to learn	**Learner characteristics** - Fulfillment expectations - Motivation to transfer - Transfer effort **Training characteristics** - Trainer support and experience - Transfer design - Feedback during training	**Work environment characteristics** - Training feedback - Supervisor support - Peer support - Opportunity to use learning - Openness to change in work environment - Personal capacity for transfer - **Transfer of training**

Table 21: Quick scan factors

In order to study development trends in transfer of training and to observe individual differences, a longitudinal design with three data collection points were used (i.e. research design trainee group 1). To ensure that the time lag between the second and third data collection point is long enough to observe full transfer of training, the third questionnaire should be measured at least four weeks after the training program. Obviously, the choice of this time lag also depends on the objectives of the quick scan. A manual has been written for VI about how to administer the quick scan (i.e. transfer process). Subsequently, the Vanderlande Academy can adapt and if necessary re-organize the input characteristics in order to enhance transfer of training.

5.3 Limitations and future research

The study showed the significant associations and predictors of the transfer of training process. Notwithstanding, the study has some limitations that should be noted. The first limitation concerns the time lag after training within the longitudinal study to apply the learned KSA on

the job. Although this limitation was captured with the cross-sectional study that investigate transfer of transfer after two till six months, a longitudinal research design over a longer period increases the possibility to observe full transfer (i.e. possibility and opportunity to apply and maintain learned KSA).

Another limitation was the independent measurement of the trainee-supervisor group. Within the project-based company VI, the group/team leaders play an important role in the motivation variables and supportive environment factors; however, not in every case these team leaders assess the trainees on their work performance. As a result, different types of supervisors provide a good insight in the work environment but were independently connected with the trainees.

A third limitation was the data of trainer group that was based on a limited sample size. As a result, the possibility of sampling-errors was higher in the relationships between the trainee-trainer training characteristics. The fourth limitation is concerned with the generalizability of the study findings. Inferences can only be made with regard to the specific VI environment. Future research may extend the generalizability of the study findings by, for instance, examining different populations and organizational settings. It may be interesting to observe whether the study research can be confirmed within comparable organizational setting as VI (i.e. technical project-based company).

Besides these limitations, directions for future research will be given related to the current study and directions will be given for the research field in general. The current study could not investigate the degree of transfer of training over time. However, it should be interesting to again investigate the extent of application and maintenance of learned KSA of trainee group 1 over a certain time period (over six months till one year). As a result, VI can identify the developments of the input characteristics and transfer of training per type of training (or individual) over a longer time period.

To maximize learning and transferring, the role of the trainer and supervisor within the transfer of training process can be expounded with respect to the training and work environment characteristics. The supervisors and team leaders are the key stakeholders who can influence a supportive transfer climate within their working group (Burke and Hutchins, 2007). This supervisor role should be extended with a special focus towards the learner characteristics (i.e. transfer effort and personality factors). In addition, the trainers' role should be extended towards motivation to learn, motivation to transfer, and the instructional designs and methods within VI classroom learning (Brown and McCracken, 2009).

According to the transfer of training literature (Colquitt et al., 2000; Burke and Hutchins, 2007), also the personality factors play a crucial role in transferring the learned KSA to the work setting. It should be interesting to evaluate how to compose a trainee group with regard to these personality characteristics to enhance the training outcomes and transfer of training. In addition, the homogeneity of the trainee group with respect to how trainees may use and apply of the learned KSA in the job could be interesting research point. Furthermore, the work environment characteristics could be investigated before training (Time 1) and in the work setting (Time 3) to study work environmental development trends in the transfer of training process and to observe individual differences. Finally a further research direction is that transfer of training could be measured within training programs that differ in their instructional methods and tools (i.e. over-learning, self-management strategies, and technological support). Findings do not provide confirmed support that these learning methods produce superior transfer relative to traditional instruction approaches (Ford et al, 1998). Therefore, more investigation is needed to decrease the research to practice gap for these factors that possibly impact transfer of training.

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Appendix A: Internal consistency of scales

All scales were checked for reliability using the Cronbachs alpha (α) test which provides a measure for the internal consistency of a scale. In Table 22 can be seen that most scales were found internally consistent with alpha's.

