

## MASTER

### An assessment tool to evaluate the effectiveness of training programs at Vanderlande

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Eindhoven, November 2015

# An Assessment Tool to evaluate the Effectiveness of Training Programs at Vanderlande

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## **ABSTRACT**

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Training evaluation is a systematic process of assessing the potential value of a training program, course or an activity. The results of evaluation can further be used as decision-making guide across various components of the training such as the design, delivery and the results. This master thesis project describes the result of an interesting seven month graduation project at Vanderlande Industries, Veghel, The Netherlands where the primary aim was to design an evaluation tool/process to assess the effectiveness of offered training programs.

The aim of the research was addressed by the following objectives:

- To determine the characteristics of training that result in positive reactions (the degree to which participants react favorable to the training), learning, effective behavior and results.
- To optimize the content of the feedback evaluation training form to effectively capture trainees' perceptions about the training program.
- To present guidelines for designing a user friendly, validation/measurement tool to measure the effectiveness of the offered training programs.

The key step involves the design of an improved evaluation questionnaire with factors from the literature and the needs of the Vanderlande Academy. Also, on the basis of a detailed analysis of the training programs at Vanderlande, best practices and further recommendations were proposed to improve the feedback evaluation system which highlights user perceptions about the training program.

## **PREFACE**

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Let me start my preface with a special thanks to my company supervisor Mr Dirk-Jan Verheijden, manager of the Vanderlande Academy for providing me such a wonderful opportunity to carry out my internship at the Vanderlande Academy. A special mention to my first supervisor, Dr Ad Kleingeld, I feel that I am very fortunate to be under his supervision. He was extremely cooperative and patient with me throughout my time at Tu/e and I cannot imagine a better supervisor than him. A special thanks to Dr Sonja Rispens for her support and feedback during the critical phases of the thesis. I thank my wonderful parents for their immense motivation and support during the phase of my thesis. A special thanks to Romy van den Hoven for her assistance with the Learning Management System. A special mention to all the members of the Academy, Ellen Daamen, Maikel van Dorst, Nick Beurskens, Lydia Neijs, Bart van der Meijden, Marleen Kerkhof and Nicole Schmidt for their extensive support and care during my thesis. A special mention to Lydia Neijs and all the member of the Academy to surprise me with a nephew card. I also would like thank Niek Kleijnen for his meeting on providing suggestions to improve the response rate for the pilot survey. I thank Vincent van Leeuwen for prepping me up for a killer presentation. A special thanks to Stephan van Bijnen, Sylvester Split, and Dieuwer Boerma for taking their time to answer my questions regarding the feedback evaluation pilot study. I sincerely thank Tessa Brand, Elsa Buijssen, and Sjoerd van der Horst for their support during my thesis. I thank you all once again.

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Eindhoven, November 2015

Pradeep Radhakrishnan

## **MANAGEMENT SUMMARY**

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### **Research Context**

Training is one of the most pervasive methods for enhancing the productivity of individuals and communicating organizational goals to new personnel. Given the importance and potential impact of training on organizations and the costs associated with the development and implementation of training, it is important that both researchers and practitioners have a better understanding of the relationship between design, evaluation features and the effectiveness of training & development efforts (Arthur et al, 2003). In this study, the factors and items corresponding to the pre training, actual and the post training phases are included in the feedback evaluation survey, which ultimately contributes towards capturing a trainees' perception in a way that helps to enhance the effectiveness of the evaluation of a training program.

### **Research objectives**

The purpose of the study is to develop an automated evaluation tool to predict the effectiveness of the training programs offered at Vanderlande. The central idea is illustrated using the three key objectives mentioned below.

1. To determine the characteristics of training that result in positive reactions (the degree to which participants react favorably to the training), learning, effective behavior and to construct an evaluation system with a defined set of factors and items that can be used to evaluate the effectiveness of the training program.
2. To optimize the content of the training feedback evaluation form to effectively capture trainee perceptions about the training program.
3. To present guidelines for designing a user-friendly, automated validation/ measurement tool to measure the effectiveness of the offered training programs.

In order to achieve the objectives of the study, the project is guided by 3 research questions:

- RQ1. What are the key factors that are needed to be added in the evaluation tool?
- RQ2. How to focus on the design of the course feedback evaluation form?
- RQ3. What are the design guidelines of the validated evaluation tool/process?

### **Data Analysis & Results**

#### **Research Question 1**

Table 1 illustrates the three phases of training along with the corresponding factors and items considered for the feedback evaluation pilot study. The factors under each phase are provided in "Appendix II: Initial set of questions for the feedback evaluation pilot study".

*Table 1: Initial set of factors for the feedback evaluation pilot study.*

<b>Phase</b>	<b>Pre-training phase</b>	<b>Actual training phase</b>	<b>Post training phase</b>
<i>Factors</i>	Relevance of the training program Training expectations Goal Clarity	Enjoyment of the training program Content of the training Method of the training Trainer support Fulfillment expectations Feedback Transfer design	Cognitive learning Performance self-efficacy Training performance Motivation to transfer
<i># of items</i>	9	27	15

Analysis of the data using statistical procedures such as Exploratory factor analysis, correlation and regression analysis results in a model with a final set of 7 factors that accounts for 51.6% of the variance in the overall rating of the training program mentioned in table 2 below.

**Table 2: Results of regression analysis**

<b>Model</b>	<b>Sig.</b>	<b>Collinearity Statistics</b>	
		<b>Tolerance</b>	<b>VIF</b>
(Constant)	.995		
Training Expectations	.011	.579	1.728
Goal Clarity	.067	.605	1.653
Practice and Feedback	.035	.514	1.947
Trainer Support	.000	.668	1.497
Up to date Content	.766	.692	1.444
Performance Self Efficacy	.000	.386	2.593
Impact on work performance	.647	.505	1.980

### **Research Question 2**

RQ2 retrieves the design requirements of a valid and reliable feedback evaluation questionnaire from literature (Radhakrishnan, 2015) and incorporates them into the design of a feedback evaluation pilot study combined with the needs of the Academy. The questions for the pilot study are obtained from reliable sources such as LTSI (Learning Transfer System Inventory), Lee et al (1991), and Giangreco et al. (2009). Moreover, this section illustrates the drawbacks of the old evaluation questionnaire in terms of content, measurement scales and statistical procedures were used to verify the new evaluation form is more reliable, valid and serves its purpose better than the existing feedback evaluation form (see Chapter 5, section 5.8).

### **Research Question 3**

RQ3 illustrates the flaws that exist in the current Learning Management System (LMS). Then the design guidelines for the new evaluation tool/process was illustrated in Chapter: 6 keeping in mind the needs of the Vanderlande Academy. Based on the results of the feedback evaluation form, plausible goals were provided to the Academy, illustrating multiple ways with which the results of the evaluation form could be used to infer meaningful results.

## **Recommendations for the Vanderlande Academy**

The analysis results with a valid and reliable questionnaire that predicts trainee perceptions about the training program. But before making it a representative sample for training evaluations at Vanderlande, these specific steps must be taken.

1. Test the resulting questionnaire with a large sample size and across different Vanderlande locations across the globe.
2. To reap the maximum benefits of the questionnaire, aim to measure a trainees' pre-training self-efficacy and post training performance improvement to understand the impact of the training program.
3. Focus on the qualitative answers and evaluate the derived inferences from them.

Mentioned below are the additional recommendations that the Vanderlande Academy could focus in order to sustain a good overall rating for their training program(s):

1. Focus on consistency in measuring the overall performance.
2. Focus on providing consistent trainee support post the training program.
3. Encourage managers, supervisors and team leaders to have an effective conversation with the trainer prior to the training.
4. Devise an evaluation with multiple assessment methods, assign and test them with appropriate training programs.
5. Perform a systematic analysis and with the resulting information, determine the content as well as the training standards for performance.
6. Try out innovative strategies such as error based learning to prepare the workforce to handle critical situations with confidence.



## GLOSSARY

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<b>Term</b>	<b>Definition(s)</b>
<i>Training</i>	Training is defined as the methodical acquisition of skills, concepts, rules and attitudes that result in improved performance (Goldstein, 1993).
<i>Competency</i>	A competency is a learned ability to adequately perform a task or a role.
<i>Hard skill</i>	Refer to the technical requirements of the job.
<i>Soft skill</i>	Soft skills are usually referred to as behavioral or soft skills (Garg et al, 2008), which can be described as an intangible skill that is hardly measurable and are closely linked with attitudes. (E.g.) Effective communication, leadership, teamwork, negotiation, time management.
<i>Training evaluation</i>	Training evaluation is defined as the measurement of the success/failure of the training program based on the changes in learners, content & design and organizational payoffs (Alvarez, Salas, & Garofano, 2004).
<i>Training effectiveness</i>	The study of the individual, training, and organizational characteristics that influence the training process before, during, and after training (Alvarez, Salas, & Garofano, 2004).
<i>Reliability</i>	Reliability refers to the stability of measurement over a variety of conditions in which basically the same results should be obtained (Nunnally, 1978).
<i>Validity</i>	Validity is concerned with the meaningfulness of research components. When researchers measure behaviors, they are concerned with whether they are measuring what they intended to measure (Drost, 2011).
<i>Cognitive Learning</i>	Cognitive learning is the cognitive acquisition of knowledge and is typically measured through paper-and-pencil or electronically administered tests of information taught in training (Kraiger, 2002).
<i>Training Performance</i>	Training performance is the ability to perform a newly acquired skill at the end of training, prior to transfer, and is measured through observable demonstration that a trainee can implement the knowledge acquired in training (Alvarez et al, 2004).
<i>Transfer Performance</i>	Transfer performance is behavioral changes on the job as a result of training and can be assessed via supervisor evaluations of on- the-job behavior or post training retests (Tannenbaum et al, 1993).
<i>Performance self-efficacy</i>	Defines the extent to which trainees feel confident about applying their applying their newly learnt skills at work (Holton et al , 2000)
<i>Training expectations</i>	The extent to which individuals are prepared to participate in a training program (Holton et al, 2000)
<i>Training feedback</i>	Represents the formal and the informal indicators from an organization about an employee's job performance (Holton et al, 2000)
<i>Motivation to learn</i>	A trainee's interest / desire to learn the training material (Colquitt et al, 2000)
<i>Opportunity to use learning</i>	The extent to which trainees are provides with adequate tasks on the job and resources that enables them to use the skills learnt during the training (Holton et al, 2000)

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## **1. INTRODUCTION**

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This master thesis report provides a comprehensive overview of the study conducted at the Vanderlande Academy. The aim of the assignment necessitates designing an evaluation tool by considering all the relevant factors that determine the effectiveness of the offered hard and soft skill training programs at Vanderlande.

### **1.1 About the company**

Vanderlande, founded in 1949 is dedicated to improve its business processes and strengthening its competitive position by providing effective logistic solutions in the form of automated baggage/material handling systems and the necessary accompanying services to maintain, optimize and enhance these systems (Vanderlande, 2014). Vanderlande focuses on providing efficient, reliable handling of goods in distribution centers; expresses parcel sortation facilities and baggage handling at airports (Vanderlande, 2014). Vanderlande implements its high-tech material handling systems across various locations of all sizes ranging from local sorting depots to airports and distribution centers all around the world (Vanderlande, 2014). Vanderlande focuses on maintaining a close partnership with the customer from the initial stage of the underlying business process through to the life cycle support. To help achieve this, Vanderlande has core competencies in all relevant disciplines, ranging from system design and engineering through manufacturing and supply chain management, to Information & communication technology, system integration, project management and customer services (Vanderlande, 2014). Vanderlande is a global player with its key presence in all the key locations around the world (Vanderlande, 2014). It functions through customer call centers' in many countries handling all key business operations and maintaining direct contact with its customers (Vanderlande, 2014).

Vanderlande Academy is the department within the Vanderlande Industries that is responsible for the skill development of employees by providing effective training programs (Vanderlande, 2014). The aim of Vanderlande Academy is to enhance the employees' personal development as well as their job-oriented technical knowledge, skills and abilities (KSA's).

### **1.2 Rationale for the study**

Vanderlande Academy offers a wide variety of hard and soft skill training programs that focus on employee development. Currently, external and in-house trainers provide the hard and soft skill training programs at Vanderlande, and the Academy finds it difficult to guarantee their effectiveness and transfer to the work floor. The Academy, which currently offers employee training programs at Veghel in the Netherlands, has drafted a plan to further expand its employee training programs to its subsidiaries around the globe. Training sessions are now being offered across the global subsidiaries of Vanderlande with the help of external trainers. This enforces immense pressure on the effectiveness of the delivered employee hard and soft training programs, the progress of an individual employee and the capacity of the trainer that provides the training sessions.

The current system also employs an evaluation form informally called the "Happy Sheet" to measure the effectiveness of the training program in which the results are penned down on paper

and analyzed. The Academy aims to eliminate this procedure by building an automated validation system that enables visualization and interpretation of data thereby eliminating the usage of paper. Vanderlande Academy is currently unable to quantify the effectiveness of the offered employee-training program in terms of amount of transfer achieved based on the feedback evaluation forms to a satisfactory level. Trainees are asked to fill the feedback evaluation form post training. The obtained results are such, the employees' rate the offered training as good, but it is not being translated effectively onto the work floor. This could be a serious concern if the issue persists as the training programs are to be implemented across worldwide locations. For example, measuring the performance of trainer at an international location should be as accurate as possible as a considerable amount of budget is allocated to the training program(s).

### **1.3 Research assignment**

This section highlights the objectives of the project along with the key research questions and its subsequent sub-questions that need to be answered to achieve the aim of the project. After careful consideration, the requirements of the Vanderlande Academy are outlined into 3 key research objectives. These objectives are addressed with the help of 3 research questions. Each of these research questions have a list of sub-questions under them. By providing answers to each of the sub-questions, the key aim of the project is subsequently addressed.

### **1.4 Objectives of the project**

The objectives of the project can be outlined into the following aspects:

**1. To determine the characteristics of training that result in positive reactions (the degree to which participants react favorably to the training), learning, effective behavior and to construct an evaluation system with a defined set of factors and items that can be used to evaluate the effectiveness of the training program.**

The key aim is to determine the characteristics of training evaluation that cause positive reactions, learning and effective behavior (transfer) at the workplace. The factors for the evaluation tool are derived from the models illustrated in the literature study and also based on the needs of the Vanderlande Academy. The factors derived for the evaluation form are aimed to focus on the three (pre -training, actual training and the post training) phases of the training program.

**2. Optimize the content of the training feedback evaluation form ("Happy Sheet") to effectively capture trainee perceptions about the training program.**

Post training, trainees are requested to fill in an evaluation form informally called the "Happy Sheet" where they are allowed to rate attributes such as the performance of the trainer, the content of the training etc. Currently, the manager at the Vanderlande Academy is not entirely convinced with the feedback responses obtained post training. His personal opinion is that, the current feedback surveys are dubious indicators of actual behavior and that they do not measure the actual, changing behavior/thoughts of the trainees. Hence the key aim here is optimize and validate the content of the questionnaire prompting the trainees for better responses that adhere to what the trainee's truly felt during the course of the training.

### **3. Provide design and implementation guidelines for a user-friendly, validation/measurement tool to predict the effectiveness of the offered training program.**

The current practice at the Vanderlande Academy indicates that analysis of the course evaluation feedback form “Happy Sheet”, is deemed to be time consuming. The academy aims to minimize this by creating a validation system that facilitates easier visualization and interpretation of data. The validated system should facilitate a structured analysis and comparison of the outcomes of the training programs in the Netherlands and in the subsidiaries around the globe. A detailed explanation of the functionalities of the system are discussed in the Chapter 6.

#### **1.5 Key research questions**

The key research questions for this project are addressed below.

##### **1. What are the key factors that need to be included in the evaluation tool?**

The aim is to identify the key factors that are relevant for the construction of the evaluation tool. The first step in the process is to identify the key factors in general and validate them against the two leading models (Kirkpatrick and IMTEE) used in the literature. Then, the need for factors exclusive towards hard and soft skills is affirmed by addressing the research sub-question 2. The final step involves narrowing down the relevant factors that assist in the construction of the evaluation tool. Mentioned below are the sub-questions that need to be addressed in order to arrive towards the key research questions.

1a. What are the key factors in general to be used?

1b. What are the differences between hard and soft skills with respect to the key aspects of the training program?

1c. What are the key factors that need to be included in the evaluation tool for the Vanderlande Academy?

##### **2. How to focus on the design of the course feedback evaluation form?**

This research question identifies the requirements of a reliable and a valid feedback evaluation form. The current feedback evaluation form is analyzed for its effectiveness and correctness. Since the key aim of the project is to optimize the content of the happy sheet, specific design guidelines for the proposed feedback evaluation forms are illustrated. Then the actual template of the new improved course feedback evaluation form is penned down on paper. In summary, the following sub-questions need to be addressed towards achieving this research question.

2a) What are the requirements of a valid and a reliable happy sheet?

2b) Is the current feedback evaluation form used by the Vanderlande Academy useful (Does it provide valid data for analysis)?

2c) What are the design guidelines for the new course feedback evaluation form?

2d) Does the new and improved feedback evaluation form serves its purpose better than the existing feedback evaluation form?



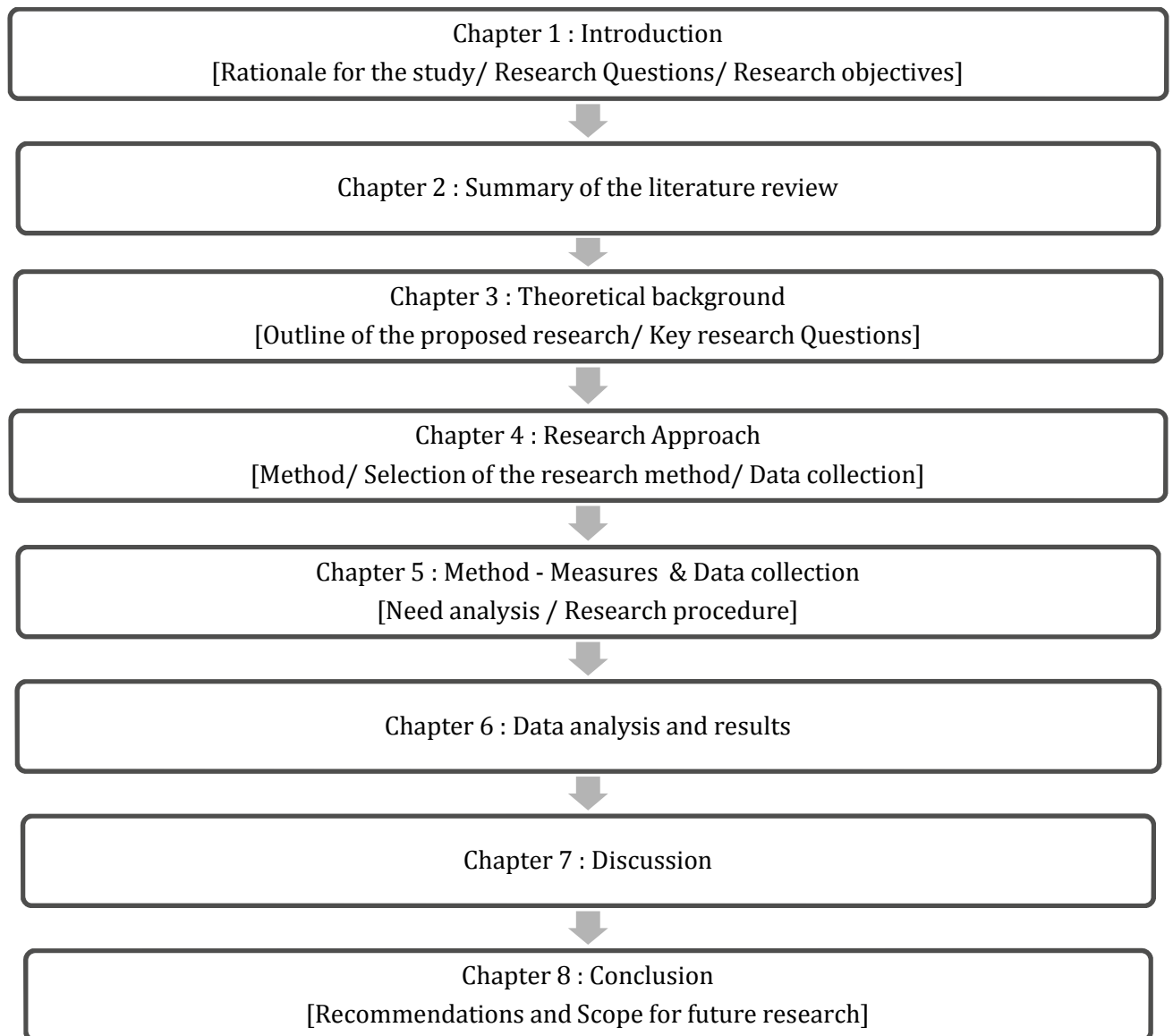
### **3. What are the design guidelines of the validated evaluation tool/ process?**

This research question analyzes the problems with the current process under existence. Then the characteristics of an effective evaluation process in terms of design, technical and functional requirements are illustrated. This section concludes with the plausible goals that could be achieved via the evaluation process that inherently benefits the Academy. In short, the key aim is to focus on addressing the following sub-questions.

- 3a) What are the inherent goals of the evaluation tool/process?
- 3b) What are the characteristics of an effective evaluation process?
- 3c) What are the problems faced in the current evaluation process?

## 1.6 Outline of the report

The outline of the report is illustrated via the flowchart mentioned below.



*Figure 1: Outline of the proposed research*

## 1.7 Conclusion

The research assignment along with the objectives of the project and the key research questions have been illustrated in this chapter. A brief summary of the literature review along with the theoretical background and the methodology used for the research are illustrated in the upcoming chapters.

## **2. SUMMARY OF THE LITERATURE REVIEW**

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This chapter illustrates the key findings of the literature review that has been carried out prior to the start of the project at the Vanderlande Academy. This section provides information for all the necessary questions that relate to the aim of the project. It starts by illustrating the need for training in organizations followed by the models (Kirkpatrick model of training evaluation and the IMTEE (Integrated model for training evaluation and effectiveness)) used to deduct the factors that need to be a part of the evaluation tool. The summary also illustrates the need for a well-structured and a validated questionnaire as one of the key aims of the project is to capture trainees' actual perceptions on a particular training program with the help of a feedback evaluation survey.