	Variables	#Items	α	Example question:
TIME 1	Self-efficacy	10	0.657	I can always manage to solve difficult problems if I try hard enough'
	Motivation to learn	14	0.779	I enjoy training programs that help me to develop knowledge and skills that will be useful to me in my work.'
	Learning goals	5	0.753	'It is easy for me to stick to my aims and accomplish my goals.'
	Clarity of training goals	3	0.805	'I am willing to select a challenging work assignment that I can learn a lot from.'
	Career planning	6	0.792	'I have not really decided what my career objectives should be yet.'
	Training expectations	4	0.836	'I fully understand what I am supposed to do in this training course.'
TIME 2	Motivation to transfer	4	0.756	'Training will increase personal productivity.'
	Goal mastery	3	0.610	'I want to learn as much as possible from this training'
	Fulfillment expect.	4	0.668	'The training has fulfilled my expectations that I had before training.'
	Transfer design	4	0.750	'During the training I got feedback from other training participants about the way I was applying the new knowledge and skills.'
	Feedback during training	4	0.778	'The trainer has the ability to treat the subjects of the training in a good way.'
	Trainer support & experience	6	0.803	'The activities and exercises the trainers used helped me know how to apply my learning on the job.'
	Performance self-efficacy	4	0.761	'I am confident in my ability to use new skills at work.'
	Transfer effort	4	0.602	'My job performance improves when I use new things that I have learned.'
	Performance-outcome expectations	4	0.661	'The organization does not really value my performance.'
TIME 3	Performance coaching	3	0.618	'I regularly have conversations with people about how to improve my performance.'
	Peer support	4	0.711	'My colleagues appreciate my using new skills I have learned in training.'
	Supervisor support	6	0.766	'My supervisor lets me know I am doing a good job when I use my training.'
	Accountability	10	0.645	'It is my responsibility to apply what I learn in training when I return to work.
	Openness to change in work environment	6	0.663	'People in my group generally prefer to use existing methods, rather than try new methods learned in training.'
	Personal capacity for transfer	4	0.612	'I have time in my schedule to change the way I do things to fit my new learning.'
	Opportunity to use learning (barriers)	4	0.618	'The resources I need to use what I learned will be available to me after training.'
	Transfer of training	4	0.792	(see section: factor analysis)

Table 22: Internal consistency of scales and example question

Appendix B: Moderation effects in longitudinal study

The first part of the transfer process moderation model is depicted in Figure 10. Overall, 108 interaction effects (i.e. 6x3x6) were analyzed.
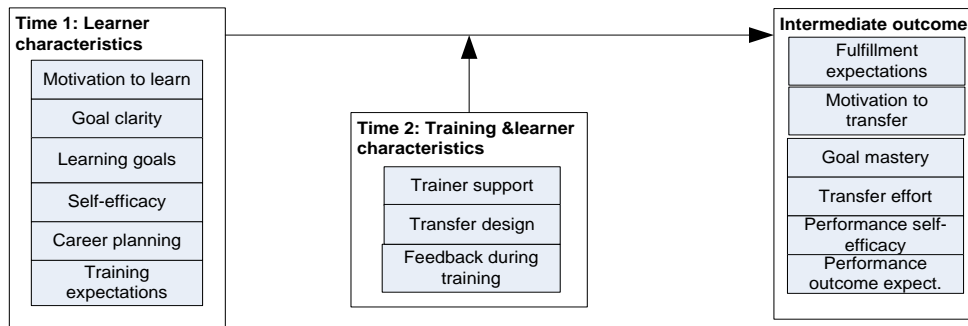

Figure 10: research model (part 1)

Table 23 shows the results from the hierarchical regression models of the intermediate outcomes with the leaner and training moderation terms. The results showed four significant interaction terms in this first part of the analysis (i.e. p<.01; p<05).