### **1. What is the need for training and development in organizations?**

The process of learning and training is necessary for achieving business objectives, and are essential to improve organizational performance. It bridges the gap between an organization's current capability and that needed to deliver the business results. From an individual point of view, it enables people to add to their stock of personal competencies and develop their full potential. In most organizations, the amount spent on training is a significant business investment. The training and development the organization needs to achieve its business goals must be efficiently identified and prioritized. Hence there is a prime need for training and development in organizations.

### **2. Is there relevant evidence whether the evaluations of hard and soft skills should differ?**

Hard skills refer to the ability that arises as a result of one's knowledge, practice and aptitude whereas soft skills refer to the non-technical, intangible skills that determine one's strength as a mediator or a leader/facilitator.

In case of hard skills, there exists less negative transfer (a less risk of skills not being transferred to the job). This is because the transfer environment for hard skills will more likely change along with the needs, because the technology and the appropriate skill required for it changes simultaneously (Laker and Powell, 2011). On the other hand most of the employees have already being trained in soft skills (communication skills) that are similar to what they are being trained now and hence they build on some behavioural patterns (Laker and Powel, 2011). Therefore, in case of soft skill training, prior experiences will be higher, but also result in an increase in negative transfer (the skills acquired via training are not transferred to the job to the desired level).

*Table 3: Differences between Hard and Soft skill training programs (Laker and Powell, 2011)*

<i>Characteristic</i>	<i>Hard-Skill Training</i>	<i>Soft-Skill Training</i>
Prior learning and experience	Less prior experience Less negative transfer	Greater prior experience Greater negative transfer
Trainee resistance to learning	Less trainee resistance	Greater trainee resistance
Organizational resistance to training	Less organizational resistance	Greater organizational resistance
Managerial support and resistance	Greater support and less resistance	Less support and greater resistance
Identification of training needs and objectives	More precise identification of training needs and objectives	Less precise identification of training needs and objectives
Immediacy and salience of feedback and consequences	More immediate and more salient on the job	Less immediate and less salient on the job
Similarity between training, work, and work environment	Greater similarity, less variety, narrower range of alternative situations	Less similarity, more variety, wider range of alternative situations
Level of proficiency (mastery) achieved in training	Greater degree of proficiency (mastery) achieved	Lesser degree of proficiency (mastery) achieved
Degree of self-efficacy achieved	Greater degree of self-efficacy achieved	Lesser degree of self-efficacy achieved
Scope of training responsibilities and methods of instruction	Hard-skill trainers and methods of instruction are frequently hard-skill specific	Soft-skill trainers and methods of instruction are frequently soft-skill specific

The characteristics of hard and soft skill training differ considerably under different dimensions and this is illustrated under “Table 3”.

Hard skill training programs tend to be more constrained, as the trainees are more likely to feel the need to be trained whereas soft skill training programs tend to be more flexible in the way it is being carried out. So, based on the results of Table 3, it is preferable to use separate evaluations for hard and soft skill training programs.

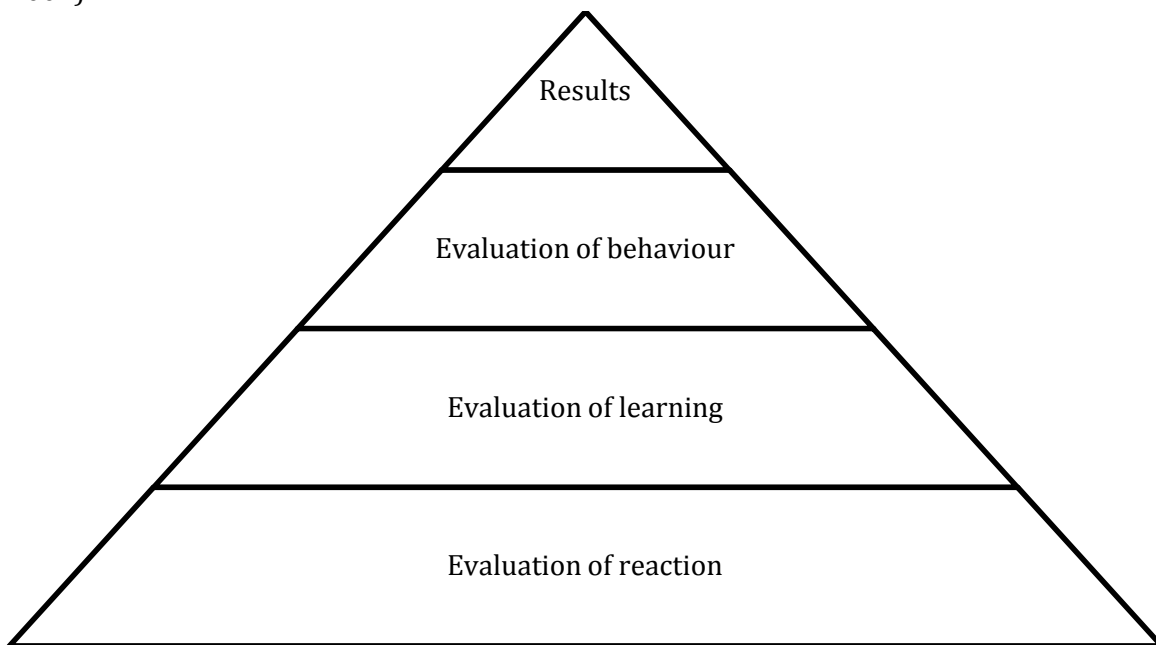
### **3. Which models are relevant to evaluate or to quantify the effectiveness of the offered training programs?**

Training evaluation is a methodological approach that focuses on learning outcomes by providing a micro view of learning results. Models such as those of Kirkpatrick, Tannenbaum, Holton and Kraiger’s fall under this category. Training effectiveness is a theoretical approach that focuses on the learning system as a whole, thus providing an extensive view of the training outcomes. The Baldwin and Ford, Holton and Baldwin, Broad and Newstrom and Tannenbaum models fall under this category. Evaluation models seek to understand the benefits of training to employees in the form of learning and enhanced on the job performance. For instance, Kirkpatrick’s model evaluates training under four dimensions (Reaction, Learning, Behavior and Results). It provides a systematic evaluation where a participant’s reaction to the training program is assessed, followed by the evaluation of the actual learning process (the learning process that occurs during the training program) to the transfer onto the job floor. Models such as those of Baldwin and Ford, Broad and Newstrom seek to benefit the organization by understanding the outcomes of the

training intervention. Effectiveness models explain why these results have occurred and provide guidelines for experts to improve training programs.

**4. Which model(s) provide a comprehensive overview of relevant factors required during this project?**

During the process of choosing the relevant factors for the study, the Kirkpatrick model for training evaluation and the IMTEE (Integrated model for training evaluation and effectiveness) were used as the baseline models as they address the relevant areas of the research under context (Radhakrishnan, 2015). Kirkpatrick’s four-levelled measurement typology, that includes reactions, learning, behavior and results, is perhaps the simplest method to understand training evaluation. The model is illustrated in Figure 2: Kirkpatrick and Kirkpatrick model (Alvarez et al, 2004).



*Figure 2: Kirkpatrick model for training evaluation (Kirkpatrick & Kirkpatrick, 2006)*

“Evaluation of reaction” includes the assessment of training participants’ reaction to the training program (Affective reactions and utility judgements) (Bates, 2004). “Evaluation of learning”, is about quantifiable indicators of learning that takes place during the training program (Knowledge retention and, Behaviour/Skill demonstration) (Bates, 2004; Alliger et al, 1998). In the Kirkpatrick model, the component “learning” is measured during training and it refers to cognitive, attitudinal and behaviour learning. “Evaluation of Behaviour” addresses the extent to which knowledge and skills gained in training are applied onto the job (Bates, 2004; Alliger et al, 1998). “Behaviour” refers to the on-the-job performance and it is measured post training. This level is also referred as the transfer of learning to the workplace. “Evaluation of results” provides insights on the impact that training had on the organizational goals and objectives (Bates, 2004). Additionally, reactions are related to learning, learning is related to behaviour and behaviour is subsequently related to results (Alvarez et al, 2004).

The IMTEE (Integrated model of training evaluation and effectiveness) model provides a comprehensive overview and addresses the relevant factors required during this project.

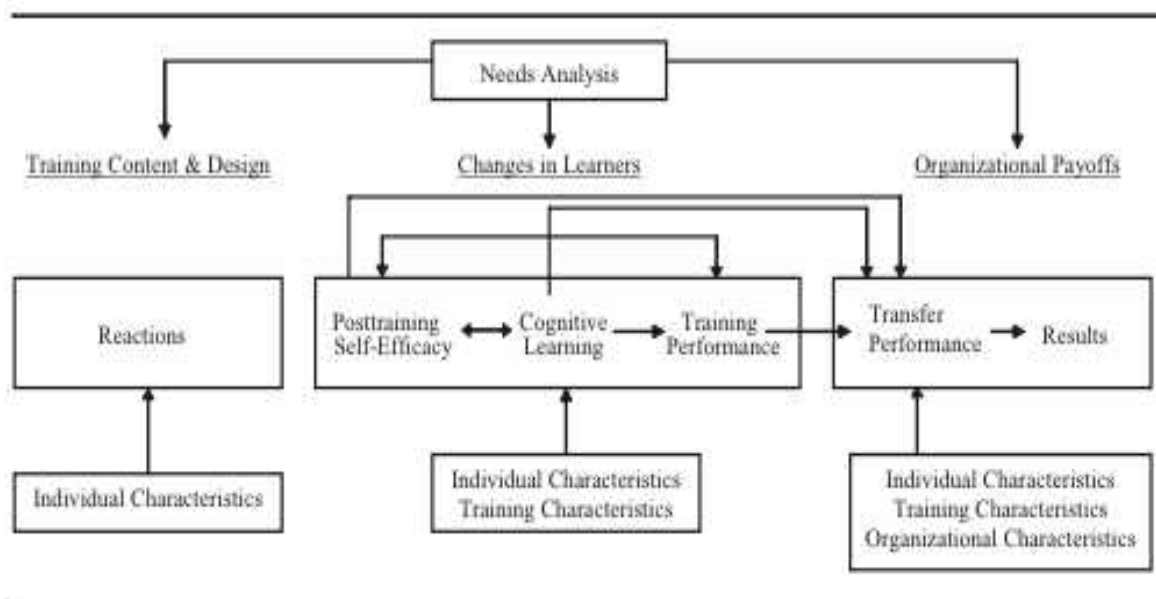


Figure 3: IMTEE model (Integrated model for training evaluation and effectiveness (Alvarez et al, 2004)

The four leveled IMTEE (Integrated Model for Training Evaluation and Effectiveness) model starts with a need analysis. The arrow from the need analysis contributes to three targets of evaluation (Training content and design, change in learners and organizational payoffs). The results of the needs analysis are used to develop training content and design that further enhances change in learners and organizational payoffs. The second and the third levels of the IMTEE model effectively combines the four important models (Kirkpatrick, Tannenbaum, Holton and Kraiger) along with its factors of training evaluation. The IMTEE is the first model, which observes relationships between post-training attitudes and effectiveness variables along with the remaining evaluation measures. Investigating on the post training attributes would further advance the knowledge on how the processes can positively enhance attitudes as well as their role in influencing training outcomes.

### 5. What are the key factors that influence transfer of training?

Factors such as the training design and delivery, individual characteristics and the work environment collectively play a role in the transfer of training to the work context. Individual characteristics such as self-efficacy (one's ability to perform well at the task), training retention (i.e.) the degree to which the trainees retain the content once the training is completed and the appropriate work environment with constructive feedback and supervisor support show a positive effect on the transfer of training to the employee's work context.

### 6. What are the factors that affect the opportunity to perform the trained tasks at a workplace?

Several significant factors in the trainee's work context can be cited as the possible determinants of the degree of transfer from the training to the job environment. Individual characteristics, work context and organizational characteristics provide a useful framework for understanding relationships to a training participants' opportunity to perform trained task at the workplace (Baldwin and Ford, 1988; Noe, 1986). Individual factors such as trainee's self-efficacy and

motivation can affect the opportunity to perform trained tasks to a significant extent (Gist, Schwoerer, & Rosen, 1989). A reporting managers' negative attitude towards a trainee may lead to assigning an unchallenging task or not allowing the trainee to practice those skills that were attained during training. Limited workgroup support and inadequate guidance to the trainee are some of the work context factors that hinder the opportunity to perform at the workplace. Also the pace at which the team operates is a major determinant of one's opportunity to perform at a workplace. For instance, trainees may have a little time to practice the more complex and difficult tasks when the pace of work demands is high in the workgroup.

## **7. What is the need for a well-structured questionnaire?**

The key purpose of the questionnaire is to help extract data from respondents. If a good structure is not maintained throughout the questionnaire, questions would be asked in a haphazard way at the discretion of the individual. Questionnaires are commonly used in need assessment, evaluating training programs and other related HR practices (Hayes, 1992; Maher and Kur, 1983; Witkin and Altschuld, 1995). They are the medium to which responses are recorded to facilitate data analysis. Efficient data analysis leads to concrete results, which in turn is the ultimate aim of the analysis. Hence a well-structured questionnaire in terms of the format, layout and content is crucial for an efficient data analysis (Radhakrishnan, 2015).

This chapter concludes with a brief summary of the literature review. The key research questions along with the outline of the proposed research is illustrated in the upcoming chapter.

### **3. OUTLINE OF THE PROPOSED RESEARCH**

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The goal of this chapter is to address the design of the research and the methods used to address the research questions. This chapter begins with an explanation of the research questions followed by a detailed explanation of the research methods and the approach used to address each of the sub-questions under each research question. This is followed by the ways and means of data collection for each specified research question. Providing a viable solution for each of the sub-questions inherently provides answers for the key research as a whole.

#### **RQ1. To identify the key factors (variables) that need to be added in the evaluation tool.**

The key aim of the research is to build an assessment tool to evaluate the effectiveness of the training programs offered at Vanderlande. In order to identify the key factors, the underlying sequence of sub-questions needs to be addressed. The initial step is to illustrate the differences between hard and soft skills based on the outcomes of the literature study. Once this step is verified, appropriate factors are selected and validated against the Kirkpatrick model and the IMTEE model (Integrated model for Training evaluation and effectiveness) (models addressed in the literature study). Finally, the factors appropriate for the evaluation tool are stated by understanding the needs of the Vanderlande Academy. Therefore, the selection of appropriate factors is carried out based on the literature and reduction to the appropriate number of factors is carried out based on the needs and the insights of the Vanderlande Academy. This latter step is carried by a series of interviews and discussions with the manager and the members of the Vanderlande Academy covering all the relevant areas of interest.

#### **1a) What are the key factors in general to be used?**

The selection of the key competencies is apportioned based on the models illustrated in the literature (i.e. Kirkpatrick model and the IMTEE model). The chosen factors are validated and linked to the model and the factors relevant to hard and soft skill training programs are listed. Under this section 1a), the factors appropriate to the model are listed in general and are later narrowed down to fit the requirements of the academy under section 1c).

#### **Based on the Kirkpatrick model**

The four levels of Kirkpatrick's evaluation model essentially measure:

Reaction – Measures how the delegates felt about the training or learning experience.

Learning – Measures the resulting increase in knowledge or capability.

Behaviour – Measures the extent of applied learning back on the job-implementation.

Results – Measures the effect on the business or environment by the trainee.

“Fig 2: Overview of the Kirkpatrick model” shown in Chapter 2: Summary of the literature review” (sub question 4), illustrates the Kirkpatrick model's structure, highlighting the evaluation description and its characteristics along with the evaluation tools and methods. The factors for the feedback evaluation pilot study listed in this section adhere to all the four levels of the Kirkpatrick's model and it is mentioned in the table below.



Table 4: Factors relative to the Kirkpatrick model (Kirkpatrick and Kirkpatrick, 2006)

<b>Reaction</b>	<b>Learning</b>	<b>Behavior</b>	<b>Results</b>
Relevance of the training program	Training Expectations	Transfer effort (Willingness to Implement at task)	Personal capacity of Transfer
Level of Participation	Fulfillment Expectations	Transfer design	Supervisor support
Enjoyment of the program (Satisfaction)	Motivation to learn Goal Clarity	Feedback	

**Based on the IMTEE (Integrated model for training evaluation and effectiveness) model**

The IMTEE model proposed by Alvarez et al (2004) has a notable extension to the Kirkpatrick’s four-levelled model. The IMTEE model (presented in Chapter 2: subsection 4) links training content and design changes in learners and organizational payoffs. The IMTEE model evaluates the extent to which training goals are met across the program, the individual and the organization (Cowman et al, 2009).

A need analysis (level 1) that contributes to all three-target areas for evaluation: training content and design, which will enhance changes in learning and organizational payoff (level 2). Level 3 in the IMTEE model identifies the measures for evaluating and measuring outcomes from training including reactions, changes in learning and organizational payoffs (transfer performance and results). Level 4 identifies variables that influence training effectiveness. The model proposes a relationship between post training attitudes (such as self-efficacy and training effectiveness variables).

Table 5: Factors relative to the IMTEE model (Alvarez et al, 2004)

<b>Model elements</b>	<b>Corresponding Factors</b>
<ul style="list-style-type: none"> <li>• Training content and design</li> </ul>	<ul style="list-style-type: none"> <li>• Clarity of training goals</li> <li>• Involvement of the trainer</li> <li>• Participatory learning method</li> <li>• Content of the training</li> </ul>
<ul style="list-style-type: none"> <li>• Reactions</li> </ul>	<ul style="list-style-type: none"> <li>• Relevance of the training program</li> <li>• Level of participation</li> <li>• Training expectations</li> </ul>
<ul style="list-style-type: none"> <li>• Post training Self efficacy</li> </ul>	<ul style="list-style-type: none"> <li>• Personal Capacity for Transfer</li> <li>• Opportunity to use learning</li> </ul>
<ul style="list-style-type: none"> <li>• Cognitive learning</li> </ul>	<ul style="list-style-type: none"> <li>• Performance Self Efficacy</li> </ul>
<ul style="list-style-type: none"> <li>• Training performance</li> </ul>	<ul style="list-style-type: none"> <li>• Motivation to learn</li> <li>• Training feedback</li> <li>• Trainer support</li> <li>• Method of training</li> </ul>
<ul style="list-style-type: none"> <li>• Training characteristics</li> </ul>	<ul style="list-style-type: none"> <li>• Transfer design</li> <li>• Fulfilment expectations</li> </ul>

Based on the model, the following factors relevant for the research under context are derived. Factors for model elements “Transfer performance” and “Results” are not considered because they cannot be measured via the feedback evaluation form. The relevant factors are provided in the Table 4 displayed above.

### **1b) What are the differences between hard and soft skills with respect to the key aspects of the training program?**

As the assignment necessitates designing a tool for measuring the effectiveness of both hard and soft skill training programs, it is crucial to understand the differences between hard skill and soft skill training programs. Hard skills are associated with the specific technical abilities or solid factual knowledge required to do a particular job. Hard skills are the technical skills including programming languages, networks and communications (Snyder, Rupp & Thornton, 2006), operating system skills, I&CT skills, foreign language skills and the procedure skills etc. Soft skills on the other hand can be defined as interpersonal, people or behavioural skills necessary for applying technical skills and knowledge in the workplace. (Rainbury, Hodges, Burchell & Lay, 2002). The differences between hard and soft skills are illustrated in “Table 2: Differences between hard and soft skill training programs.”

Vanderlande offers about 300 training programs (both hard and soft skill training programs) to its employees in the Netherlands and across the various locations across the globe. Both external and in-house trainers are involved in providing training programs. Based on the interviews conducted with the manager, members of the team and the trainer who provides the training, it has become evident that a clear distinction exists between the hard and the soft skill training programs in terms of the observed learning outcomes. For instance, consider the hard skill training program “Equipment training: Module 2 (Transport)”, the key intention here is to observe whether the participant is able to transfer the obtained knowledge to his/her job. In contrast, consider the soft skill program; “Professional communication” is focussed on observing the “behaviour” of participants over time. This is supported with literature, which illustrates the clear difference between hard and soft skills and the need or different factors in order to measure the intended outcomes. Therefore, two sets of measures, one each for hard and soft skills are required to measure the intended outcomes. In this research, this claim is verified by dividing the pilot study responses into hard and soft skill responses. On the individual sample, statistical procedures such as correlation and regression analysis are carried out to conclude whether identical / different factors are needed to be focused on, to predict the outcomes of soft and hard skill training programs.

### **1c) What are the key factors that have to be included in the tool for the Vanderlande Academy?**

Vanderlande training programs are formulated in a way that adhere to the standards put forth in the training design guide manual. This guide clearly depicts the steps that a trainer should follow towards the preparation, design and the execution of the training program, which includes measuring the performance of the trainer, the content of the training program and the effectiveness of the transfer etc. Therefore, the training design guide will be considered as the key starting point for the analysis.

The key task of the Vanderlande academy is to offer training programs for its employees, which includes the following tasks and responsibilities,

- Organize and provide training courses to employees.
- Check the participant’s knowledge and skill set.
- Manage the participants’ training expectations.

- Ensure that the training material is up to date.
- Evaluate the quality of the offered training program and improve them if necessary.

A series of interviews were conducted with the manager and the members of the academy and the requirements were base-lined. The outcome results with a choice of factors for analysis, pertaining to the preparation and the training phase. Hence the academy can influence the preparation phase (which includes functionalities like organizing the training programs, sending out emails about the schedule and the overview of the training programs to the participants, making sure the venue is fully equipped with the required facilities etc.) and the actual training phase where the academy can influence the content of the training itself. Thus, the choice of factors are restricted to these 2 phases. As the new feedback evaluation form does not enable the actual measurement of behaviour and results (as these occur after the feedback evaluation form is completed), the new evaluation form includes factors that predict (and are causally related to) behaviour and results. Based on the above claim, the following factors mentioned in the table 6 below.

*Table 6: Relevant factors for the feedback evaluation form*

<b>Phase</b>	<b>Pre-training phase</b>	<b>Actual training phase</b>	<b>Post training phase</b>
<i>Factors</i>	Relevance of the training program Training expectations Goal Clarity	Enjoyment of the training program Content of the training Method of the training Trainer support Fulfillment expectations Feedback Transfer design	Cognitive learning Performance self-efficacy Training performance Motivation to transfer

**RQ2: How to focus on the design of the course feedback evaluation form.**

**2a) What are the requirements of a valid and a reliable feedback evaluation form?**

Questionnaires are the most frequently used data collection method in evaluation research. Questionnaires help gather information on knowledge, attitude, behaviour, opinion, facts other such information. Development of a valid and a reliable questionnaire involves several steps taking a considerable amount of time. Since one of the key aims of the research is to optimize the feedback evaluation form in terms of the content and layout, the developed questionnaire must be validated before implementation. A valid and reliable evaluation form should incorporate necessary factors and items as illustrated in research question 1c) for measurement based on sound literature and measure trainee perceptions in an effective way leading to reliable and valid results.

**2b) Is the current feedback evaluation form used by the Vanderlande Academy useful (To what extent the current form meets the requirements)?**

The current feedback evaluation form was analysed in terms of its setup, formulation of the content, and length of the evaluation form, answer scales, inclusion of open/close ended questions and the outcomes are provided in Chapter 5 section 5.8. The current feedback evaluation form is also checked to see whether it provides reliable results. In order to facilitate this, training

responses from the period 1/4/15 to 1/7/15 (This time frame was chosen because the current version of the questionnaire was administered via the LMS during this period) are retrieved from the Learning Management System (LMS). Statistical techniques such as reliability analysis, correlation and regression analysis was carried out on the data to see whether they provide reliable results.

### **2c) What are the design guidelines of the new feedback evaluation forms?**

The design guidelines for the new feedback evaluation form will be based on the literature and on the needs of the Vanderlande Academy. Decisions have to be made regarding the content, layout and the rating scale used in the evaluation form. With regard to the content of the questionnaire, the first step involves a clear definition of the purpose of the questionnaire along with the validation of its questions. Questions such as to whether the feedback evaluation form would consist of open-ended / close-ended questions or a combination of both need to be addressed. According to Weisberg, Krosnick, and Bowen (1996), if rating scales are used in a questionnaire, three decisions must be made prior to the design. The initial decision is to determine the number of points to include in the scale. The second decision is to decide on whether to provide a middle alternative for the scale and it is considered ideal as it represents the best description of the feelings of respondents (Lee, 2006). The third decision is to determine whether to ensure consistency when it comes to verbal labels assigned to the scales. Also decisions on the length of the questionnaire (number of questions in the questionnaire), need for a proper introductory and a concluding statement will be addressed in this section of the research. Detailed guidelines on the process of questionnaire construction, which illustrates the essential elements of a questionnaire, the format of the questions, rating scales, layout and format along the data analysis procedures are illustrated in the literature review by Radhakrishnan (2015).

### **2d) Does the new and improved feedback evaluation form serves its purpose better than the existing feedback evaluation form?**

The flaws of the existing feedback evaluation form were analyzed in terms of content, measurement scales and statistical procedures such as correlation and regression analysis as illustrated in research question 2b). Then it is compared with the results of the new feedback evaluation form to show the new feedback questionnaire is more valid, reliable and performs better than the old happy sheet. The results are mentioned in Chapter 5 section 5.9.

### **RQ3: What are the design guidelines of the validated evaluation tool/ process?**

#### **3a )What are the inherent goals of the evaluation tool/process?**

This section illustrates the goals of the evaluation process by addressing the different ways with which the results of the evaluation questionnaire could be used by Academy to infer meaningful and plausible results. A detailed illustration on the goals of the evaluation process could be found in Chapter 6.

#### **3b) What are the characteristics of an effective evaluation process?**

An effective evaluation process should be able to provide the necessary information needed to improve the training programs. Hence this sub-question illustrates the appropriate evaluation

procedure / method(s), the type of data required for analysis and the way the results need to be presented for the better visualization and interpretation. A detailed explanation of the characteristics of an effective evaluation process is illustrated in Chapter 6.

### **3c) What are the problems in the current evaluation process?**

Participants who attend the training program are required to fill in an online feedback evaluation form at the end of each training program. The results of the training program are sent to the trainer as well as the Academy. The current evaluation tool consists of a database where the responses are stored. The responses from the feedback evaluation forms are represented in the form of pie charts for the purpose of interpretation. The academy aims to use the results of the obtained feedback to meet the current training deficiencies and simultaneously improve the training programs. However, the current evaluation process offers a set of functionalities that are rigid and limited and the issues with the existing process are illustrated in chapter 6.

This section concludes with illustrating the outline of the proposed research along with the key research questions. The approach carried out for the research along with the appropriate data collection methods and the ways to assess measurement quality of the research are illustrated in the next chapter "Research methodology".

## **4. RESEARCH METHODOLOGY**

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The “research methodology” chapter illustrates the selection of appropriate methods that can be applied in the research in order to address the research questions in Chapter 3. The first part of the chapter describes the approach used in this chapter. This is followed by an in-depth explanation of the research method(s) used. The “data collection” section explains the way and means by which data is collected for the study. This is then followed by an illustration on the analysis methods carried out on the data. This chapter concludes with measures taken to ensure the quality of the data used in the research.

### **4.1 Research Approach**

The research approach used in this study is exploratory survey research combined with quantitative and qualitative data collection methods. Exploratory survey research is carried out when the objective of the study is to gain a preliminary insight on the topic of interest (Forza, 2002). This work well in cases where no model exists and the concepts of interest need to be better understood and measured (Malhotra and Grover, 1998). Exploratory survey research subsequently assists in providing evidence of association among concepts (Forza, 2002). The aim of the research is to design an evaluation tool to measure the effectiveness of training programs offered at Vanderlande. Exploratory survey research fits perfectly to this setting because of two reasons. First of all, the study does not have a model associated with it. Secondly, trainee perceptions are aimed to be captured with the help of a post training feedback evaluation survey which comprises of several factors which lead to the prediction of the overall rating of the training program.

Surveys are a popular way of collecting data as they favor large amounts of data collection over a sizeable sample in a highly economical way (Saunders et al, 2009). In most of the cases, survey strategy is administered as a questionnaire to the sample, thereby achieving data standardization and easy comparison of data. Survey strategy also allows the researcher to collect quantitative data which can be further analyzed using descriptive and inferential statistical techniques (Saunders et al, 2009). The collected data are further used to suggest possible reasons for relationships between variables and to produce models of these relationships (Saunders et al, 2009). In this research, a feedback evaluation pilot questionnaire is proposed to be administered on a sample of training participants, which comprises of evaluating various aspects of training program such as Training expectations, Goal clarity, Performance Self-efficacy etc. All these dependent factors lead towards the measurement of independent variable “The overall rating of the training program”.

### **4.2 Research methods**

This section illustrates the research method used in the study. It provides a brief illustration on the need analysis, followed by the selection of participants for the survey, calibrating the measurement instrument, ways of data collection and analysis and the procedures undertaken to ensure the quality of the research.

### **4.2.1 Getting started**

The first step in the research is to address the underlying need(s) of the Vanderlande Academy in terms of well-defined research question(s) followed by the scope of the research. The aim of the project is to build an automated evaluation tool to improve the effectiveness of the training programs offered at Vanderlande. The initial step involves capturing the trainee's perception on the offered hard/soft skill training programs with the help of feedback evaluation questionnaire. As a starting point, literature on the need for training in organizations, differences between hard and soft training programs, literature on the models that are used to evaluate the effectiveness of training programs, the models that provide a comprehensive overview of the relevant factors for the research are analyzed. Studies by Tannenbaum (2002), Kirkpatrick & Kirkpatrick (2006) and Alvarez et al, (2004) illustrates the above mentioned subject in detail. Suggestions from previous master thesis of Sjoerd van der Horst (2014) are incorporated in the practical recommendations (Chapter7) section of the research. The objectives of the research are clearly illustrated in the form of well-defined research questions and they are discussed with the research supervisor(s) who are the subject matter experts in this area. As a final check , the research questions were confirmed with the manager and the learning consultants at the Vanderlande Academy (practitioners of the research) in order to gain a practical relevance of the research. A detailed explanation of the objectives of the research along with the research questions are illustrated in Chapter 3.

Furthermore, scholarly databases such as ProQuest, Elsevier and ABI/Inform were used to find relevant articles for the literature study. Search terms such as training in organizations, evaluation of training programs, reliability and validity of training programs, training evaluation and effectiveness, questionnaire construction were used to obtain the necessary information. Peer reviewed articles from a journal with a high impact factor were preferred thereby guaranteeing the reliability and the validity of the chosen articles.

### **4.2.2 Steps prior to the survey research design**

Survey research involves a number of sub processes prior to its implementation. The steps include translating a theoretical domain into empirical processes, the actual design and the pilot testing of the created survey, the process of data collection for testing the theory, the data analysis process and finally interpreting the results of the analysis and drafting the final results in a report (Forza, 2002). The steps needed to perform a survey research design is illustrated in the form of a flowchart illustrated in the figure below.

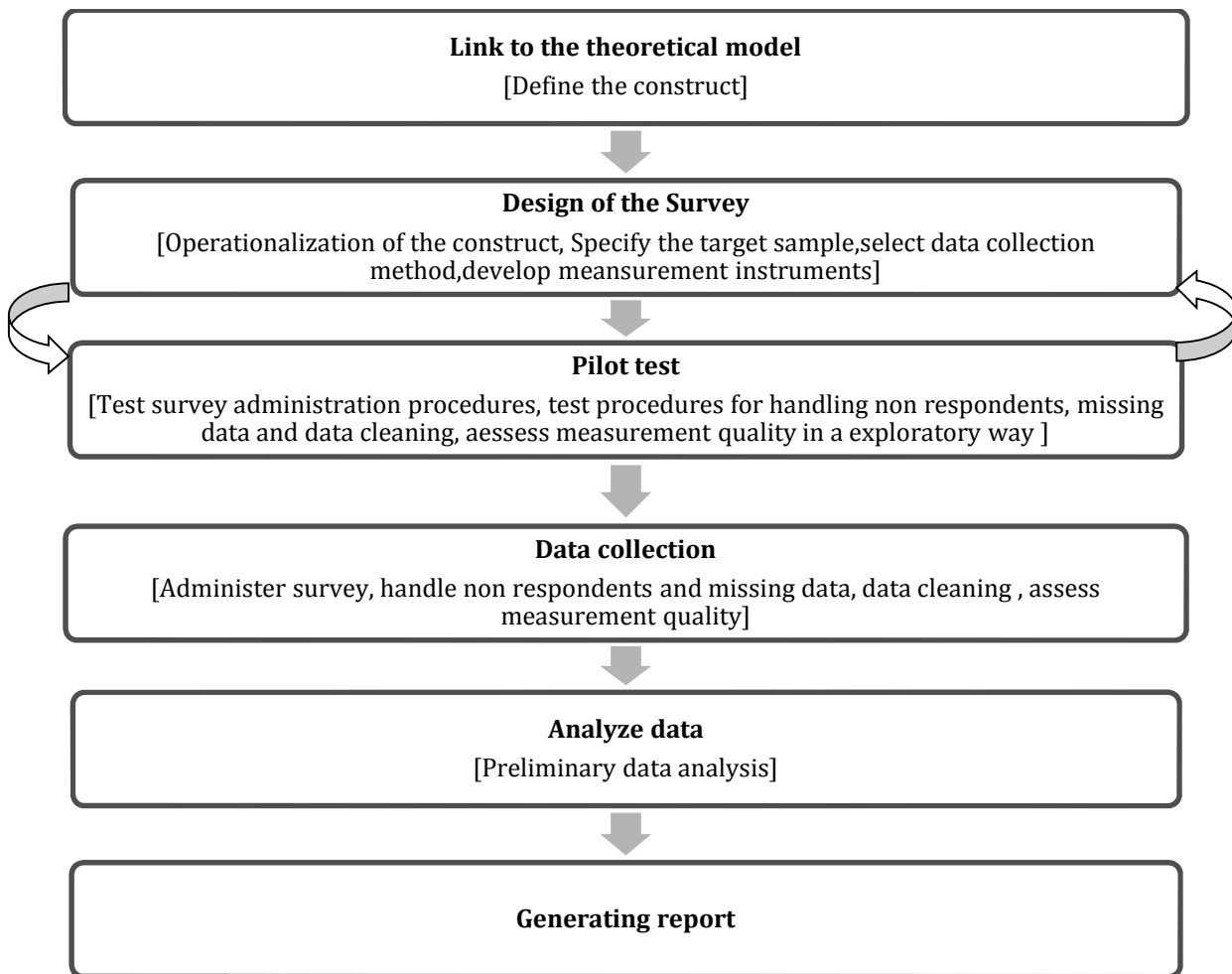


Figure 4: Steps in Survey Research (Forza, 2002)

### Phase 1: Link to the theoretical model

The first step in the survey research includes establishing a conceptual model (Dublin, 1978; Sekaran, 1992; Wacker, 1998) by providing a clear identification and definition of all the constructs (factors) that are considered relevant for the analysis (Wacker, 1998). Selection of the appropriate factors are based on the models form the literature presented from Chapter 3. The initial set of factors appropriate for the conceptual model are based on the literature study carried out prior to the start of the project and needs of the Vanderlande Academy. The selection of initial set of factors are mentioned below in “Table 7”.

Table 7: Initial set of factors for the evaluation survey

Phase	Pre-training phase	Actual training phase	Post training phase
<i>Factors</i>	Relevance of the training program Enjoyment of the training program Goal Clarity	Training expectations Content of the training Method of the training Trainer support Fulfillment expectations Feedback Transfer design	Cognitive learning Performance self-efficacy Training performance Motivation to transfer
<i># of questions</i>	9	27	15



The next step is to illustrate the role of the constructs (independent, dependent and the moderating factors) used in the analysis, highlighting the correlation between the factors along with the indication on the direction and the nature of the relationships (if any) between them (Sekaran, 1992). Table 8 illustrates the dependent variable and the independent factors used in the initial feedback evaluation pilot study survey highlighting the literature from which the factors have been derived.

*Table 8: Dependent variable V.s. Independent factors*

<b>Dependent variable</b>	<b>Independent factors</b>	<b>Source</b>
Overall rating of the training program	Relevance of the training program	Giangreco et al ( 2009)
	Enjoyment of the training program	Weinstein et al (2004)
Item: "How will you rate this training program considering all its aspects?"	Goal Clarity	Lee et al (1991)
	Training expectations	LTSI (2000)
	Content of the training	Giangreco et al ( 2009)
	Method of the training	Giangreco et al ( 2009)
	Trainer support	Giangreco et al ( 2009)
	Fulfillment expectations	LTSI (2000)
	Feedback	LTSI (2000)
	Transfer design	LTSI (2000)
	Cognitive learning	Vanderwalle (1997)
	Performance self-efficacy	LTSI (2000)
	Training performance	LTSI (2000)
	Motivation to transfer	LTSI (2000)

## **Phase 2: Design of the survey**

This section illustrates the requirements focusing on the design part of the feedback evaluation pilot study questionnaire.

### **1. Operationalization of the constructs**

Two key steps are carried out in this phase of the survey design research. The first step involves transforming the theoretical concepts into observable and measurable elements (Sekaran, 1992). In this research, this is carried out by defining measurable items under each construct. The entire list of factors and their corresponding measurable items are illustrated in "APPENDIX II." As a second step, these operational definitions are tested for face and content validity. Content validity is defined as the extent to which a measure apprehends the different facets of a construct (Rungtusanathan, 1998) and face validity predicts the extent to which the construct is a good representation of the theoretical concept. The factors along with its corresponding items used in the feedback evaluation pilot study survey are obtained from well recognized articles such as LTSI (Learning Transfer System Inventory), Lee et al (1991), and Giangreco et al. (2009) from published journals in the literature thereby ensuring face and content validity. In addition, the final set of questions are peer reviewed by subject matter experts (supervisors at the university), the manager and the learning consultants at the Vanderlande Academy.

### **2. Specification of the target sample**

The next important step in the survey research involves selecting the ideal set of training participants to participate in the feedback evaluation pilot study. The pilot study survey was carried out in a training environment (Learning Management System) tool and the pilot survey

was designed in the same Learning Management System. The target audience for this research involves participants of training programs (technical or soft skill) in the month of June 2015. The feedback evaluation pilot study was carried out in the month of July 2015 and the aim for the target sample was to select participants who attended training programs in the month prior to the time the experiment was being carried out. This is because the recollection of the proceedings and the outcomes of the training program decreases as time increases.

### **3. Selection of the data collection method**

With respect to this research, online questionnaires with close ended questions were used for the purpose of data collection for three key reasons. First, online questionnaires provide a quick and an easy way to target a larger set of participants. Second, they eliminate manual entry of data into data analysis software applications, thereby providing readily usable data for analysis. Finally, soliciting responses for online questionnaires is easy. (Singh et al, 2009).

The pilot version of the survey created for the study comprises of 54 questions (51 validated questions derived based on the literature and the needs of the Academy) and 3 compulsory questions that need to be retained throughout the study. One of the main features of a survey is that it relies on structured instruments to collect data (Forza, 2002). The researcher must take care in defining the way questions were asked to collect information about a specific aspect (wording), identify the appropriate respondents (respondent identification) and align the questions in a structured way that facilitates and motivates responses (Forza, 2002).

In the feedback evaluation pilot study, care has been taken to ensure that the respondent level of understanding is consistent with the language used in the questionnaire. Questions were repeatedly analyzed to eliminate biased responses. The pilot survey comprised of a combination of open and close ended questions that facilitates end users to provide positive/'negative comments on various aspects of the training program. Attention to detail in design of the questionnaire was provided to ensure maximum response rate. Questions were validated to make sure that ambiguity in the context and double barreled questions were eliminated. Care was taken to ensure that questions were not constructed in a way that elicits socially desirable responses. The measurement instrument is constructed with nominal and interval scales as the primary focus is inclined towards the analysis of metric (quantitative) data. In order to enhance the confidence in the findings of the analysis, some form of triangulation is ensured with multiple measurement methods and multiple responses per question are used .Doing so would reduce the common source/method variance (Rungtusanatham et al, 2001) (i.e.) potentially overstated empirical results due to the fact that data has been collected with the same method or by a single source.

The Vanderlande Academy aims to retain three standard questions throughout their versions of the feedback evaluations. These questions are added to the final set of 51 questions of the feedback evaluation pilot study. The additional questions are retrieved from analyzing the previous versions of the questionnaire used by the Academy.

1. Would you recommend this training program to your colleagues?
2. How will you rate this training program considering all its aspects?
3. Suggestions/ Further remarks

### **Phase 3: Pilot testing the questionnaire**

The Feedback evaluation pilot survey was pretested with the researcher, three learning consultants, the manager of the Vanderlande Academy and two targeted respondents to ensure the measurement properties of the survey are intact and also to examine the viability of the survey. The researcher was present during the entire pretesting session to ensure that question and instruction in the survey were clear and well stated.

### **Phase 4: Data collection**

#### **1. Survey administration**

The feedback evaluation pilot survey was focused onto a total of 108 training programs with 560 participants. The pilot survey was conducted online and the purpose of the study was clearly illustrated in the form of a cover letter in the email prior to the start. The pilot study resulted in 157 responses over a time span of 2 weeks. Out of the 157 responses, 133 were deemed to complete and valid and used for further analysis of the data. A reminder to fill in the pilot study was sent to the participants after a time span of 5 working days to whom have not completed the survey yet. The response rate for the survey was increased to 147 within a duration of 4 working days.

#### **2. Handling non respondents and response bias**

Non-respondents to a survey can limit the generalizability of the obtained results (Forza, 2002). They tend to alter the frame in a way that does not represent the sample population as it was designed to be. Response rates were increased by sending out reminder email to participants whom have not completed the survey after a time span of 5 working days. Follow up strategies such as ensuring the participant has received the survey, establish a personal connection with the participant to prompt him/her to respond, assist the respondent with the survey were carried out to ensure a higher response rate. The current LMS tool uses a time tracker mechanism which notifies the researcher whether the participant has completed the survey. Reminder emails were focused on the participants who delay their responses or the participants with incomplete responses (participants who closed the questionnaire basically after answering few questions (in this research, 3 questions to be specific)).

#### **3. Input and cleaning data**

Independent verification of the responses are carried out and the criteria for deletion includes:

1. Incomplete entries are considered as obsolete and removed from the analysis.
2. The average response time for the feedback evaluation survey involves 8 to 10 minutes. Generalization of this specific time is based on the pre-test responses and the response rate of the majority of the population sample during the study. This survey response time is traced with time tracker functionality inbuilt in the LMS. Respondents with irregular response times ( $t \leq 2$  minutes) were captured. Reminder emails were sent to these participants prompting for a refill.

3. The raw data is exported as .csv (comma separated value) file in Excel and analyzed. Responses who fall under the category of irregular response times were manually analyzed and deleted.

### **Phase 5: Assessing the measurement quality**

Without assessing the validity and the reliability of the measurement instrument, it is impossible to eliminate the deceiving influences of measurement errors on theoretical relationships that are being evaluated" (Bagozzi et al, 1991). Measurement error represents one of the dominant causes of error in exploratory survey research (Biemer et al, 1991; Malhotra and Grover, 1998) and the aim is opt keep it to the lowest level as possible.

The credibility of a measure is usually evaluated in terms of reliability and validity. Validity of a measurement instrument is concerned with the notion whether the instrument is measuring the right concept and reliability is concerned with the consistency and the stability of the measuring instrument (Forza, 2002). Lack of validity results in biased results whereas lack of reliability introduces random error in measurement (Carmines and Zeller, 1990).

#### **1. Assessing reliability of the measure**

Reliability indicates stability, accuracy and consistency of a measuring instrument and refers to the extent to which a procedure yields the same results when subjected under repeated trials (Kerlinger, 1986; Carmines and Zeller, 1990). Reliability of a measurement instrument is usually assessed after data collection (Forza, 2002). In this research, reliability is established by observing the Cronbach alpha value for each of the factors used in the evaluation.