A moderation effect resulting in fulfillment expectations showed that trainees with low self-efficacy will benefit from a strong transfer design. The transfer design plays a less important role as the self-efficacy of the trainee is high. This moderation effect is also found with motivation to transfer as dependent variable. Furthermore, results showed that setting clear goals have a stronger effect on fulfillment expectations when transfer design is high. Also a moderation effect is found with performance self-efficacy as outcome variable. The effect of self-efficacy on performance self-efficacy is stronger when the feedback during training is high. Especially, trainees with low self-efficacy will benefit from feedback during training.

Dependent variable: Fulfillment expectations				Dependent variable: Motivation to transfer			
Variable	**B**	**SE B**	**β**	**Variable**	**B**	**SE B**	**β**
Step 1				*Step 1*			
Self-efficacy	0,05	0,13	0,03	Self-efficacy	0,19	0,15	0,10
Transfer design	1,41 **	0,20	0,52	Transfer design	1,46 **	0,24	0,47
Step 2				*Step 2*			
Self-efficacy	-2,21 *	1,03	-1,30	Self-efficacy	-3,47 **	1,20	-1,79
Transfer design	6,90 **	2,50	-2,54	Transfer design	10,38 **	2,92	3,33
Self-efficacy * transfer design	-1,42 *	0,65	-2,56	Self-efficacy * transfer design	-2,31 **	0,76	-3,62
ΔR2	0,03			ΔR2	0,05		
Dependent variable: Fulfillment expectations				**Dependent variable: Performance self-efficacy**			
Variable	**B**	**SE B**	**β**	**Variable**	**B**	**SE B**	**b**
Step 1				*Step 1*			
Goal clarity	0,56	0,36	0,12	Self-efficacy	0,22 **	0,04	0,42
Transfer design	1,32 **	0,21	0,49	Feedback during training	0,04 *	0,02	0,19
Step 2				*Step 2*			
Self-efficacy	6,37 *	2,54	1,34	Self-efficacy	0,63 **	0,19	1,19
Transfer design	3,00 **	0,76	1,11	Feedback during training	0,56 *	0,24	2,52
Self-efficacy * transfer design	3,79 *	1,64	1,51	Self-efficacy * feedback during tr	-0,13 *	0,06	-2,34
ΔR2	0,03			ΔR2	0,03		

*Table 23: Coefficients moderation analysis (part I)*

For illustrative purposes, the significant interaction effects were graphically represented in the picture below according to the method described by Aiken and West (1991). Values of the predictor variables (i.e. Time 1: learner characteristics) were chosen one standard deviation

above and below the mean. Looking at the first picture, the regression lines are representing respondents, which have low self-efficacy and high self-efficacy respectively. The interaction effect was computed as the product of self-efficacy and transfer design.