#### **2. Assessing the validity of the measure**

A measure is said to have construct validity if the set of items complementing that measure represents the aspect of the theoretical construct and does not possess items that equate aspects that are not included in the theoretical construct (Flynn et al, 1990). In this research, exploratory factor analysis is carried out on the initial set of 14 factors and 51 items. The outcomes of the exploratory factor analysis are compared with the pre specified loadings and factors to ensure construct validity. Content validity is ensured by subjecting the feedback evaluation pilot study for a peer review session amongst a panel of subject matter experts (manager and 2 learning consultants at the Academy and the supervisor(s) at the Tu/e).

### **Phase 6: Preliminary Data analysis**

The responses of the feedback evaluation pilot study are exported to excel for initial data cleaning. The entries are sorted alphabetically along with the responses. The columns of the excel file comprises of the training factors and its corresponding variables whereas the rows contain individual participant responses to the training program. The entries of the excel file are manipulated to facilitate analysis using SPSS (Software Package for Social Sciences). The Likert scale responses are recoded into SPSS executable format and the data is set for further statistical analysis. Since one of the key aim of the analysis to develop a feedback evaluation form with a concise set of items relevant for the research, Exploratory factor analysis is carried out on the

initial set of 51 items and the analysis results in 9 factor and 28 items .A detailed explanation of the analysis and the findings are mentioned in the upcoming chapter.

In order to address research question 1b) “What are the differences between hard and soft skills with respect to the key aspects of the training program”, the entire dataset of 133 responses were divided into 91 (hard skill responses) and 42 (soft skill data) and analyzed separately. Correlation and regression analysis was carried out on both the samples to see whether there are similarities/differences in predictors that contribute to the overall rating of the training program. A detailed analysis is provided in section 5.7 in Chapter 5.

In order to prove “Does the new and improved feedback evaluation serves its purpose better than the exiting one”,(Research Question 2d) training responses between 1/4/15 to 1/7/15 were retrieved. The raw data obtained in excel was exported to SPSS for analysis. Exploratory factor analysis with Promax rotation method was carried out on the available data (N=75). Since the measurement scales used in the old evaluation from had an option “N/a”, pairwise deletion of data was considered as “N/a” responses were treated as missing values. Correlation and regression analysis were simultaneously carried out to see the impact the 3 factors (resulting out of exploratory factor analysis) have towards the overall rating of the training program, A detailed analysis is provided in section 5.8 in the upcoming chapter.

### **4.3 Conclusion**

This section concludes with the illustration of the type of research carried out in this study along with the prerequisites that need to be satisfied prior to executing a survey analysis along with the appropriate data collection methods. The upcoming chapters illustrates a detailed explanation of the data analysis carried out along with the results and the practical recommendations for the Vanderlande Academy.

## 5 ANALYSIS AND RESULTS

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This chapter examines the analysis and the results of 3 key aspects of the study . The goal of this chapter is divided into three phases. Phase 1 focuses on the analysis of the new feedback evaluation questionnaire; Phase 2 focuses on the separate analysis of hard and soft skill data to see whether similarities/ differences exists with respect to the key aspects of the training program. Phase 3 provides a comparative analysis of the old and new feedback evaluation. This is concluded by stating that the newly developed questionnaire is more reliable and valid in terms of content and measurement scales; and performs better than the existing feedback evaluation form. The collected data was analyzed using the Statistical Package for Social Sciences (SPSS) version 22.

### 5.1 Phase 1 : New evaluation questionnaire :- Exploratory factor analysis

In order to explore the construct dimensions, Exploratory Factor Analysis (EFA) was carried out initially to verify whether the proposed factor structures are indeed consistent with the actual data. The analysis was carried out with the extraction method “Principal Component’s” method with “Promax Rotation” with a kappa value of 4 which proved to be ideal among the various combinations executed. (Field, 2009) claims that Promax method provides a quicker and a better results when compared to Oblimin method when the sample size is large. Since the objective of this study is to predict the smallest number of interpretable factors that can adequately explain the correlation among a set of variables, principal components extraction method is used.

#### 5.1.1 Survey results

1. Total number of respondents: 157
2. Number of complete responses: 133
3. Number of items in the feedback evaluation pilot study: N=51
4. Number of expected factors: 14

#### 5.1.2 Steps involved in the exploratory factor analysis

- Determine the assumptions and the conditions for the Exploratory Factor Analysis.
- Determine the number of factors to be extracted.
- Rotate to obtain a sharper distinction between the factors and the questions.
- Drop poor factors and variables that load on more than a single factor.
- Estimate factor scores.
- Obtain a validated scale.

#### 5.1.3 Constraints with which items are deleted in the pattern matrix

##### 1. Statistical constraints

1. Item with a factor loading of less than 0.40 (Field, 2009)
2. Items that load on more than one factor
3. Items that diminish the reliability of the scale.

## 2. Practical constraints

Items are removed solely based on the requirements of the study and based on the outcomes of the discussions with the members of the Vanderlande Academy.

### 5.1.4 Initial data screening

The data obtained via the Learning Management System, the tool used by the Vanderlande Academy to send out feedback evaluation questionnaires, was initially checked for its completeness. Out of the 157 respondents obtained from the 108 hard and soft skill training programs that occurred with a time span of 1 working month (June 2015), 133 complete responses were obtained. Since the perception of a training experience tends to decrease with time, the sample for data analysis was limited to responses from participants whom underwent training programs within the last working month. The feedback evaluation pilot study comprised of 54 questions: 51 deemed for exploratory factor analysis and 3 to be included in the feedback evaluation irrespective of the analysis. The number of expected factor were 14. Since a low sample size (N) does not favor a valid exploratory factor analysis for all the 51 items, the items were divided into 3 parts in par with the three phases of the analysis (Pre training, Actual training and post-training phase). An exploratory factor analysis was carried out in each of the phases in order to infer the results. The division of factors among the various training phases and the results of the corresponding analysis are mentioned below.

## 5.2 Analysis + Results: Pre-Training Phase

### 5.2.1 Exploratory Factor Analysis: Pre-training phase (N=13)

In the first step of the analysis, the factorability of the 13 pre-training items were examined. The outcomes of the Kaiser- Meyer-Olkin measure of sampling adequacy was 0.851 above the commonly recommended value of 0.60, and the Bartlett's test of Sphericity has a value of 0.000 (significant), which means that the variables are correlated highly enough to provide a reasonable basis for a factor analysis. The diagonals of the anti-image correlation matrix were also over 0.5. Finally, the communalities were all above 0.3, confirming that each item shares some common variance with the other. With respect to all the above credentials, a factor analysis as deemed to be suitable for all the 13 items.

Table 9: Summary of Exploratory Factor Analysis: Factors pertaining to pre-training items (N=13)

Items	Rotated Factor Loadings			
	Training expectations	Relevance of the training program	Goal Clarity	Motivation
The expected outcomes of this training were clear at the start of the training program.	.807			
From the start of the training program, I was aware of the goals I am supposed to achieve via this training program.	.780			
I knew what to expect from this training (e.g. content, type) before it began.	.760			

*Table 10: Summary of Exploratory Factor Analysis: Pre-training items (N=13) - Continued*

Prior to the training, I knew how the program was supposed to affect my performance.	.639			
Before the training, I had a good understanding of how it would fit my job related expectations.	.585	.357		
Prior to the start, I had a good understanding of how well the training would fit my job related development.	.496	.523		
This training program fits well to my job requirements.		.824		
This training program will enhance my career development.		.765		
The training program helped me identify how to build on my current knowledge and skills.		.666		
I had specific, clear training goals to aim for during this training program.			.827	
I knew which of the goals I want to accomplish were the most important.			.817	
I enjoyed the way the training program was being carried out.	.418			.764
I was motivated to attend this training program.				.741
Eigen Value	5.552	1.528	1.038	1.023
% of variance	42.706	11.756	7.986	7.869
Alpha( $\alpha$ ) value	.789	.771	.825	“Factor Deleted”

Principal Component Analysis with Promax rotation was employed to assess the underlying structure for the 13 items in the pre-training phase of the feedback evaluation pilot study. The analysis resulted in 4 factors due to rotation. The first factor accounted for 42.706 % of the variance, the second for 11.756%, the third for 7.986% and the fourth factor for 7.869 % of the total variance.

### 5.2.2 Candidates for deletion

*Table 11: Items for deletion: Pre-training phase*

Sno	Item(s)	Statistical reason(s)	Practical reason(s)
1.	Prior to the start, I had a good understanding of how well the training would fit my job related development.	Cross loading between factors: training expectations (.496) and relevance of the training program (.523).	-N/A-
2.	Before the training, I had a good understanding of how it would fit my job related developments.	Cross loading between factors: training expectations(.585) and relevance of the training program(.357)	-N/A-
3.	I enjoyed the way the training program was being carried out	Cross loading on factor “Training expectations(.418)” and factor “Motivation(.764)”	-N/A-
4.	Prior to the training, I knew	-N/A-	Based on the outcome(s) of the



	how the program was supposed to affect my performance.		discussion with the supervisor at the Vanderlande Academy.
5.	I was motivated to attend this training program.	-N/A-	The premise of this item has been addressed implicitly by the items under the factor(s) "Training expectations" and "Relevance of the training program"

### ***5.2.3 Reliability check for the appropriate factors***

#### **Factor 1: Training expectations**

The reliability statistics of 3 items under the factor "Training expectations" are analyzed and the inferences are listed below. The overall subscale has a high reliability value of Cronbach alpha  $\alpha=0.789$ . The "Corrected Item-Total correlation" values for the 3 items are higher than 0.3 which ensures that all items correlate well with the overall scale.

#### **Factor 2: Relevance of the training program**

For "Relevance of the training program", the overall subscale has a high reliability value of Cronbach alpha  $\alpha=0.771$ . The "Corrected Item-Total correlation" values for the 3 items are higher than 0.3 which ensures that the items correlate well with the overall scale.

#### **Factor 3: Goal clarity**

In case of "Goal Clarity, the overall subscale has a high reliability value of Cronbach alpha  $\alpha=0.826$ . The "Corrected Item-Total correlation" values for the 2 items are higher than 0.3 which ensures that the items correlate well with the overall scale.

### ***5.2.4 Final set of reduced items with their appropriate factors***

#### **Training Expectations**

1. From the start of the training program, I was aware of the goals I am supposed to achieve via this training program.
2. I knew what to expect from this training (e.g. content, type) before it began.
3. The expected outcomes of this training were clear at the start of the training program.

#### **Relevance of the training program**

1. This training program fits well to my job requirements.
2. This training program will enhance my career development.
3. The training program helped me identify how to build on my current knowledge and skills.

#### **Goal Clarity**

1. I had specific, clear training goals to aim for during this training program.
2. I knew which of the goals I want to accomplish were the most important.

### 5.3 Analysis + Results: The Actual Training Phase

#### 5.3.1 Exploratory factor analysis: The Actual Training phase (N=23)

A principal component analysis was conducted on 23 items with oblique rotations (Promax) method. The Keyser-Meyer-Olkin test verified the sampling adequacy for the analysis, KMO= 0.892 ("good: according to Field, 2009) and KMO values for all the individual items were well above the acceptable limit of 0.5 (Field, 2009).

Table 12: Summary of Exploratory Factor Analysis results: The Actual training phase (N=23)

Items	Rotated factor loadings				
	Practice and Feedback	Fulfilment expectations	Trainee expectations	Trainer expertise	Up-to-date content
During the training, I got feedback from the trainer about the way I was applying the new knowledge and skills.	.923				
After the training, the trainer made clear that I did or did not meet the formulated requirements.	.806				
There were sufficient exercises during the training to properly understand how I must apply the learned knowledge and skills into practice.	.738		.331		
During the training, I received feedback from other participants about the way I was applying the new knowledge and skills.	.711				
During the training, I got enough instructions from the trainer about how to apply the new knowledge and skills of the training.	.692				
The activities and exercises the trainer(s) used helped me how to apply the learning on the job.	.617				
The training program had a good mix of theory and practice.	.488		.304		.327

Bartlett's test of Sphericity: Sig = .000 (p<.001), indicated that correlations between items were sufficiently large for Principal Components Analysis. An initial analysis was run to obtain eigenvalues for each component in the data. Five components had eigenvalues over Kaiser's criterion of 1 and in combination explained 68.461% of the variance. Based on the convergence of the Scree plot and the Kaiser's criterion, the number of factors retained form analysis is determined

to be 5. The first factor accounted for 43.352 % of the variance, the second for 9.160%, the third for 6.614% and the fourth factor for 5.305 % and the fifth for 4.480% of the variance.

*Table 13: Summary of Exploratory Factor Analysis: The Actual training phase (Continued)*

The trainer(s) used lots of examples during the training program that showed me how I could use my learning on the job.	.435	.378		.416	
I really enjoyed the variety of methods that the trainer used (e.g. team work, role play and presentation).	.399		.324		
The training method(s) reflect current practice.	.360				
The training will influence my performance on the job.		.921			
The training meets my job related development goals.		.870			
The content of the training program fits to my training needs.		.699			
The way the trainer(s) taught the training material made me feel more confident I could apply them in my job.	.383	.551			
The trainer had a good a schedule during the training.			1.004		
The content of the training program was relevant.	-.308	.407	.559		
The trainer ensured that all the participants were actively involved in the training.	.444		.475	.345	
At the end of the program, the outcomes of the training were clear.			.437		
The training has fulfilled my expectations that I had before the training.		.315	.434		
The trainer had sufficient experience on the topics covered during the training.				.919	
The trainer had sufficient knowledge about the topics covered during the training.				.889	
The content of the training program was up to date.					.873

The trainer used up-to-date equipment/training materials.					.809
Eigen values	9.971	2.107	1.418	1.220	1.030
% of variance	43.352	9.160	6.164	5.305	4.480
Alpha( $\alpha$ ) values	.854	.875	"Factor deleted"	.882	.719

### 5.3.2 Candidates for deletion

Table 14: Items for deletion: The Actual training phase

Sno	Item(s)	Statistical reason(s)	Practical reason(s)
1.	The way the trainer taught the training material made me feel more confident I could apply them in my job.	Deleted from the final set of items as it cross loads with both the factors "Practice and feedback (0.383)" and "Fulfilment Expectations (0.551)".	-N/A-
2.	The trainer(s) used lots of examples during the training program that showed me how I could use my learning on the job.	Cross loading of items on more than 2 factors Practice and Feedback (0.435), Fulfilment expectations(0.378) and Trainer Expertise (0.416)	-N/A-
3.	I really enjoyed the variety of methods that the trainer used (e.g. team work, role play and presentation).	Factor loadings are below the acceptable level. Practice and Feedback (0.399) and Trainee Expectations(0.324)	-N/A-
4.	The training method(s) reflect current practice	Factor loadings are below the acceptable level. Practice and Feedback(0.360)	-N/A-
5.	The training program had a good mix of theory and practice	Cross loading of item on more than 2 factors Practice and Feedback(0.488), Trainee Expectations(0.304) and Up-to-date content(0.327)	-N/A-
6.	At the end of the program, the outcomes of the training program were clear.	Factor loadings are below the acceptable level. Trainee Expectations(0.437)	-N/A-
7	The training has fulfilled my expectations that I had before the training.	Cross loading of item on 2 factors: Fulfilment expectations(.315) and Trainee expectations(.434)	-N/A-
8.	The trainer ensured that all the participants were actively involved in the training.	Cross loading of item on more than 2 factors Fulfilment expectations(.444), Trainee expectations(.475) and Trainer support(.345)	-N/A-

9.	After the training, the trainer made clear that I did or did not meet the formulated requirements.	Removal of this item from the factor "Practice and Feedback" preserved the reliability of the scale.	-N/A-
10.	The activities and exercises the trainer(s) used helped me how to apply the learning on the job.	-N/A-	The construct the item aims to measure is implicitly measured by the item "There were sufficient exercises during the training to properly understand how I must apply the learned knowledge and skills into practice".  Hence this item is removed to avoid repetition of items.
11.	The content of the training program fits to my training needs.	-N/A-	Item does not correspond well to the Factor "Fulfilment Expectations" thereby prompting the deletion from the final list of items.
12.	The trainer had a good schedule for the training.	-N/A-	The term "schedule "used in this item was misinterpreted by the respondents of the survey.
13.	The content of the training was relevant.	Cross loading of item on more than 2 factors. Practice and Feedback(-.308), Fulfilment Expectations(.407) and Trainee expectations(.559)	Item did not fit well to the factor "Trainee expectations". Also the factor "Trainee expectations" was eventually removed from the final set of factors.

### ***5.3.3 Reliability check for the appropriate factors***

#### **Factor 1: Practice and Feedback**

For the factor "Practice and Feedback", the overall subscale has a high reliability value of Cronbach alpha  $\alpha=0.854$ . The "Corrected Item-Total correlation" values for the 4 items under the "Item Total statistics" are higher than 0.3 which ensures that the items correlate well with the overall scale. The values in the column labelled "Cronbach alpha if item deleted "has items values less than the overall Cronbach alpha value of the subscale which indicates a good degree of reliability of the overall subscale.

#### **Factor 2: Fulfilment expectations**

For "Fulfilment expectations", the overall subscale has a high reliability value of Cronbach alpha  $\alpha=0.875$ . The "Corrected Item-Total correlation" values for the 3 items under the "Item Total statistics" are higher than 0.3 which ensures that the items correlate well with the overall scale.

#### **Factor 3: Trainer expertise**

In case of "Trainer expertise", the overall subscale has a high reliability value of Cronbach alpha  $\alpha=0.882$ . The "Corrected Item-Total correlation" values for the 2 items are higher than 0.3 which ensures that the items correlate well with the overall scale.

#### Factor 4: Up-to-date content

For the factor “Up-to-date content”, the overall subscale has a high reliability value of Cronbach alpha  $\alpha=0.719$ . The “Corrected Item-Total correlation” values for the 2 items are higher than 0.3 which ensures that the items correlate well with the overall scale.

#### 5.3.4 Final set of reduced items with their appropriate factors

##### Practice and Feedback

1. During the training, I got feedback from the trainer about the way I was applying the new knowledge and skills.
2. There were sufficient exercises during the training to properly understand how I must apply the learned knowledge and skills into practice.
3. During the training, I received feedback from other participants about the way I was applying the new knowledge and skills.
4. During the training, I got enough instructions from the trainer about how to apply the new knowledge and skills of the training.

##### Fulfilment expectations

1. The training will influence my performance on the job.
2. The training meets my job related development goals.
3. The content of the training program fits to my training needs.

##### Trainer expertise

1. The trainer had sufficient experience about the topics covered during the training.
2. The trainer had sufficient knowledge about the topics covered during the training.

##### Up-to-date content

1. The content of the training program was up to date.
2. The trainer used up-to-date equipment/ training materials.

#### 5.4 Analysis + Results: Post Training Phase

A principal component analysis was conducted on 15 items with oblique rotations (Promax) method. The Keyser-Meyer-Olkin test verified the sampling adequacy for the analysis, KMO= 0.992 (“good: according to Field, 2009) and KMO values for all the individual items were well above the acceptable limit of 0.5 (Field, 2009). Bartlett’s test of Sphericity: Sig = .000 ( $p<.001$ ), indicated that correlations between items were sufficiently large for Principal Components Analysis. The diagonals of the anti-image correlation matrix was also over 0.5 and the communalities were well over 0.3 confirming that each item shares some common variance with the other. The analysis resulted in 2 factors due to rotation. The first factor accounts for 61.402% and the second for 8.785% of the total variance explained.

Table 15: Summary of Exploratory Factor Analysis results: Post-training phase (N=15)

Items	Rotated Factor Loadings	
	Performance self-efficacy	Impact on work performance
I am confident in my ability to use the new skills at work.	.943	

I do not doubt my ability to use the newly learned skills at the job.	.926	
At work, I feel very confident using what I have learnt in this training program even in the face of difficult situations.	.801	
I am happy to try out the skills that I have learnt at the training program.	.765	
I am sure that I can overcome obstacles on the job that hinder my use of the new skills and knowledge.	.737	
I am curious to see the outcomes when I employ my learnt skills at work.	.736	
I feel empowered when I try out the new skills that I learn at this training program.	.730	
After the training program, I can't wait to get back to work and try out what I have learnt.	.618	.310
I feel the need to use the skills that I am trained in.	.596	
I get excited when I think about trying to use my new learning on my job.	.542	.355
My training performance will have a direct impact on my results at my job.		1.030
This training program will increase my personal productivity.		.927
I believe that this training program will help me do my current job better.		.901
My performance in this training program will be an influencing factor for my success at work.		.843
This training program will help me perform my tasks better.		.639
Eigen values	9.210	1.318
% of variance	61.402	8.785
Alpha( $\alpha$ ) value	.893	.896

#### 5.4.1 Candidates for deletion

Table 16: Items for deletion: Post-training phase

Sno	Item(s)	Statistical reason(s)	Practical reason(s)
1.	I feel empowered when I try out the new skills that I learn at this training program.	-N/A-	Even though the above mentioned item correlates well with Factor 1: Performance Self-Efficacy, the respondents were concerned with the interpretation of the item, thereby prompting the removal of the item from the questionnaire.
2.	I get excited when I think about trying to use my new learning at the job.	Cross loads with both the factors "Performance self-efficacy (.542)" and "Impact on work	-N/A-

		performance (.355)”. -N/A-	
3.	I do not doubt my ability to use the newly learnt skills at the job.	-N/A-	Closely relates to the message conveyed by the item “I am confident in my ability to use the new skills at work”.
4.	This training program will help me perform my tasks better	-N/A-	This item closely resembles “I believe that this training program will help me perform my current job better”.
5.	I feel the need to use the skills that I am trained in.	-N/A-	Considered by the Vanderlande Academy as irrelevant for this analysis.
6.	My performance in this training program will be an influencing factor for my success at work.	-N/A-	The term “influencing factor” used in this item is too general and could be misunderstood by the respondent.
7.	I am sure that I can overcome obstacles on the job that hinder my use of the new skills and knowledge.	Inclusion of this item decreased the reliability of the subscale to $\alpha = .734$ from $\alpha = .861$ .	-N/A-

#### **5.4.2 Reliability check for the appropriate factors**

##### **Factor 1: Performance Self Efficacy**

The overall subscale has a high reliability value of Cronbach alpha  $\alpha = 0.893$ . The “Corrected Item-Total correlation” values for the 5 items are higher than 0.3 which ensures that the items correlate well with the overall scale.

##### **Factor 2: Impact on work performance**

For “Impact on work performance”, the overall subscale has a high reliability value of Cronbach alpha  $\alpha = 0.896$ . The “Corrected Item-Total correlation” values for the 3 items are higher than 0.3 which ensures that the items correlate well with the overall scale.

#### **5.4.3 Final set of reduced items with their appropriate factors**

<p><b>Performance Self-Efficacy</b></p> <ol style="list-style-type: none"> <li>1. I am happy to try out the skills that I have learnt at the training program.</li> <li>2. I am curious to see the outcomes when I employ my learnt skills at work.</li> <li>3. I am confident in my ability to use the new skills at work.</li> <li>4. At work, I feel very confident using what I have learnt in this training program even in the face of difficult situations.</li> <li>5. After the training program, I can’t wait to get back to work and try out what I have learnt.</li> </ol> <p><b>Impact on work performance</b></p> <ol style="list-style-type: none"> <li>1. My training performance will have a direct impact on my results at my job.</li> <li>2. This training program will increase my personal productivity.</li> <li>3. I believe that this training program will help me do my current job better.</li> </ol>
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## **5.5 Correlation analysis**

The nine factors and their corresponding items obtained as a result of an exploratory factor analysis are correlated with the item “How would you rate this training program considering all the aspects”.

The overall rating that a participant provides for a training program depends on various factors derived based on exploratory factor analysis carried out in the previous section. To understand the impact of various parameters on the overall rating of a particular training program, correlation analysis and multiple regression are used. Performing a correlation analysis illustrates the bivariate relationship between the independent and the dependent variable and simultaneous regression analysis explains the relationship between the independent factors and the dependent variable, taking into account the correlation between independent factors. The final set of factors are subjected to correlation and regression analysis and the inferences of the results are provided below.

### ***5.5.1 Factors involved in the study***

#### **Dependent variable**

- How would you rate this training program considering all its aspects? (Overall rating)

#### **Independent factors(s)**

- Training expectations (TrExp)
- Relevance of the training program (Relev)
- Goal Clarity (Goal)
- Practice and Feedback (PraFeed)
- Fulfilment Expectations (FulExp)
- Trainer Support (TrSup)
- Up to date content (Uptodate)
- Performance Self-Efficacy (PerSelf)
- Impact on work Performance (IWP)

### ***5.5.2 Research hypothesis to be tested***

- To test the strength of the relationship among independent factors.
- To test the significance of the relationship between the overall rating of the training program with the independent factors.

### ***5.5.3 Statistical tests***

To address the objectives of the study, the following computations can be carried out.

- A correlation analysis to determine the strength of a relationship between independent variables/ factors.
- A multiple regression analysis to explain the relationship between dependent and independent variables, taking into account the correlation between independent variables.

#### ***5.5.4 Reporting the results of bivariate correlations***

The correlation matrix (Table 14) indicates the magnitude of the Pearson correlation coefficients. Results of correlation analysis indicate that there exists a significant correlation (mostly  $p < 0.01$ ) among the independent variables that are considered in the analysis.

Table 17: Results of correlation analysis

Item(s)	Mean	Standard Deviation	1	2	3	4	5	6	7	8	9	10
1) How would you rate this training program considering all its aspects? (1 to 10 rating scale)	7.5000	1.38717										
2) Training Expectations	4.6015	1.19734	.445**	(0.789)								
3) Relevance of the training program	5.2707	1.10718	.504**	.383**	(0.771)							
4) Goal Clarity	4.7970	1.24322	.271*	.529**	.481**	(0.826)						
5) Practice and Feedback	4.6692	1.21382	.509**	.530**	.521**	.498**	(0.854)					
6) Fulfilment Expectations	5.2005	1.19549	.547**	.491**	.742**	.484**	.557**	(0.875)				
7) Trainer Support	6.3496	0.72818	.536**	.305**	.389**	.150*	.243*	.334**	(0.882)			
8) Up to date Content	5.8045	0.84798	.367**	.310**	.354**	.262*	.371**	.426**	.473**	(0.719)		
9) Performance Self Efficacy	5.2241	1.05802	.610**	.350**	.798**	.460**	.582**	.781**	.377**	.383**	(0.893)	
10) Impact on work performance	4.6842	1.33101	.377**	.354**	.674**	.413**	.469**	.744**	.140*	.265*	.672**	(0.896)

N=133 \*\* : Correlation is significant at 0.01 level (2 tailed)  
 \* : Correlation is significant at 0.05 level (2 tailed)  
 Note: Diagonals contain Cronbach alpha ( $\alpha$ ) values

Correlations range from 0.140 to .798 and all the nine independent variables are significantly correlated with the overall rating of the training program.

## **5.6 Interpretation of the results of the regression analysis**

Once the final set of factors along with the corresponding items are obtained from the correlation analysis, they are subjected to a multiple regression analysis to predict the which of the 9 obtained factors (predictors) contribute towards the overall rating of the training program . Based on the 133 survey responses on the 9 final factors, it is feasible to predict how many and which of these predictors contribute towards the overall rating of the training program. This technique is specifically used when the intention is to explore a linear relationship between multiple correlated predictors and the criterion (How would you rate this training program considering all the aspects?) variable (Brace et al, 2006).

Multiple regression technique offers different methods to assess the relative contribution of each predictor variable. In this particular analysis, the method “ENTER” is used. This method is preferred in this analysis for two reasons. Since the number of responses are limited and there exists no theoretical model in mind, ENTER method is preferred as it is safer to use compared to its alternatives (Brace et al, 2006). In addition to that, this method allows the researcher to specify the set of predictor variables that make up the model. Then the success of this model in predicting the criterion variable is then assessed (Brace et al, 2006).

When choosing an independent variable, it is rational to select one that might be correlated with the dependent variable, but not strongly correlated with other independent variables. However, it is typical to observe correlation between independent variables which may lead to a concept known as “Multicollinearity” which is basically a situation that depicts high correlation between two or more independent variables. This leads to a paradoxical effect where the regression model fits to the data well, but none of the predictor variables have significant effect in predicting the dependent variable (Ho, 2013). Such instances can cause problems when trying to obtain interpretations on the relative contribution of each independent variable to the success of the model.

Multicollinearity is examined by observing the VIF (Variance inflation factor) which indicates whether an independent variable has a strong linear relationship with other independent variables. The rule of thumb is that the independent variables whose VIF values are above 10 demand further investigation (Ho, 2013); VIF values greater than 2.5 signify a weaker model. Also “Tolerance” values ( $1/VIF$ ) less than 0.10 also demand a further investigation when it comes to choosing the independent variables for the model.

Initial regression analysis shows strong collinearity in 3 independent factors: Relevance of the training program (VIF: 3.388), Fulfilment Expectations (VIF: 3.961) and Performance Self efficacy (VIF: 3.956). The  $R^2$  value of the regression model with 9 factors is 0.513. Removal of the first two factors leads to final set of independent predictors with accepted VIF values and this is depicted in the table above. Despite the fact that the independent factor “Performance Self Efficacy” has a VIF value slightly above 2.5, the factor is retained as it is highly significant (Sig: .000).

Table 18: Regression analysis: Collinearity Statistics

Model	Sig.	Collinearity Statistics	
		Tolerance	VIF
(Constant)	.995		
Training Expectations	.011	.579	1.728
Goal Clarity	.067	.605	1.653
Practice and Feedback	.035	.514	1.947
Trainer Support	.000	.668	1.497
Up to date Content	.766	.692	1.444
Performance Self Efficacy	.000	.386	2.593
Impact on work performance	.647	.505	1.980

### 5.6.1 Reporting the results of the regression analysis

Table 19: Regression analysis: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients
	B	Std. Error	Beta ( $\beta$ )
(Constant)	.005	.805	
Training Expectations	.239	.092	.206*
Goal Clarity	-.161	.087	-.144
Practice and Feedback	.205	.097	.180*
Trainer Support	.589	.141	.309**
Up to date Content	-.035	.119	-.022
Performance Self Efficacy	.548	.128	.418**
Impact on work performance	-.041	.089	-.039

N=133 \*\*: Correlation is significant at 0.01 level (2-tailed)

\*: Correlation is significant at 0.05 level (2-tailed)

Dependent variable: Overall Rating of the training program

The resulting model has a  $R^2$  value of 0.516 which is not greatly different from the previous cases. The value of  $p < 0.005$  implying that the model is significant. The adjusted  $R^2$  value claims that the regression model with 7 factors for 51.6% of the variance in the overall rating of the training program. Amongst the 7 factors, Performance Self efficacy and Trainer support, proved to be more significant. This proves that a substantial amount of variance is explained by the factors used in the design of the feedback evaluation which is the desired outcome.

## **5.7 Phase 2: Reporting the results of the Hard versus soft skill data analysis**

In order to justify whether the developed model complies with the evaluation of either hard or soft skill training programs, the obtained sample is divided into hard and soft skill data and the entries are processed in SPSS Version 22. Statistical procedures such as reliability checks, correlation analysis and regression analysis are carried out on the obtained sample and the inferences are listed below. The solution to this section inherently answers research question 1c).

### ***5.7.1 Reporting the results of Correlation Analysis: Hard and Soft skills***

Results of correlation analysis (hard skill data) indicate that there exists a significant correlation (mostly  $p < 0.01$ ) among the independent variables that are considered in the analysis. This is shown in Table 20. A similar pattern is observed in case of soft skill training programs and the results are shown in Table 21. Items pertaining to each training phase(s) are analyzed for reliability. Results show that the Cronbach alpha values for each of the scales are greater than 0.7 thereby indicating a good overall reliability of the subscale. This is exhibited in terms of both hard and soft skill data.

Table 20: Hard skill correlation data

Item(s)	Mean	Standard Deviation	1	2	3	4	5	6	7	8	9	10
1) How would you rate this training program considering all its aspects? (1 to 10 rating scale)	7.4011	1.19541	(1)									
2) Training Expectations	4.5641	1.17568	.520**	(.763)								
3) Relevance of the training program	5.1832	1.06381	.476**	.472**	(.735)							
4) Goal Clarity	4.6319	1.22890	.264*	.562**	.498**	(.793)						
5) Practice and Feedback	4.5381	1.14573	.629**	.588**	.531**	.379**	(.854)					
6) Fulfilment Expectations	5.0112	1.20845	.608**	.546**	.687**	.482**	.551**	(.868)				
7) Trainer Support	6.3022	.73363	.415**	.303**	.429**	.186*	.197*	.309**	(.865)			
8) Up to date Content	5.6758	.92308	.338**	.291*	.352**	.217*	.277**	.393**	.483**	(.763)		
9) Performance Self Efficacy	5.0754	.87517	.597**	.417**	.714**	.451**	.585**	.794**	.329**	.304**	(.855)	
10) Impact on work performance	4.4918	1.25524	.447**	.424**	.638**	.411**	.525**	.744**	.175*	.255*	.692**	(.887)

N=91 \*\*: Correlation is significant at 0.01 level (2 tailed)

\*: Correlation is significant at 0.05 level (2 tailed)

Diagonal values within brackets contain Cronbach alpha ( $\alpha$ ) values

Table 21: Soft Skill Correlation data

Item(s)	Mean	Standard Deviation	1	2	3	4	5	6	7	8	9	10
1) How would you rate this training program considering all its aspects? (1 to 10 rating scale)	7.7143	1.72903	(1)									
2) Training Expectations	4.6829	1.24307	.347*	(.841)								
3) Relevance of the training program	5.4602	1.18662	.537**	.212	(.839)							
4) Goal Clarity	5.1548	1.21217	.257*	.465**	.418**	(.883)						
5) Practice and Feedback	5.1386	1.12981	.436**	.445**	.514**	.634**	(.827)					
6) Fulfilment Expectations	5.6105	1.06914	.464**	.378**	.873**	.402**	.568**	(.890)				
7) Trainer Support	6.4524	.71405	.739**	.303*	.290*	.016*	.253*	.353*	(.931)			
8) Up to date Content	6.0833	.57293	.486**	.398**	.337**	.288*	.554**	.419**	.442**	(.386)		
9) Performance Self Efficacy	5.5074	1.21463	.595**	.194*	.881**	.429**	.568**	.761**	.356*	.470**	(.936)	
10) Impact on work performance	5.0595	1.40644	.269*	.2168	.785**	.306*	.382*	.742**	.061*	.213*	.660**	(.911)

N=42 \*\* : Correlation is significant at 0.01 level (2 tailed)

\* : Correlation is significant at 0.05 level (2 tailed)

Diagonal values within brackets contain Cronbach alpha ( $\alpha$ ) values



## 5.7.2 Reporting the results of regression analysis: Hard skills

Table 22: Hard skill regression analysis: Collinearity statistics

Model	Sig.	Collinearity Statistics	
		Tolerance	VIF
(Constant)	.213		
Training Expectations	.035	.488	2.048
Goal Clarity	.110	.593	1.686
Practice and Feedback	.001	.490	2.041
Trainer Support	.021	.639	1.566
Up to date Content	.713	.721	1.388
Performance Self Efficacy	.005	.356	2.086
Impact on work performance	.974	.446	2.241
Relevance of the training program	.419	.371	2.698

Table 23: Regression analysis coefficients: Hard skills

Model	Unstandardized Coefficients		Standardized Coefficients
	B	Std. Error	Beta ( $\beta$ )
(Constant)	1.049	.836	
Training Expectations	.228	.106	.225*
Goal Clarity	-.149	.092	-.154
Practice and Feedback	.359	.109	.344**
Trainer Support	.351	.149	.215*
Up to date Content	.041	.112	.032
Performance Self Efficacy	.489	.167	.358**
Impact on work performance	.003	.104	-.004
Relevance of the training program	-.110	.135	-.98

N=91 \*\*: Correlation is significant at 0.01 level (2-tailed)

\*: Correlation is significant at 0.05 level (2-tailed)

Dependent variable: Overall Rating of the training program

The resulting model has a  $R^2$  value of .519. The value of  $p < 0.005$  implying that the model is significant. The adjusted  $R^2$  value shows that the regression model with 8 factors accounts for 51.9% of the variance in the overall rating of the training program. Moreover, analysis over the current sample shows 4 significant predictors of hard skills which include Training Expectations, Practice and Feedback, Trainer Support and Performance Self Efficacy.

### 5.7.3 Reporting the results of regression analysis: Soft skills

Table 24: Soft skill regression analysis: Collinearity statistics

Model	Sig.	Collinearity Statistics	
		Tolerance	VIF
(Constant)	.005		
Training Expectations	.854	.668	1.496
Goal Clarity	.356	.512	1.954
Practice and Feedback	.539	.420	2.379
Trainer Support	.000	.742	1.347
Up to date Content	.580	.582	1.719
Impact on work performance	.210	.845	1.183

Table 25: Regression analysis coefficients: Soft skills

Model	Unstandardized Coefficients		Standardized Coefficients
	B	Std. Error	Beta ( $\beta$ )
(Constant)	-6.699	2.216	
Training Expectations	-0.32	.172	-.023
Goal Clarity	.188	.201	.132
Practice and Feedback	.148	.238	.096
Trainer Support	1.644	.284	.679**
Up to date Content	.223	.399	.074
Impact on work performance	0.172	.135	.140

N=42 \*\*.: Correlation is significant at 0.01 level (2-tailed)

\*: Correlation is significant at 0.05 level (2-tailed)

Dependent variable: Overall Rating of the training program

The resulting model has a R<sup>2</sup> value of .582. The value of p<0.005 implying that the model is significant.

### 5.7.4 Comparison of standardized coefficients

Table 26: Comparison of standardized coefficients

Factors	N=133 (Hard and Soft skill)	N=91 (Hard skill)	N=42 (Soft Skill)
Training expectations	.21*	.23*	-.02
Relevance of the training program	-----	-.98	-----
Goal Clarity	-.14	-.15	.13
Practice and Feedback	.18*	.34**	.09
Fulfilment expectations	-----	-----	-----
Trainer support	.31**	.22**	.68**

<b>Up-to-date content</b>	-0.2	.03	.07
<b>Performance Self Efficacy</b>	.42**	.36**	-----
<b>Impact on work performance</b>	-.04	0.03	.14

From the results of the table above, there exists a clear difference between hard and soft skills with respect to the key aspects of the training program (Research Question RQ 1(c)). In case of exclusive hard skills, factors such as Training expectations, Practice and Feedback, Trainer support and Performance Self Efficacy plays a key role in the overall rating of the training program. In case of soft skills, Trainer support ( $\beta = .679, p < .001$ ) appears to play a dominant role towards the overall rating of the training program. Additional follow up such as testing under a larger sample size is required as this distinctive result is due to the small sample size (N=42). For the purpose of analyzing the data with respect to the sample used and to come up with a strategy to identify where exactly the problem lies, the starting point should focus on the results of factor “Trainer support” in case of soft skills and “Training expectations, Practice & Feedback, Performance Self Efficacy and Trainer Support” in the case of Hard skills.

### **5.8 Phase 3: To illustrate the newly developed feedback evaluation form performs better than the current version**

The aim of this section is to illustrate in multifaceted ways, the newly developed feedback evaluation tool developed for the Vanderlande Academy is reliable and valid compared to the existing questionnaire used and the differences are shown in terms of content, measurement scales and statistical results.

#### **5.8.1 In terms of content**

The old feedback evaluation questionnaire used by the Academy comprises of 24 (open and close ended) questions defined under 7 factors. The list of questions along with their corresponding rating scales are provided in the Table X: Appendix. Initial analysis on the contents identifies two major issues with the current questionnaire with respect to the following attributes below.

#### **Clarity of questions**

Questions such as “How do you rate the level of the training program”, “How do you rate the group size” and “How do rate the length of the training program” seem to be very abstract and are open to multiple interpretations. They could possibly be framed in a more clear way in order to eliminating dubious responses. This is also evident from the results of statistical analysis where the factor loadings for these above mentioned questions load on several factors ultimately leading to deletion. Moreover, the questions defined in this section measure only the “training phase aspects” of the training program. The focus on the pre training phase is absent and the post training phases is illustrated with the help of a single question “How well do you think you are able to put the knowledge of the training program into practice”.

#### **Logical ordering of questions under a relevant factor**

Factor 1: “Organization” has 2 items “How do you rate the accommodation” and “How do you rate the provided information about the training program about the training program” .The grouping of these items under the factor “Organization” seems like a complete misfit. This is also evident in

case of “Factor 5”, where group size and putting the knowledge of training into practice are combined together under “Information transfer”.

### **5.8.2 In terms of measurement scales**

Literature claims that it is necessary to maintain consistency in terms of measurement scales and pole values that defines the measurement scales (Radhakrishnan, 2015). The old feedback evaluation questionnaire deviates from the above claim by using different Likert scales per question therefore could lead to unreliable results. Also the use of a single item to measure a factor leads to inconsistency in results. This is evident in case of “Factor 2: Education Targets”, which has 1 item “In regards to this training what do you think about achieving your goals by following the training” to measure the entire factor.

### **5.8.3 In terms of statistical analysis**

The current feedback evaluation form administered via the LMS used by the Vanderlande Academy comprises of 24 questions. Description of the items along with its corresponding factors and measurement scales are illustrated in the table below (Appendix).

#### **Dependent variable**

1. Overall rating of the training program

#### **Independent factor(s)**

1. Organization
2. Training
3. Content/ training methodology
4. Information transfer
5. Testing

#### **Constraints**

1. In order to maintain consistency in results, values of items “How do you rate the accommodation” and “How do you rate the skills of the trainer” are averaged to produce a single stream of results. (This was one as multiple locations and trainers were involved in the training program.).
2. Factor scales that contain “N/A” were considered as missing values in SPSS.

#### **Initial data check(s)**

Responses to both hard and soft skill training programs dated from 1/4/15 to 1/7/15 were retrieved from the LMS and subjected to the data cleaning procedures as illustrated in Chapter 5. This specific timeline was chosen because the current feedback evaluation questionnaire was active during this specific time period. The initial head count was 83 respondents. Post data cleaning, the number of complete responses was brought down to 75 which was then subjected to statistical analysis. The items along with its corresponding factors are illustrated in “Table X Appendix”

Initial reliability checks were carried out based on the categories defined according to the previous evaluation questionnaire to verify the internal consistency of the scale and the results

are mentioned below. Then a full-fledged Exploratory Factor Analysis (EFA) was carried out as illustrated in Chapter 5 to identify the categories / factors that come out of this analysis.

#### **5.8.4 Results of reliability analysis**

##### **Factor 1: Organization**

The reliability statistics of 2 items under the factor “Organization” are analyzed and the inferences are listed below. The overall subscale has a poor reliability value of Cronbach alpha  $\alpha=0.500$ . The “Corrected Item-Total correlation” values for the 2 items are 0.3 which ensures that the two items do not correlate well with the overall scale. This is also proved in quantitative terms, as grouping “How do you rate the accommodation” and “How do you rate the provided information about the training program by the Academy” under the factor “Organization” seems unclear and misleading.

##### **Factor 2: Trainer**

The 2 items under the factor “Trainer” has a high reliability value of Cronbach alpha  $\alpha=0.761$ . The “Corrected Item-Total correlation” values for the 2 items are higher than 0.3 which ensures that all items correlate well with the overall scale.

##### **Factor 3: Content / Training methodology**

The 7 items under the factor “Content / Training methodology” has a high reliability value of Cronbach alpha  $\alpha=0.893$ . The “Corrected Item-Total correlation” values for the 3 items are higher than 0.3 which ensures that all items correlate well with the overall scale.

##### **Factor 4: Information transfer**

There exists no correlation( $\alpha=0.000$ ) between the items “ How do you rate the group size” and “ How well do you think you are able to put the knowledge of the training program into practice” listed under the factor “ Information transfer”.

##### **Factor 5: Testing**

The reliability statistics of 3 items under the factor “Testing” are analyzed and the inferences are listed below. The overall subscale has a poor reliability value of Cronbach alpha  $\alpha=0.614$ . The “Corrected Item-Total correlation” values for 2 of the 3 items are less than 0.3 which shows that items do not correlate well with the overall scale.