Dependent variable (intermediate outcome): Fulfillment expectations
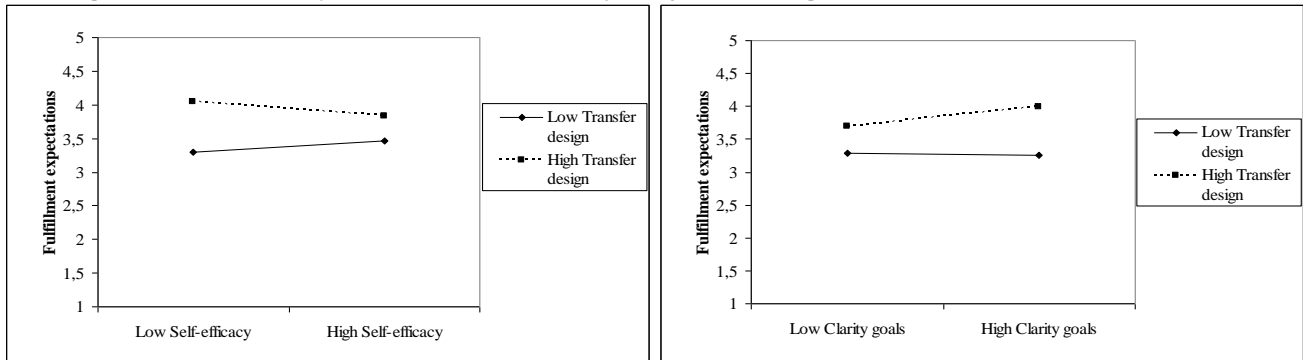
Dependent variable: Motivation to transfer   Dependent variable: Performance self-efficacy
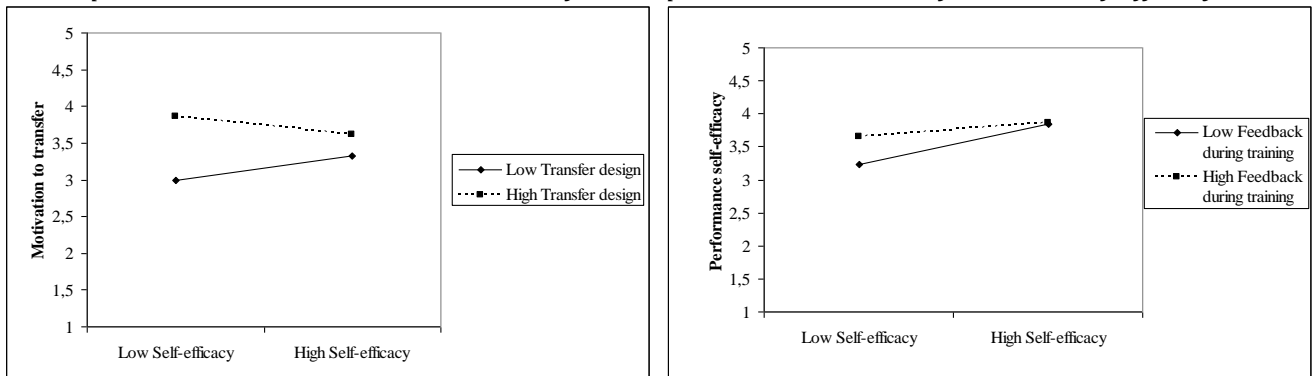
The second part of the transfer process moderation model is depicted in Figure 11. Overall, 54 interaction effects (i.e. 6x9x1) were analyzed.
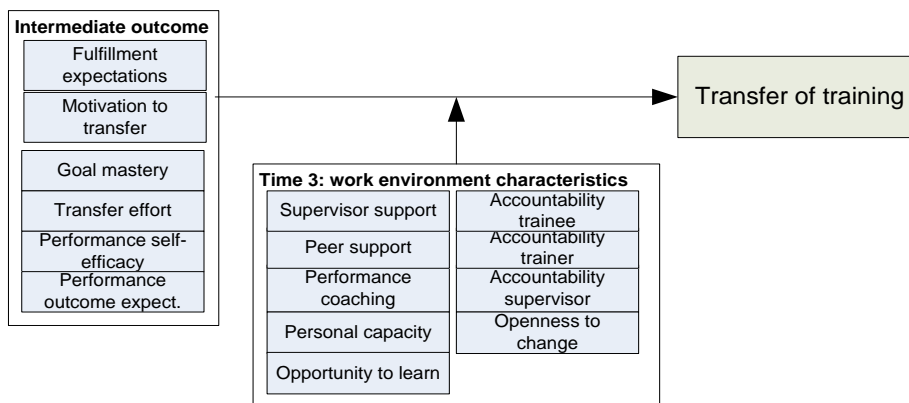
Figure 11: research model (part 2)

Table 24 shows the results from the hierarchical regression models of transfer of training with the intermediate outcomes and work environment moderation terms. One significant interaction effect is found for transfer of training. Transfer effort was positively related with transfer of training and this relationship was stronger when the accountability of the trainer is low.