#### **5.8.5 Exploratory Factor Analysis: Old Feedback evaluation questionnaire (N=13 items)**

The first step involves analyzing the factorability of the 13 items in the old feedback evaluation questionnaire. The outcomes of the Kaiser- Meyer-Olkin measure of sampling adequacy was 0.830(above the commonly recommended value of 0.60) and the Bartlett’s test of Sphericity has a value of 0.000 (significant), which means that the variables are correlated highly enough to provide a reasonable basis for a factor analysis. The diagonals of the anti-image correlation matrix were also over 0.5. Finally, the communalities were all above 0.3, confirming that each item shares some common variance with other. With respect to all the above credentials, an exploratory factor analysis can be carried out on all the 13 items.

Principal Component Analysis with Promax rotation was employed to assess the underlying structure for the 13 items in the old feedback evaluation questionnaire. Also note that pairwise

deletion of missing values is employed here in the analysis. The questions pertaining to factor “Testing” are not considered for the analysis as 26 participants have not taken any form of testing during their training. This was indicated by a “N/A” option in the feedback evaluation which is set to be treated as a missing value in SPSS. The analysis resulted in 3 factors due to rotation. The first factor accounted for 46.921 % of the variance, the second for 10.584 % and the third for 7.878% of the total variance explained. The rotated factor loadings are illustrated in the pattern matrix shown below.

*Table 27: Exploratory Factor Analysis: Existing feedback questionnaire (N=13)*

Items	Rotated Factor Loadings		
	Content/ trainer	Training Aspects	Other Aspects
How do you rate the accommodation?			.832
How do you rate the provided information about the training program by the Academy?	.430	-.373	.695
How do you rate the skills of the trainer?			.568
How do you rate the interaction with the trainer?	.504		
How do you rate the material of the training program?	.723		
How do you rate the content of the training program?	.664		
How do you rate the level of the training program?	.586	.352	
How do you rate the practical education tools?			.602
How do you rate the length of the training program?		.837	
How do you rate the tempo of the training program?		.835	
How do you rate the variation (theory and practice) during the training program?		.672	
How do you rate the group size?	-.547	.375	.589
How well do you think you are able to put the knowledge of the training program into practice?	.852		
Eigen values	6.100	1.376	1.024
% of variance	46.921	10.584	7.878
Alpha( $\alpha$ ) value			

### 5.8.6 Candidates for deletion

Table 28: Items for deletion: Existing feedback form

S.no.	Item(s)	Statistical reason(s)	Practical reason(s)
1.	How do you rate the provided information about the training program by the Academy?	Cross loading on factors: Content/ trainer (.430), Training aspects (-.373) and Other aspects (.695).	-N/A-
2.	How do you rate the level of the training program?	Cross loading on factors: Content/ trainer (.586) and Training aspects (.352).	-N/A-
3.	How do you rate the group size?	Cross loading on factors: Content/ trainer (-.547), Training aspects (.375) and Other aspects (.589).	-N/A-

### 5.8.7 Reliability check for the appropriate factors

#### Factor 1: Content/trainer

The reliability statistics of 4 items under the factor “Content/Trainer” are analyzed and the inferences are listed below. The overall subscale has a high reliability value of Cronbach alpha  $\alpha=0.879$ . The “Corrected Item-Total correlation” values for the 4 items are higher than 0.3 which ensures that all items correlate well with the overall scale.

#### Factor 2: Training aspects

For “Training aspects”, the overall subscale has a high reliability value of Cronbach alpha  $\alpha=0.833$ . The “Corrected Item-Total correlation” values for the 3 items are higher than 0.3 which ensures that the items correlate well with the overall scale.

#### Factor 3: Other aspects

In case of “Other aspects”, the overall subscale has a high reliability value of Cronbach alpha  $\alpha=0.730$ . The “Corrected Item-Total correlation” values for the 2 items are higher than 0.3 which ensures that the items correlate well with the overall scale.

### 5.8.8 Final set of reduced items with their appropriate factors

#### Content/ Trainer

1. How do you rate the interaction with the trainer?
2. How do you rate the material of the training program?
3. How do you rate the content of the training program?
4. How well do you think you are able to put the knowledge of the training program into practice?

#### Training Aspects

1. How do you rate the length of the training program?
2. How do you rate the tempo of the training program?
3. How do you rate the variation (theory and practice) during the training program?

## Other Aspects

1. How do you rate the accommodation?
2. How do you rate the skills of the trainer?
3. How do you rate the practical education tools?

### 5.8.9 Interpretation of the results of the correlation analysis

Table 29: Results of correlation analysis : Old feedback evaluation

Item(s)	Mean	Standard Deviation	1	2	3	4
1) How would you rate this training program considering all its aspects? (1 to 10 rating scale)	7.65	1.470	(1)			
2) Content/ Trainer	1.96	.670	-.886**	(.879)		
3) Training Aspects	2.23	.786	-.733**	.647**	(.833)	
4) Other Aspects	1.90	.589	-.625**	.526**	.525**	(.730)

N=75 \*\*: Correlation is significant at 0.01 level (2 tailed)

\*: Correlation is significant at 0.05 level (2 tailed)

Note: Diagonals contain Cronbach alpha ( $\alpha$ ) values

The correlation matrix above indicates the magnitude of the Pearson correlation coefficients. Results of correlation analysis indicate that there exists a significant correlation (mostly  $p < 0.01$ ) among the independent variables that are considered in the analysis. Correlations range from 0.525 to .886 and all the three independent variables are significantly correlated with the overall rating of the training program. Also note that the presence of negative correlation values is because of the way the rating scales for the overall rating of the training program have been defined (1: Highest to 10 : Lowest).

### 5.8.10 Interpretation of the results of the regression analysis

Table 30: Old feedback regression analysis: Collinearity statistics

Model	Significance	Collinearity Statistics	
		Tolerance	VIF
(Constant)	.000		
Content/Trainer	.000	.533	1.875
Training Aspects	.001	.534	1.873
Other Aspects	.005	.665	1.504



Table 31: Regression analysis coefficients: Old Feedback Evaluation

Model	Unstandardized Coefficients		Standardized Coefficients
	B	Std. Error	Beta ( $\beta$ )
(Constant)	12.177	.255	
Content/Trainer	-1.442	.139	-.657
Training Aspects	-.414	.119	-.222
Other Aspects	-.408	.142	-.163

N=75 \*\*: Correlation is significant at 0.01 level (2-tailed)

\*: Correlation is significant at 0.05 level (2-tailed)

Dependent variable: Overall Rating of the training program

The resulting model has a  $R^2$  value of 0.841 and the value of  $p < 0.005$  implying that the model is significant. From the results of the regression it is evident that, the three factors accounts for a considerable measure on the overall rating of the training program. But it is to be noted that, these results are due to smaller sample size  $N=75$  and a lot of data elimination procedures in order to facilitate credible statistical procedures. Also note that the presence of negative correlation values is because of the way the rating scales for the overall rating of the training program have been defined (1: Highest to 10 : Lowest).

### 5.8.11 Overall verdict

A brief comparison of the new and the old feedback evaluation questionnaire is provided in this section to illustrate on how the developed feedback evaluation serves its purpose than the older version used by the Academy.

Table 32: Overall Verdict: New versus Old feedback evaluation questionnaire

S.no	New Feedback Questionnaire	Old Feedback Questionnaire
1	The new feedback evaluation questionnaire developed for the Vanderlande Academy comprises of reliable and validated questions designed based on sound literature and considerations of the Academy.	The old feedback evaluation questionnaire has not been tested for validity and reliability before use. It not based on literature and the
2	Comprises of factors and items that cover the pre , actual and the post training phases (In line with the requirements of the Academy)	Comprises of factors and items that primarily focus only on the actual training phase. Therefore the old feedback questionnaire is highly incomplete.
3.	Comprises of clearly formulated questions and consistent measurement scales throughout the	Evidence of unclear questions along with inconsistent measurement scales are present

	questionnaire.	in the old feedback evaluation questionnaire.
4.	Ample number of relevant questions are formulated under each factor thereby prompting efficient analysis.	Factors with single items / inconsistent questions are evident here (see the analysis above).
5.	Items defined under each factor are consistent with what the factor aims to measure. Basically the categories made in the new feedback evaluation form are consistent.	In certain factors such as “Organization” and “Information transfer”, Items defined are inconsistent with what it aims to measure. The categories made in the old evaluation form are relatively inconsistent.
6.	Post analysis, the new evaluation form comprises of 9 factors with relevant items that cover all the relevant phases of the training program.	Post analysis, the old evaluation form results in 3 factors with questionable items that address on the “training phase” aspect of the training program.
7.	Contains ample factors and items that address the post training phase of a training program.	Contains just a single item “How well do you think you are able to put the knowledge of the training program into practice” to measure the post training outcomes.
8.	The option of “N/a” is not provided here.	“N/a” seems to be standard answer option and it appears to be chosen a lot by the respondents, even though it is unclear on why a trainee would respond “N/A” for the item “How do you rate the material of the training program”.
9.	“Testing” section is not provided in the new feedback evaluation form	A section on “Testing” was provided, but it is applicable only to a few trainees which led to deletion of data prior to the analysis.

## **6 GOALS, FUNCTIONAL, TECHNICAL AND DESIGN REQUIREMENTS OF THE EVALUATION PROCESS**

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### **6.1 Goals of the evaluation process**

The findings of the feedback pilot study are analyzed to infer meaningful outcomes to achieve the goals of the evaluation process. The goals aimed via this evaluation process have been communicated with the manager and the members of the Academy; prioritized according to their needs and then listed in the order of importance. Then the corresponding data needed to achieve the goals of the evaluation process are listed in section 6.2. This is then followed by the specific functional, technical and the design requirements that have to be built within the design of the tool. The design requirements mentioned in this tool are aimed at addressing the issues faced with the current LMS tool in use and improvements are derived from numerous licensed and free survey creation software's found across the web. The functional and the technical specifications are derived after careful analysis and discussions with the members of the Academy and with five survey participants. This section provides a credible response to research question 3a, 3b and 3c by addressing the inherent goals, the characteristics of an effective evaluation process and concludes with the issues in the existing evaluation process.

An effective training evaluation process must facilitate the assessment of the training programs offered by the Vanderlande Academy and predict how the tool can be used as an effective training aid. Evaluation helps in improving the training programs by discovering which of the trainings are successful in attaining their stated objectives. Since an effective training evaluation affects learning outcomes, it can be used a competent training aid. The key goals of the training evaluation process are mentioned below.

#### **Inherent Goals**

1. To measure the overall score provided by a participant for a training program.
2. To measure the relative contribution of the nine different components of training resulting as an outcome of the evaluation analysis.
3. Evaluation of the training program against a benchmark value.
4. To compare and analyze the training program based on selective factors.
5. To enable the computation of participant scores based on the training factors and compare it against a benchmark value.
6. Conduct a detailed analysis on: Comparing the performance of two training programs, performance of a trainer or multiple trainers, the progress of a training program over a specified duration.

### **6.2 Information needed to address the goals of the evaluation process**

#### **1. Compute the mean factor scores for every training participant.**

To address Goals 1 and 2, it is essential to analyze participant responses on each of the nine factors as obtained from the analysis in the previous section. This helps the researcher to measure the overall score provided by a participant for a training program. To measure the effectiveness of the different components of the training program, it is essential to interpret the outcomes of the nine specific factor scores.

## **2. Evaluation of the training program against a benchmark value.**

The tool must be capable of computing the overall score of the specified training along with the nine individual factor scores after performing the necessary steps embedded in its defined analysis sequence. Then the tool must prompt Academy to enter a threshold value with which a benchmark analysis could be carried out on the overall score / individual factors.

### **3. To compare and analyze the training program based on selective factors.**

The evaluation tool/process must facilitate the computation and the analysis of training program(s) based a single or a combination of factors. The tool should facilitate the extraction of factor scores simultaneously in order to effectively perform a comparative analysis of the selective training programs.

### **4. To enable the computation of participant scores based on several factors of a training program and compare it against a benchmark value.**

The tool must prompt the user to retrieve and compute the participant scores for an appropriate factor and perform a comparative analysis against several training programs. Also the evaluation tool/process must facilitate an option to set a benchmark value and perform a threshold analysis on the obtained results.

## **6.3 Functional requirements**

The functional and the design requirements in this sections are mentioned below and they are aimed to address the goals of the evaluation process. The upgraded tool must incorporate the requirements mentioned below.

### **1. Provision to evaluate training programs against a benchmark value.**

The Feedback evaluation tool must provide options to evaluate training programs against a predefined benchmark value determined by the Vanderlande Academy. Providing this feature enables the academy to scrutinize the training program(s) in a way that leads to optimized results and improvement in several factors such as Goal Clarity, Training expectations, Practice and Feedback etc. The tool must enable the analyst/researcher to select the appropriate factors; appropriate training programs within a specified time span in order to predict the effectiveness of the training programs offered. Doing so would aid the academy to constantly evaluate the effectiveness of the offered training programs at Vanderlande. By maneuvering the benchmark value over time, the effectiveness of a hard/soft skill training program can either be sustained or increased a desired level. Based on the discussion with the manager of the Vanderlande Academy, the benchmark standards are defined. Training programs with an overall rating above 8 is preferred by the academy . An overall rating of 7 is considered as mediocre and any value under 5 is considered as unacceptable. In case of overall rating score less than 5 , the trainer of that particular training program is called upon by the Academy to discuss on further improvements .

### **2. Provision to compare the performance of the trainers under a specific program.**

The feedback evaluation must prompt the evaluation of trainers to measure their overall performance on various factors such as the support provided to the trainees during the training,

the ability to answer the participant questions, the knowledge on the subject etc. The tool/process must prompt the Academy to choose the appropriate factors (Trainer Support, Practice and Feedback) and compare and analyze the results of multiple trainers of the same/different training programs to measure variation in performance amongst trainers. Doing such a comparative analysis benefits not only the Academy but also the trainers as it enables them to improve upon performance by analyzing the weak points and also by simultaneously learning from their peers.

### **3. Provision to view a performance review update report over a specified duration of time.**

The manager of the Vanderlande Academy must make it a point to closely analyze the outcomes of the training programs by viewing the performance review update report consistently over a specified period of time (Say every quarter). Doing so would enable the Academy to rank the training programs in terms of importance and also lets the Academy to predict the training programs that are going well and the training programs that deserve special attention. Consistency in review enables improvement(s) without any delay rather than predicting issues with training programs at the last minute. This saves a lot of time and effort to the Academy.

## **6.4 Technical requirements**

This section focusses on the technical aspects that have to be incorporated in order to realize the functional requirements. The technical requirement wish-list(s) for this tool are mentioned below.

### **1. Time tracker mechanism**

The evaluation tool must offer a functionality that tracks the response time for every participant who fills in the evaluation. It must highlight the indication on the start time of the survey along with the time taken for a participant to respond to the survey. This enables the researcher to get an idea on the average time taken to complete the survey. With this information, the researcher can spot legitimate versus the obsolete responses, thereby making it easier to predict the complete set of valid data. The Academy must make sure this functionality is provided in the upgraded evaluation tool/process.

### **2. Results and instant feedback**

The upgraded process must deliver reports containing a clear, graphically enhanced representation of the results that can include features such as bar, pie charts, line graphs with point values (in case of comparative analysis), highlighted indicators and crosstabs. In addition to the analysis of each question; to highlight strong positive and negative responses or in case of trend data, comparative profile lines can be used. For the sake of benchmark analysis, traffic light representation can be used to indicate the attained targets against the organizational targets.

### **3. Credibility of the output**

In order to make data analysis easier, the raw data generated as a result of the feedback evaluation should be in a format that is acceptable and easier to comprehend by the personnel at the Academy. The raw data file must be facilitated in such a way that it can be conveniently exported to a statistical data processing software such as Microsoft Excel or SPSS (Statistical package for social sciences) with ease, in case of further data processing and analysis. The data file must be downloadable in a .csv format supported by multiple data processing software(s). When

the raw data file is analyzed in excel, various aspects of data cleaning must be taken in consideration such as deletion of incomplete records, meaningful sorting of data in ascending order even when the response rate tends to increase. Basically the raw data file should eliminate manual processes; and macros must be created within the process to provision a smooth transfer of data from Excel to SPSS.

#### **4. Provision to add a unique identifier**

The updated version of the process must define/create a variable as a unique identifier as it facilitates efficient retrieval and interaction with the entity.

### **6.5 Design Requirements**

The design requirements specified in this section illustrates the look and feel of the user interface with specific rules for the functioning of the elements in the process. Mentioned below are the required design specifications of the evaluation tool.

#### **1. Survey Design Editor**

The key aim of the tool is to focus on the creation of a user-friendly, simple and practical feedback evaluation survey. The survey editor must be capable of providing the key functionalities required to create a full-fledged survey and the specific list of preferred requirements are mentioned in the section “Appendix V: Survey Editor Design Requirements”.

#### **2. Use of module evaluations**

The upgraded process must enable the construction of a modular survey that can link users to specific output elements of the survey. For, instance the manager of the academy would be interested in the complete results of a training program the trainer would be interested in certain sections of the results. Creating a modular survey facilitates sectioning the feedback reports according to the requirements of the end user.

#### **3. Reporting Capabilities**

In addition to the generation of an evaluation report for every training program, Coach View must facilitate the creation of an overall summary of results and a comparative analysis report by accurately mapping the corresponding fields across the selected training programs.

#### **4. Exporting and querying data**

The Learning Management System must facilitate raw formatted data at any point of time for a single or a combination of surveys. It must provide data ready for analysis in the form of .csv or .sav file formats which are widely used by statistical programs such as MS Excel and SPSS. Providing the data in the above mentioned formats favors exploratory data analysis techniques such as multiple factor analysis and regression analysis resulting in meaningful interpretations of data as well as qualitative text reasoning for open ended questions.

## **6.6 Limitations of the current evaluation process**

The current flaws of the evaluation process has prompted the Academy to consider for an alternative LMS (Learning Management System) and the information provided in the section defines the need for the purpose of the stated cause.

The current process used by the Vanderlande Academy to handle the administration and the organization of training programs is rigid and limited only to a specific set of options such as one question per page, no possibility of a combining questions under a specific factor, restrictions with respect to the choice of measurement scale etc. Despite the stated limitations, the feedback pilot study was created via this tool as the resulting survey had to be administered in the same process, thereby ensuring the fact that the newly designed survey must be compatible with the current system used at the Vanderlande Academy.

In the current scenario, the results of the training evaluation can only be either be retrieved in the form of a .csv file or viewed as a report with responses for every question illustrated in the form of pie charts. The Academy aims to conduct extensive statistical procedures on the obtained raw data to achieve productive results such as to predict the overall rating of the training program, performance of the trainer(s), trainee's perception on the training program etc. Currently, the raw data obtained from the .csv file has to undergo a series of data cleaning procedures such as deletion of incomplete entries, sorting and arranging data before it could be provided as input to a statistical analysis software such as SPSS or SAS etc. These drawbacks provide a greater scope for further improvement in order to make data analysis in a simple and systematic way.

## **7. DISCUSSION**

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The concluding chapter provides a brief summary of answers to each of the research questions addressed in Chapter 1 followed by a critical assessment of the thesis and recommendations for the Vanderlande Academy to adhere to. This is then followed by the research directions and improvements that the Academy can consider to implement in the future.

### **7.1 Overview of the results**

The aim of the study involves designing an evaluation tool/process that effectively captures user perceptions, facilitates an effective evaluation and provide suggestions to improve the training programs offered at Vanderlande. The initial step involved identifying the key factors that are needed to be added in the evaluation tool followed by the actual design of the feedback evaluation form followed by the design , functional and the technical requirements of the actual tool/process itself. The factors appropriate for the feedback evaluation form were based on a combination of literature and company preferences. The outcome of initial analysis resulted in nine valid and reliable factors. Furthermore, a regression analysis on these nine factors showed that there exists a significant relationship with the overall rating of the training program. So the research concludes by claiming that a majority of the nine factors have been a good predictor of what the trainees think of the training program. Overall, these statistical analysis provide credible instances to improve the way training evaluations can be effectively carried out at Vanderlande and after successful implementation of these analyses, the following conclusions were drawn.

Based on the Kirkpatrick model for training evaluation and the IMTEE (Integrated model for training evaluation and effectiveness, 14 factors were selected to be a part of the feedback evaluation pilot study and this addresses research question 1A. The key factors that need to be included in the evaluation tool for the Vanderlande Academy focuses on all the three (pre-training, actual training and post training) phases of training evaluation and the final set of factors are chosen based on the models from the literature and discussions with the manager and the learning consultants at the Academy. Based on the 133 responses obtained, statistical procedures such as factor, correlation and regression analysis is carried. The analysis results in 7 key factors that create an impact on the overall rating of the training program (Research question 1C). Literature illustrates a clear distinction between hard and soft skills with respect to the key aspects of the training program, this claim is statistically proven based on the available sample size (133 responses across hard and soft skill training programs) and the results are illustrated in Chapter 5 section 5.7 (Research Question 1B).

A valid and reliable evaluation form should comprise of factors and items for measurement based on sound literature and it must measure trainee perceptions in an effective way leading to reliable and valid results (Research question 2A). Factors are retrieved from Kirkpatrick and IMTEE models in the literature and items (questions) included in the feedback evaluation study were derived from reliable resources such as LTSI (Learning Transfer System Inventory), Lee et al (1991) etc. The current feedback evaluation form does not contain questions that have been tested for its reliability and validity. The limitations of the current feedback evaluation form was illustrated in terms of content, measurement scales (Research question 2b) and tested statistically in Chapter 5, section 5.8 to show the newly developed questionnaire serves better than the older one (Research question 2d). Brief summary of the design guidelines for the new feedback evaluation form (2c) have been illustrated in detail in the outline of the proposed research.



Detailed information on the design guidelines are available in the literature review by Radhakrishnan (2015). The actual design of the feedback evaluation form adheres to the functionalities offered by the current LMS used by the Vanderlande Academy.

A detailed overview of the inherent goals and the characteristics of the evaluation process (Research questions 3A and 3B) are illustrated in detail in chapter 6 as the goals, functional, technical and design guidelines for the evaluation process. This is followed by the (Research question 3A) which illustrates the problems faced in the current evaluation process (refer to section 6.6).

## **7.2 Critical assessment and scope for further improvement**

This section illustrates the limitations of the study in the form of a critical analysis followed by the ideas for further improvement.

1. It is not possible to affirm that a smaller sample size comprising of Dutch participants can be baselined as a representative model for training evaluations across the globe. Prior testing, preferably with the target participants is needed before implementation. Given this as the first test with N=133 responses, three individual Exploratory Factor Analysis (EFA) were carried out in this analysis which is in par with the three phases of the training program. The reason behind performing three EFA is that the response rate of 133 is not sufficient enough to carry out a full-fledged EFA in one attempt considering the number of questions (54) used in the analysis.
2. The feedback pilot study focussed more towards the internal training programs offered at Vanderlande rather than the training offered by external providers. The stipulated time frame used for the selection of the training programs to analyse (July 2015) had more internal training programs rather than external ones.
3. The entire set of questions designed for the feedback evaluation have been statistically tested to ensure validity and reliability of the measuring instrument. Inclusion of the other questions or rephrasing questions forces a repetition of the entire analysis to ensure validity of the measuring instrument.

This section illustrates the plausible improvements that must be carried out on the undertaken study.

### **1. Test the current model under a large sample size and at different work locations.**

The final sample size of 133 respondents from a single organization (Vanderlande Netherlands) leads to questions about the generalizability of the model findings. These concerns could be reduced when the final sample size included participants across different training programs in various subsidiaries around the globe. Therefore, future research would undeniably benefit by exploring the relationships implemented in this study under the influence of a larger sample size.

### **2. Aim at measuring the pre-training efficacy and the post training performance improvement in order to predict the impact of the training program.**

The feedback pilot evaluation study does not measure a participants' pre-training self-efficacy/motivation towards the training program or the opportunity to perform/ hindrance to perform a task after he/she completes the training program. Measure these aspects could illustrate whether the participant is motivated to attend the training program, which has a significant effect on the trainees' affective reactions (Harris et al, 2012) thereby leading to an increase in the overall rating of the training program.

**3. Test whether the hypothesis applies for the predication of only either soft or hard skill training programs.**

The feedback evaluation pilot study was focused on a mixture of both hard skill and soft skill training program but was not tested exclusively, neither on participants attending soft skill nor hard skill training programs. Therefore, run an evaluation exclusively on either hard skill or soft skill training programs in order to predict whether the obtained results are similar to the results attained in the case of a mixed scenario.

**4. Focus on the qualitative answers and provide inferences from them.**

The current evaluation process does not include the subjective verdict of the respondents. Further inquiry and analysis on the data may yield interesting results that would be of the interest to the Academy.

**5. Carry out a Confirmatory Factor Analysis to test how well the measured variables represent the constructs.**

The analysis was limited to an Exploratory Factor Analysis that resulted in a finalized set of factors along with the corresponding evaluation questions. This could further have been expanded by conducting a Confirmatory Factor Analysis on the data which constitutes an explicit test for the fit of the competing models.

### **7.3 Practical recommendations for Vanderlande Academy**

In this section, practical recommendations are provided to improve the effectiveness of training evaluations within Vanderlande Industries. These improvement suggestions are addressed directly to the manager and to the members of the Vanderlande Academy. The recommendations starts out the key attributes that could be derived from the analysis and then branches out into suggestions that could be considered as add-on that facilitates the evaluation process.

**1. Consistency in measuring the overall performance.**

The manager of the Academy should make sure that the results of the evaluations are measured on a regular basis. The manager at the Academy could start by creating an innate interest to analyse the results of the evaluation on a regular basis. Then based on the result of the training evaluation, focus and aggregate a (for e.g.) 3 month performance review report in order to understand the performance constraints and provide extra attention to the trainings that needs attention. By doing this, the manager of the Academy is consistent and well informed about the proceedings of the training programs that are being offered by the Academy.

## **2. Migration to a new tool must absolutely meet the basic needs.**

Since the Academy is in the process of migration towards a more sophisticated and an upgraded LMS (Learning Management System), explicit care must be taken to ensure that the basic functional, technical and the design requirements of the Academy must be satisfied with customization possibilities. As quality guidelines and reported settings are deemed to be modified at any point of time during the evaluation process, the manager and the learning consultants at the Academy must give considerable thought not only on the evaluation part of the tool but also with functions such as email, e-learning modules, administration capabilities of the tool etc. The Academy must prioritize their requirements based on their needs and also obtain ideas for the section mentioned in Chapter 6 and Appendix VI, rank them against the possibilities that several vendors can offer and look for the most cost effective solution keeping the requirements in mind. Doing this task would enable the academy to migrate to a new LMS (Learning Management System) that can sustain in a longer run.

## **3. Devise an evaluation with multiple assessment methods, assign and test them with appropriate training programs.**

Literature suggests that, to increase the objectivity of outcomes, different measurement methods could be used during the evaluation using different approaches including focus groups, self/multi-rater assessments. When these approaches are combined, they represent a powerful and a diverse approach to perform an effective training evaluation (Berthnal, 1995). For instance, consider the importance of the project-management training program, as project management is a core competence for the organization. It would be interesting to observe participant responses in the form of self-assessment and multi-rater assessment (360-degree feedback) combined with the regular feedback evaluation post the training program to predict the effectiveness of the training program. Combing different approaches in this scenario would be a benefit to the Academy as it helps in predicting trainee perceptions in an unbiased way. The Academy could carry out a pilot using a combination of different evaluation approaches starting from this training program (e.g. Project management) and branch out to different training program after visualizing its importance and success. Furthermore, the Academy may compute the overall cost and the resource requirements of plausible combinations of assessment options to determine a strategy that makes the optimal use of the existing resources and infrastructure. Performing a multiple assessment such as self-assessment /multi-rater assessment along with the training evaluation can help the Academy to highlight the issues with trainings that contain a low score on the feedback evaluation. Incorporating these extra measures has added benefits towards improving the performance of the training program.

## **4. Focus on the measuring the motivation of the trainee prior attending the training program.**

The updated feedback evaluation contains variables (questions) that define and measure pre-training self-efficacy and post-training outcomes. Nevertheless, the major part of the attention is dedicated towards the actual training phase as it measures key aspects such as the performance of the trainer, up to date content and training and fulfilment expectations. Harris et al, (2012) analyses the link between pre training self-efficacy to trainee reactions. Alliger et al, (1997) classifies trainee reactions into affective and utility reactions. Affective reactions illustrate how well a trainee enjoys a training programme and utility reactions confirms to the degree to which the trainee feels the training has a practical utility for his/her job related tasks (Harris et al, 2012).

Quinones (1995) demonstrated a relationship between trainee self-efficacy and trainee reactions with “motivation to learn” as a mediator between these two variables. Hence, it is a key task for the Academy to realize a participant’s pre-training motivation to ensure training fulfilment and success. To realize that, the learning consultants at the Academy and the internal/external trainers at Vanderlande must ensure that the participants clearly understood the learning goals and the outcomes of the training prior to the start of the training program. This must be done adding an extra check at “course application form” that the participants fill in order to be enrolled in the training program, stating, “I have clearly understood the learning goals and the outcomes of this training program”. In addition, the Academy must utilize the competency management tool developed by van der Horst (2013) and make sure the trainees have been allocated to the appropriate training programs. To increase trainees’ self-efficacy and training motivation, the managers can provide information on the training such as the attributes of the training, content complexity, the training environment etc. (Karl et al., 1993). Adding these extra steps increases trainees’ self-efficacy and motivation thereby reducing the chances of participants who drop out during the course of the training program realizing that this training program is not well suited to their development needs.

**5. Focus on the post training self-efficacy / opportunities to use once the trainee post training.**

The learning consultants at the Academy and the reporting manager could consider to make it a point to communicate with the participants after the training program on a regular basis in order to understand the amount of transfer and the impact the particular training program has contributed to his/her personal and professional development. Selection of the participants for this session can be done at random. Doing so would help the academy to identify the appropriate target group(s) for the training program when setting up training programs in the future. (For instance, “Presentation power” soft skill training program is of high importance for participants from the sales department but relatively less important for a participant from R&D who does not have the opportunity to communicate with customers on a regular basis). Communication with the participant post training would help the Academy to set the appropriate target group for the training program. In addition, it lets the academy to prioritize the participant who are in urgent need of a specific training.

**6. Focus on providing consistent support post the training program.**

Kraiger (2008) claims that training should be designed in such a way that it prepares the trainees to know where and to whom to go for help and how to accelerate knowledge elicitation back on their job. Hence the Academy must ensure that the trainees are provided with the right tools and learning materials as it can increase the likelihood that they would use what have they have learnt in the training once they get back to their tasks. The Academy can also consider building a forum or a community where individuals whom share similar interests and job demands can interact virtually across various locations, answering each other’s questions and tackling challenging situations (Wenger et al, 2002). Hence it is the job of the Academy to equip trainees to use post training sources of job knowledge and access to appropriate information sources and tools.

**7. Perform a systematic job task analysis and with the resulting information, determine the content as well as training standards for performance.**

The first key step in the formulation of training needs efficient analysis (TNA) is conducting a proper diagnosis of what is needed, to whom the training is addressed to (Salas et al , 2012). Job task analysis, one of the prime components of TNA specifies the crucial work functions of a job and illustrates the key task requirements as well as competencies needed to accomplish these tasks successfully. Unfortunately, TNA including job task analysis is often skipped or replaced by just asking a question such as “What training would you like to attend?”. Also research shows that employees are not usually able to clearly articulate the training that they need. (Baddeley and Longman, 1978). So performing a job task analysis not only uncovers the training needs, but also assists in differentiating the “Information that has to be conveyed at the training” and “Information that can be added to the manuals “of the task requirements (Tannenbaum, 2002). Making this differentiation is crucial as it assists the design of the training program only with the necessary content. Training people to memorize and retain unnecessary information consumes excessive cognitive capacity that should be focused towards acquiring information that they will need to know from their memory (Salas et al, 2012). So the Academy could consider to make it a point to perform a clear job task analysis as a basis for allocating employees to training programs and to design a compact and a content relative training.

**8. Ensure that the training catalogue is up to date.**

Expectations about the training program can influence one’s learning (Salas et al, 2012). Trainees with unmet expectations show lower performance, commitment, motivation and self-efficacy post his/her training program. (Sitzmann et al, 2009). Therefore the academy must make sure that every trainee has not only understood how the training program is relevant to successful performance on the job, but also must receive realistic previews of the content and how that was proposed to be covered. In order to ensure this claim, the Academy could start by keeping the training description in the training catalogue up to date. A detailed overview of the training content would be an added bonus. This enables the trainee to browse through the training design and content to get an overall idea on the structure and the content of the training program. Also subtle details such as the way the trainees are notified about the training makes an effect on the learning process. For instance, training that is described as an opportunity to improve one’s career rather than as “mandatory” or a “test” reduces anxiety and motivates learning among the participants (Ford et al, 1998; Martocchio, 1992). Hence the academy must keep in mind to communicate on the benefits of the training to the participants rather than the deficits (alleged) of the learners (Salas et al, 2012).

**9. Encourage managers, supervisors and team leaders to have effective communication with the trainee prior to the training.**

The registration for a training program involves the trainee filling in a request to attend a training in the “Training request” form. The request is then approved by the reporting manager and it is processed by the academy. Once this process is done, the trainee is registered for that particular training. The selection of the training is a result of mutual discussion between the employee and the manager during the mid-year review meeting. The employee can either initiate a request to attend the training or the manager can suggest training program based on the assessment of his/her competence level. The reporting manager can utilize the “Competency management tool” developed for the Vanderlande Academy by van der Horst (2013) in order to identify a

participants' competency gap and allocate them to the appropriate training program(s). The Academy must aim towards making sure to provide the managers / team leaders with the information that they need to 1) guide the employees to the appropriate training 2) clarify trainee expectations and prepare them for the training 3) emphasize on the learning objectives (Salas et al, 2012). Therefore organizations must prepare the supervisors/ managers/team leaders to have effective conversations with the trainees prior to the training. They must also be involved in the earlier stages of the need assessment as they understand the need for the training and can provide accurate information and motivate the employee to attend the training program.

#### **10. Promote error based leaning strategies.**

Error based learning strategies are exceptionally useful in-case of technical training programs. Advanced learning methods and strategies for classroom style teaching encourages effective learning and greater transfer of training (Salas et al, 2012). These methods include error training, discovery learning and cognitive skill training (Ford and Weissbein, 1997). During the process of the fabricating the content of the training program, Frese et al (1991) claim that errors caused by a trainee are never incorporated as examples in the training program. Salas et al, (2012) claims that addressing errors in formal technical training programs prepares the trainees to cope up with errors at an emotional and a strategic level. Hence, the learning consultants and the trainers must make it a point to devise content that focuses on managing and handling error situations. Participants in the error encouragement situation learnt the most and showed improved performance at work thereby enhancing the transfer of training (Salas et al, 2012). Keith and Frese, (1991) found positive correlation between the error training and post training performance. Hence, the Academy must make sure to incorporate error situations, particularly in case of complex cognitive training. Training activities can be designed in a way that participants are likely to commit errors and they could be encouraged to try out different solutions even if leads to errors. Doing so would improve the performance self-efficacy of training participants. For example, "At work, I feel very confident using what I have learnt in this training program even in the face of difficult situations". Incorporating error based learning strategies would equip the trainees to face any issues with confidence even in the face of difficult situations when they try to incorporate what they have learnt at the training programs.

#### **8. Conclusion**

As stated in the research and exposition of the thesis, the key aim is to build an automated evaluation tool to measure the effectiveness of the training programs offered at Vanderlande. In this study, three key research aims have been answered with the help of research questions defined under each section. Analysis of the new feedback evaluation form depicts the predictive power of various factors that contribute to the overall rating of the training program. Analysis has been carried out to illustrate the differences between hard and soft skills with respect to the key aspects of the training program. Enough justification has been provided qualitatively and quantitatively to prove that the newly developed feedback evaluation form serves well than the existing one used at the academy. The study concludes with recommendations and ways with which the academy could use the results of the analysis to infer meaningful outcomes in order to improve training evaluations at Vanderlande.

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## **APPENDIX I: Feedback pilot study evaluation questionnaire**

### **COVER LETTER**

Dear Participant,

I hereby invite you to participate in the research study entitled “Designing an automated evaluation tool to determine the effectiveness of the training programs at Vanderlande”.

I am Pradeep Radhakrishnan, graduate student from the Technical University of Eindhoven currently undergoing my master thesis at the Vanderlande Academy. The key aim of the study is to design an evaluation tool that aims to capture trainee’s perceptions on the soft and hard skill training programs offered at Vanderlande. The result of the study inherently provides you with a polished training feedback evaluation form and training improvement suggestions for the Vanderlande Academy.

The pilot phase of the study requires user participation by filling out the attached online evaluation survey. The target audience for this study involves participants whom underwent training course(s) within the last month. The online evaluation survey would approximately take 10 - 15 minutes to complete. Kindly fill in all the questions as sincerely as possible. The information gathered will remain strictly confidential. **Individual respondents will not be identified in any data or reports.** Only copies of the final analysis will be provided to the supervisor(s) at the TU/e and Vanderlande Academy.

Thank you for your support towards assisting in my educational endeavors. If you would like a summary of the outcomes, kindly e-mail me at “XXXXXX” and I will be happy to forward it to you. I will be the single point of contact for all your inquiries and correspondence. If you require any additional information or have questions, feel free to contact me on my email or on my phone number mentioned below.

On behalf of the Vanderlande Academy, I would like to thank you for taking your time to complete this survey.

Name: Pradeep Radhakrishnan

Email address: XXXXXX

Phone Number: XXXXXX

Name of the Supervisor: Mr. Dirk-Jan Verheijden

Responsible department: Vanderlande Academy

### **Welcome text**

Welcome to the Vanderlande Academy: Training feedback evaluation survey!

Thank you for agreeing to take part in this study in order to effectively capture trainee’s perceptions on the training programs offered at Vanderlande. Today we will be gaining your thoughts and opinions in order to serve you better in the future. This survey should only take 10-15 minutes to complete. Be assured that all the answers you provide will be kept strictly confidential. Please click on “Next” to begin the survey.

## **Closing text**

On behalf of the Vanderlande Academy, I would like to thank you for taking your time to complete this survey.

## **APPENDIX II: Initial set of questions for the feedback evaluation pilot study**

### **1) Pre training phase**

#### **1.1 Relevance of the training program**

- 1) Prior to the start, I had a good understanding of how well the training program would fit my job related development.
- 2) This training program fits well to my job requirements.
- 3) The training program will enhance my career development.

#### **1.2 Enjoyment of the training program**

- 4) The training program helped me identify how to build on my current knowledge and skills.
- 5) I really enjoyed the way the training program was being carried out.
- 6) I was really motivated to attend this training program.

#### **1.3 Goal Clarity**

- 7) From the start of the training program, I was aware of the goals that I am supposed to achieve via this training program.
- 8) I had specific, clear training goals to aim for during this training program.
- 9) I knew which of the goals I wanted to accomplish were the most important.

### **2) Actual Training phase**

#### **2.1 Training expectations**

- 10) Prior to the training, I knew how the program was supposed to affect my performance.
- 11) I knew what to expect from the training (content) before it began.
- 12) Before the training, I had a good understanding of how it would fit my job-related expectations.
- 13) The expected outcomes of this training were clear at the start of the training program.

#### **2.2 Content of the training**

- 14) The content of the training program fits to my training needs.
- 15) The content of the training program was relevant.
- 16) The content of the training program was up to date.

#### **2.3 Method of the training:**

- 17) The training program had a good mix of theory and practice.
- 18) The training method(s) reflect current practice.
- 19) The trainer used up-to-date equipment / facilities.

#### **2.4 Trainer Support**

- 20) The trainer ensured that all the trainees were actively involved in the training.
- 21) The trainer had a good schedule for the training.

- 22) The trainer had sufficient knowledge about the topics covered during the training.
- 23) The trainer had sufficient experience on the topics covered during the training.
- 24) I really enjoyed the variety of the methods that the trainer used (e.g. team work, role play and presentation).
- 25) There were sufficient exercises during the training to properly understand how I must apply the learned knowledge and skills into practice.

## **2.5 Fulfillment expectations**

- 26) The training will influence my performance at the job.
- 27) The training has fulfilled my expectations that I had before the training.
- 28) The training meets my job related developments.
- 29) At the end of the program, the outcomes of the training were clear.

## **2.6 Feedback**

- 30) During the training, I got feedback from other training participants about the way I was applying the new knowledge and skills.
- 31) During the training, I got feedback from the trainer about the way I was applying the new knowledge and skills.
- 32) During the training, I got enough instructions from the trainer about how to apply new knowledge and skills of the training.
- 33) After the training, the trainer made clear that I did or did not meet the formulated requirements.

## **2.7 Transfer design**

- 34) The activities and exercises the trainer(s) used helped me how to apply the learning on the job.
- 35) The trainer(s) used lots of examples during the training program that showed me how I could use my learning on the job.
- 36) The way the trainer(s) taught the training material made me feel more confident I could apply them in my job.

## **3) Post Training phase**

### **3.1 Cognitive learning:**

- 37) I am happy to try out the skills that I have learnt at the training program.
- 38) I am curious to see the outcomes when I employ my learnt skills at work.
- 39) I feel the need to use the skills that I am trained in.
- 40) I will feel empowered when I try out the new skills that I learn at this training program.

### **3.2 Performance self-efficacy**

- 41) I am confident in my ability to use the new skills at work.
- 42) I do not doubt my ability to use the newly learned skills at the job.
- 43) I am sure that I can overcome obstacles on the job that hinder my use of the new skills and knowledge.
- 44) At work, I feel very confident using what I have learnt in this training program even in the face of difficult situations.

### **3.3 Training performance:**

- 45) This training program will help me perform my tasks better.
- 46) My performance in this training program will be an influencing factor for my success at work.
- 47) My training performance will have a direct impact on my results at my job.

### **3.4 Motivation to transfer**

- 48) This training program will increase personal productivity.
- 49) After the training program, I can't wait to get back to work and try out what I have learnt.
- 50) I believe that this training program will help me do my job better.
- 51) I get excited when I think about trying to use my new learning on my job.

### **Concluding questions: {Compulsory}**

- 52) Would you recommend this training program to your colleagues?
- 53) How will you rate this training program considering all its aspects?
- 54) Suggestions/ Further remarks

## **APPENDIX III: Final set of questions to be included in the feedback evaluation form**

### **Pre-Training Phase**

#### **Training Expectations**

- 1. From the start of the training program, I was aware of the goals I am supposed to achieve via this training program (Texp\_1).
- 2. I knew what to expect from this training (e.g. content, type) before it began (Texp\_2).
- 3. The expected outcomes of this training were clear at the start of the training program (Texp\_3).

#### **Relevance of the training program**

- 4. This training program fits well to my job requirements (Relev\_1).
- 5. This training program will enhance my career development (Relev\_2).
- 6. The training program helped me identify how to build on my current knowledge and skills (Relev\_3).

#### **Goal Clarity**

- 7. I had specific, clear training goals to aim for during this training program (Goal\_1).
- 8. I knew which of the goals I want to accomplish were the most important (Goal\_2).

### **The Actual Training Phase**

#### **Practice and Feedback**

- 9. During the training, I got feedback from the trainer about the way I was applying the new knowledge and skills (PraFeed\_1).
- 10. After the training, the trainer made clear that I did or did not meet the formulated requirements (PraFeed\_2).
- 11. There were sufficient exercises during the training to properly understand how I must apply the learned knowledge and skills into practice (PraFeed\_3).

12. During the training, I received feedback from other participants about the way I was applying the new knowledge and skills (PraFeed\_4).
13. During the training, I got enough instructions from the trainer about how to apply the new knowledge and skills of the training (PraFeed\_5).

#### **Fulfilment expectations**

14. The training will influence my performance on the job (Fuexp\_1).
15. The training meets my job related development goals (Fuexp\_2).
16. The content of the training program fits to my training needs (Fuexp\_3).

#### **Trainer support**

17. The trainer had sufficient experience about the topics covered during the training (Trsup\_1).
18. The trainer had sufficient knowledge about the topics covered during the training (Trsup\_2).

#### **Up-to-date content**

19. The content of the training program was up to date (UpCon\_1).
20. The trainer used up-to-date equipment/ training materials (UpCon\_2).