Dependent variable: Transfer of training			
Variable	B	SE B	β
Step 1			
Transfer effort	1,49 **	0,41	0,30
Accountability trainer	0,05	0,09	0,05
Step 2			
Transfer effort	4,09 **	1,16	0,82
Accountability trainer	-2,10 *	0,90	-1,95
Transfer effort * Accountability trainer	-1,47 *	0,62	-2,05
ΔR2	0,04		

Table 24: Coefficients moderation analysis (part II)
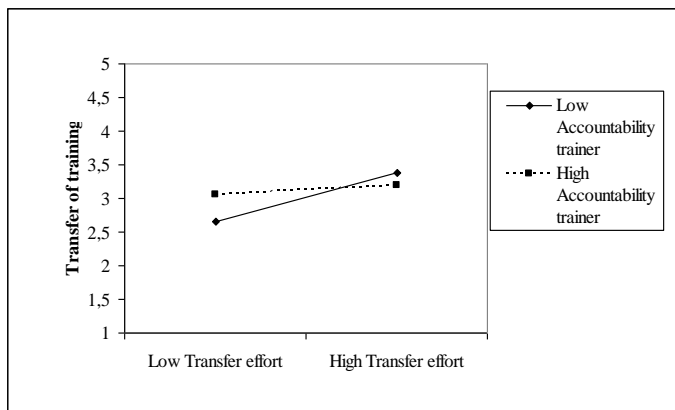
Appendix C: Practical actions to enhance transfer of training

In Table 25, the practical actions for VI to enhance transfer of training are listed per time period (before, during, and after training) and per stakeholder (trainees, trainers, supervisors, and Vanderlande Academy). The recommendations are listed in order of importance (Table 25).

	Before training program	During training program	In work setting

Trainees	1. Obtain realistic expectations
	2. Reasons to learn
	3. Set clear goals
	4. Compose a job-related case
	  - Choose training that fit your personal development plan (POP)
	  - Sufficiently fill in training application form
	  - Read carefully training catalogue
	5. Make colleagues aware of training participation
		1. Actively participate during training program
		  - Involve other trainees with training content
		2. Ask feedback about cases and your personal applicability of the learned KSA (transfer intentions)
		3. Get motivated and obtain expectations how to apply learned KSA in the job
			1. Involve peers with transferring of learned KSA
			2. Asked peers and supervisor to provide feedback

Trainers	1. Just before training remember trainees of their expectations goal setting
	  - Know the training expectations of the trainee group
	  - Ensure that trainees have short-term training goals
	  - Ensure that trainees have long-term applicability goals
		1. Provide during feedback about cases, exercises, and applicability of KSA in work situation
		  - Give trainee confidence and motivation about applicability in work setting
		2. Included team work, exercises, practical cases in training program
		  - Explain applicability of training across range of situations
		3. Evaluate training and ask about transfer intentions
		  - Ask trainees about their implementation plans
		  - Focus on applicability of learned KSA
		  - Ask trainees to involve colleagues with transferring KSA
		  - Ask feedback about training method and case
			1. Contact person for questions about applicability
			2. Refresher meeting after 3 till 6 months

Super-visors	1. Assist prospective trainees in their training decisions
	  - Conversation regarding the training application form and job-related case
	  - Think together with trainee about the applicability of learned KSA
	2. Make whole working group aware of training participation of group member(s)
		1. Ask trainee about their opinion during training programs that last several days	1. Stimulate coaching in work situation (focus on applicability)
			  - Involvement of peers in trainees' learned KSA
			  - Help trainee with transfer learned KSA
			  - Reduce situational constraints
			2. Short training evaluation conversation between supervisor and trainee
			3. Evaluate transfer of training in mid-year review and assessment conversations

	Before training program	During training program	In work setting

VI Academy	1. Adjust application form
	  - Focus on expectations, reason to learn, setting clear (SMART) goals, job related case, achievements
	2. Provision of information about training
	  - Clear description of training in training catalogue (also ask external trainer for training description)
	  - emphasize training value for organization, work applicability's
	3. Control filled in forms to judge whether trainees make a justified decision to participate
		1. Develop together with trainer interactive training programs with longer duration
		  - Improve especially technical and H&S training programs
		  - Exercises, team work, practical cases
		2. Involve external training partners regarding training changes
		  - Focus on transfer intentions, confidence to apply learned KSA, feedback on cases/training, and motivation to transfer
			1. Compose (online) checklist to follow transfer progress
			  - Remember trainees about their transfer intentions
			2. Link transfer of training to organizational values (eager to learn)
			3. Refresher meeting for external training

Table 25: Interventions to improve the transfer of training process