#### **Post Training Phase**

##### **Performance Self-Efficacy**

21. I am happy to try out the skills that I have learnt at the training program (Perfself\_1).
22. I am curious to see the outcomes when I employ my learnt skills at work (Perfself\_2).
23. I am confident in my ability to use the new skills at work (Perfself\_3).
24. At work, I feel very confident using what I have learnt in this training program even in the face of difficult situations (Perfself\_4).
25. After the training program, I can't wait to get back to work and try out what I have learnt (Perfself\_5).

##### **Impact on work performance**

26. My training performance will have a direct impact on my results at my job (IWP\_1).
27. This training program will increase my personal productivity (IWP\_2).
28. I believe that this training program will help me do my current job better (IWP\_3).

#### **Compulsory Questions**

29. Would you recommend this training program to your colleagues?
30. How would you rate this training program considering all its aspects?
31. Suggestions/ Further Remarks?

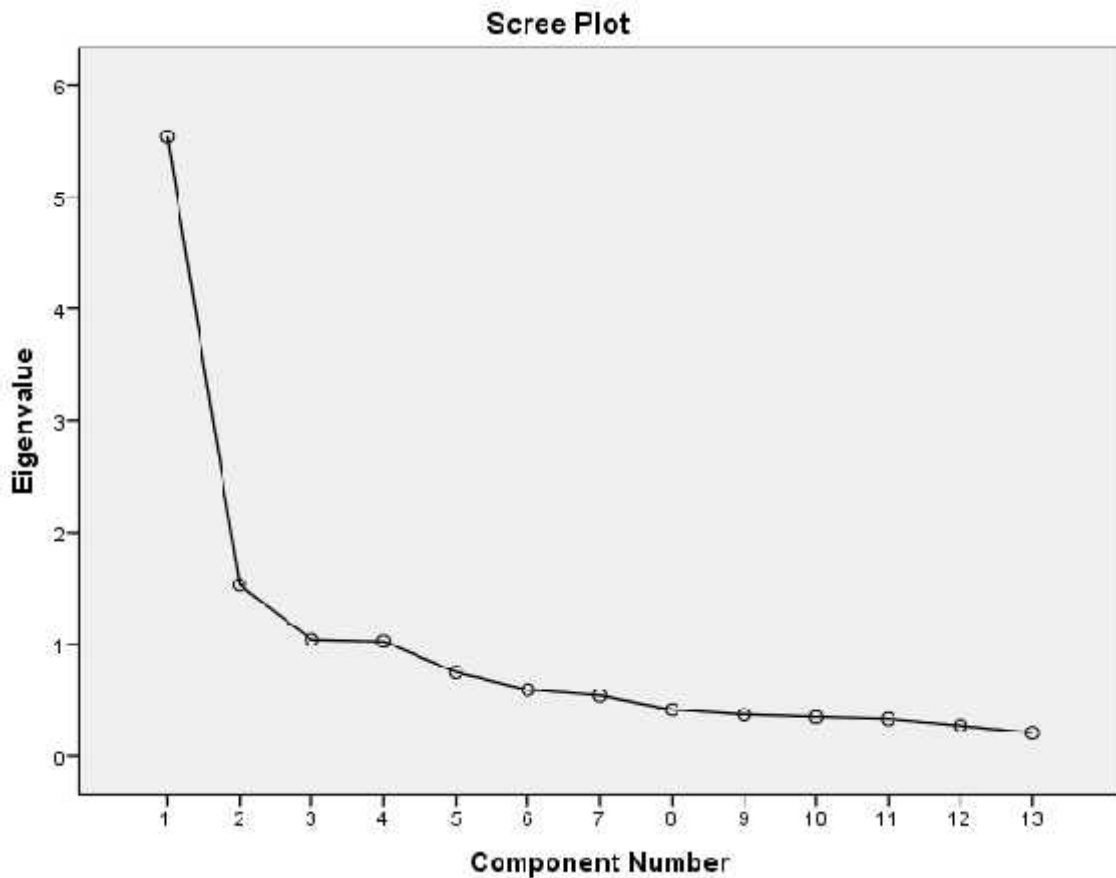
#### **APPENDIX IV: Pre-Training Phase (N=13)**

##### **1. Questions under Pre-training phase**

1. Prior to the start, I had a good understanding of how well the training would fit my job related development (Relev\_1).
2. This training program fits well to my job requirements (Relev\_2).



3. This training program will enhance my career development (Relev\_3).
4. The training program helped me identify how to build on my current knowledge and skills (Enjoy\_1).
5. I enjoyed the way the training program was being carried out (Enjoy\_2).
6. I was motivated to attend this training program (Enjoy\_3).
7. From the start of the training program, I was aware of the goals I am supposed to achieve via this training program (Goal\_1).
8. I had specific, clear training goals to aim for during this training program (Goal\_2).
9. I knew which of the goals I want to accomplish were the most important (Goal\_3).
10. Prior to the training, I knew how the program was supposed to affect my performance (Texp\_1).
11. I knew what to expect from this training (e.g. content, type) before it began (Texp\_2).
12. Before the training, I had a good understanding of how it would fit my job related expectations (Texp\_3).
13. The expected outcomes of this training were clear at the start of the training program (Texp\_4).



*Figure 5: Scree Plot: Pre-training phase*

## 2. Structure matrix: Pre-training phase

Table 33: Structure Matrix: Pre-training phase (N=13)

Items	Rotated Factor Loadings			
	Training expectations	Relevance of the training program	Goal clarity	Motivation
The expected outcomes of this training were clear at the start of the training program.	.797		.357	.351
I knew what to expect from this training (e.g. content, type) before it began.	.786	.327	.409	
From the start of the training program, I was aware of the goals I am supposed to achieve via this training program.	.780		.313	.307
Before the training, I had a good understanding of how it would fit my job related expectations.	.747	.616	.384	
Prior to the training, I knew how the program was supposed to affect my performance.	.734	.491	.327	
Prior to the start, I had a good understanding of how well the training would fit my job related development.	.650	.638		
This training program fits well to my job requirements.	.447	.814		
This training program will enhance my career development.		.802	.499	.343
The training program helped me identify how to build on my current knowledge and skills.		.759	.517	.441
I had specific, clear training goals to aim for during this training program.	.460	.411	.879	
I knew which of the goals I want to accomplish were the most important.	.452	.420	.871	
I was motivated to attend this training program.		.362	.393	.804
I enjoyed the way the training program was being carried out.	.487	.321		.774

### 3. Component Correlation matrix: Pre-training phase

Table 34: Component correlation matrix: Pre-training phase (N=13)

Component	Training expectations	Relevance of the training program	Goal clarity	Motivation
Training expectations	1.000	.435	.326	.163
Relevance of the training program	.435	1.000	.417	.240
Goal Clarity	.326	.417	1.000	.288
Motivation	.163	.240	.288	1.000

## APPENDIX IV: The Actual Training Phase (N=23)

### 1. Questions under the Actual training phase

1. The content of the training program fits to my training needs (Cont\_1).
2. The content of the training program was relevant (Cont\_2).
3. The content of the training program was up to date (Cont\_3).
4. The training program had a good mix of theory and practice (Method\_1).
5. The training method(s) reflect current practice (Method\_2).
6. The trainer used up-to-date equipment/training materials (Method\_3).
7. The trainer ensured that all the participants were actively involved in the training (Trsup\_1).
8. The trainer had a good schedule during the training (Trsup\_2).
9. The trainer had sufficient knowledge about the topics covered during the training (Trsup\_3).
10. The trainer had sufficient experience on the topics covered during the training (Trsup\_4).
11. I really enjoyed the variety of methods that the trainer used (e.g. team work, role play and presentation) (Trsup\_5).
12. There were sufficient exercises during the training to properly understand how I must apply the learned knowledge and skills into practice (Trsup\_6).
13. The training will influence my performance on the job (Fuexp\_1).
14. The training has fulfilled my expectations that I had before the training (Fuexp\_2).
15. The training meets my job related development goals (Fuexp\_3).
16. At the end of the program, the outcomes of the training were clear (Fuexp\_4).
17. During the training, I received feedback from other participants about the way I was applying the new knowledge and skills (Feed\_1).
18. During the training, I got enough instructions from the trainer about how to apply the new knowledge and skills of the training (Feed\_2).
19. During the training, I got feedback from the trainer about the way I was applying the new knowledge and skills (Feed\_3).
20. After the training, the trainer made clear that I did or did not meet the formulated requirements (Feed\_4).
21. The activities and exercises the trainer(s) used helped me how to apply the learning on the job (Trdes\_1).
22. The trainer(s) used lots of examples during the training program that showed me how I could use my learning on the job (Trdes\_2).
23. The way the trainer(s) taught the training material made me feel more confident I could apply them in my job (Trdes\_3).

## 2. Scree Plot: The Actual training phase

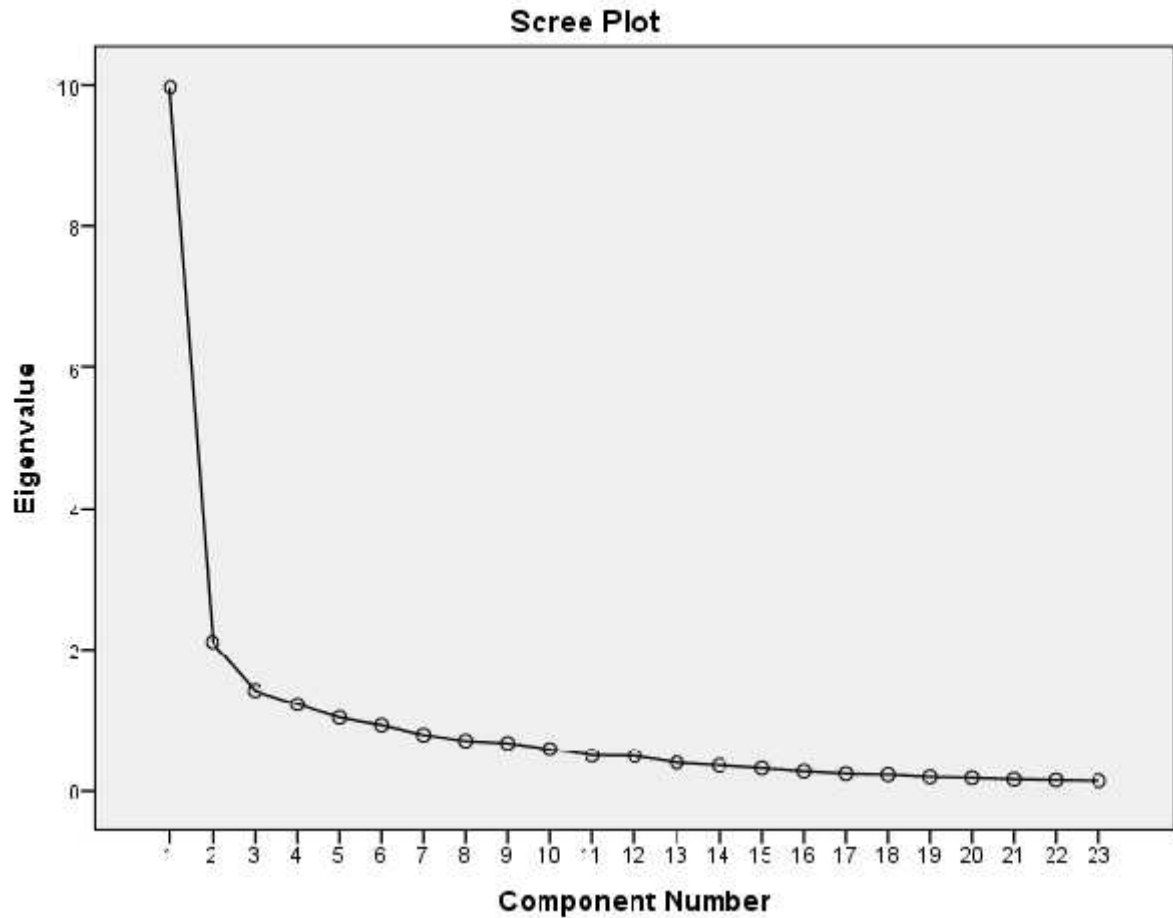


Figure 6: Scree Plot: The Actual training phase

## 3. Structure matrix: Post training phase

Table 35: Structure matrix: The Actual training phase (N=23)

Items	Rotated Factor Loadings				
	Practice and Feedback	Fulfilment expectations	Trainee expectations	Trainer Expertise	Up-to-date content
During the training, I got feedback from the trainer about the way I was applying the new knowledge and skills.	.870	.488	.424		.323
There were sufficient exercises during the training to properly understand how I must apply the learned knowledge and skills into practice.	.824	.464	.660		.414
During the training, I received feedback from other participants about the way I was applying the new knowledge and skills.	.743	.534	.363		.309

During the training, I got enough instructions from the trainer about how to apply the new knowledge and skills of the training.	.736	.589		.369	
The activities and exercises the trainer(s) used helped me how to apply the learning on the job.	.726	.565	.462		
I really enjoyed the variety of methods that the trainer used (e.g. team work, role play and presentation).	.665	.602	.594		
The training program had a good mix of theory and practice.	.665	.425	.621		.552
After the training, the trainer made clear that I did or did not meet the formulated requirements.	.652				
The training method(s) reflect current practice.	.599	.542	.416	.413	.483
The training meets my job related development goals.	.559	.876	.506		.323
The training will influence my performance on the job.	.462	.863	.405	.335	.318
The content of the training program fits to my training needs.	.520	.825	.542	.389	.588
The way the trainer(s) taught the training material made me feel more confident I could apply them in my job.	.693	.761	.431	.384	
The trainer(s) used lots of examples during the training program that showed me how I could use my learning on the job.	.651	.659		.630	.327
The trainer had a good a schedule during the training.	.389	.399	.894		
The training has fulfilled my expectations that I had before the training.	.544	.642	.697	.383	.508
The content of the training program was relevant.		.570	.666	.333	.432
At the end of the program, the outcomes of the training were clear.	.579	.616	.665	.502	.364
The trainer ensured that all the participants were actively involved in the training.	.615	.334	.627	.482	.312
The trainer had sufficient experience on the topics covered during the training.				.912	.430
The trainer had sufficient knowledge about the topics covered during the training.		.378		.906	.410
The content of the training program was up to date.		.410		.425	.865
The trainer used up-to-date equipment/training materials.	.373		.354	.390	.826

#### 4. Component Correlation matrix: The Actual training phase

Table 36: Component Correlation matrix: The Actual training phase(N=23)

Factor(s)	Practice and Feedback	Fulfilment expectations	Trainee expectations	Trainer Expertise	Up-to-date content
Practice and feedback	1.000	.603	.524	.343	.375
Fulfilment expectations	.603	1.000	.491	.398	.401
Trainee expectations	.524	.491	1.000	.271	.447
Trainer support	.343	.398	.271	1.000	.392
Up-to-date content	.375	.401	.447	.392	1.000

#### APPENDIX V: Post Training Phase (N=15)

##### 1. Questions under Post-training phase

1. I am happy to try out the skills that I have learnt at the training program (Coglr\_1).
2. I am curious to see the outcomes when I employ my learnt skills at work (Coglr\_2).
3. I feel the need to use the skills that I am trained in (Coglr\_3).
4. I feel empowered when I try out the new skills that I learn at this training program (Coglr\_4).
5. I am confident in my ability to use the new skills at work (Perself\_1).
6. I do not doubt my ability to use the newly learned skills at the job (Perself\_2).
7. I am sure that I can overcome obstacles on the job that hinder my use of the new skills and knowledge (Perself\_3).
8. At work, I feel very confident using what I have learnt in this training program even in the face of difficult situations (Perself\_4).
9. This training program will help me perform my tasks better (Trper\_1).
10. My performance in this training program will be an influencing factor for my success at work (Trper\_2).
11. My training performance will have a direct impact on my results at my job (Trper\_3).
12. This training program will increase my personal productivity (Motiv\_1).
13. After the training program, I can't wait to get back to work and try out what I have learnt (Motiv\_2).
14. I believe that this training program will help me do my current job better (Motiv\_3).
15. I get excited when I think about trying to use my new learning on my job (Motiv\_4).

## 2. Scree Plot: Post training phase

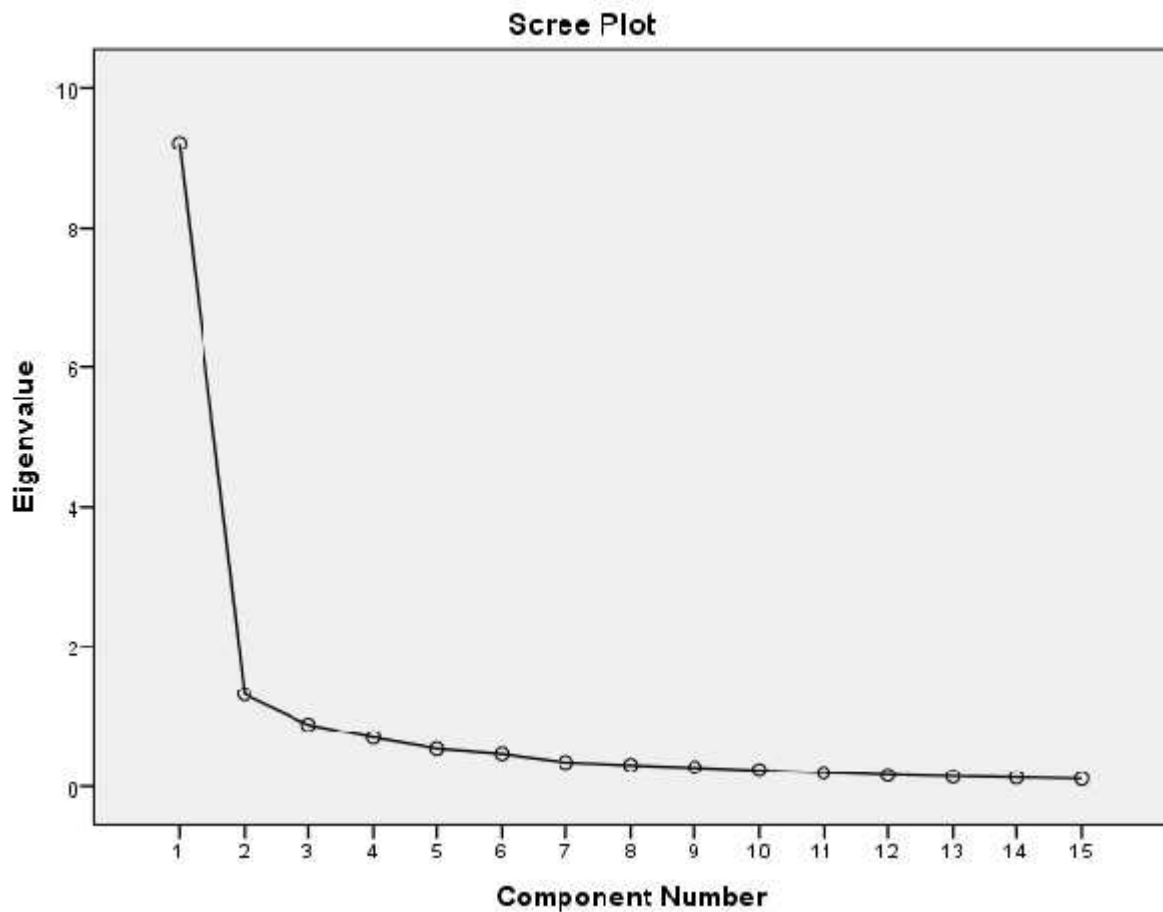


Figure 7: Scree Plot: Post-training phase

## 3. Structure matrix: Post training phase

Table 37: Structure Matrix: Post-training phase (N=15)

Items	Rotated Factor Loadings	
	Performance Self-Efficacy	Impact on work performance
I am confident in my ability to use the new skills at work.	.882	.576
I feel empowered when I try out the new skills that I learn at this training program.	.859	.697
After the training program, I can't wait to get back to work and try out what I have learnt.	.836	.744
I do not doubt my ability to use the newly learned skills at the job.	.835	.523
At work, I feel very confident using what I have learnt in this training program even in the face of difficult situations.	.824	.597
I get excited when I think about trying to use my new learning on my job.	.792	.736

I am happy to try out the skills that I have learnt at the training program.	.779	.559
I feel the need to use the skills that I am trained in.	.776	.675
I am curious to see the outcomes when I employ my learnt skills at work.	.771	.568
I am sure that I can overcome obstacles on the job that hinder my use of the new skills and knowledge.	.635	.374
My training performance will have a direct impact on my results at my job.	.547	.905
This training program will increase my personal productivity.	.605	.894
My performance in this training program will be an influencing factor for my success at work.	.643	.878
I believe that this training program will help me do my current job better.	.599	.876
This training program will help me perform my tasks better.	.733	.838

#### 4. Component Correlation matrix: Post training phase

Table 38: Component Correlation matrix: Post-training phase (N=15)

Component	Performance Self-efficacy	Impact on work performance
Performance Self-efficacy	1.000	.704
Impact on work performance	.704	1.000

### APPENDIX VI: Attributes of the existing evaluation form

#### 1. Components of the existing evaluation form

Table 39: Components of the existing evaluation form

Factor	Sno	Items	Closed / Open ended	Measurement scale(s)
Organization	1	How do you rate the accommodation? (Org_1)	Closed	1 = Excellent 2 = Good 3 = Neutral 4 = Poor 5 = Insufficient
	2	How do you rate the provided information about the training program by the Academy? (Org_2)	Closed	1 = Excellent 2 = Good 3 = Neutral 4 = Poor 5 = Insufficient 6 = N/A
Trainer	3	How do you rate the skills of the trainer (Train_1)	Closed	1 = Excellent 2 = Good 3 = Neutral 4 = Poor 5 = Insufficient
	4	How do you rate the interaction	Closed	1 = Excellent



		with the trainer? (Train_2)		2 = Good 3 = Neutral 4 = Poor 5 = Insufficient
Content/ Training methodology	5	How do you rate the material of the training program? (Cont_1)	Closed	1 = Excellent 2 = Good 3 = Neutral 4 = Poor 5 = Insufficient 6 = N/A (Missing value)
	6	How do you rate the content of the training program? (Cont_2)	Closed	1 = Excellent 2 = Good 3 = Neutral 4 = Poor 5 = Insufficient
	7	How do you rate the level of the training program? (Cont_3)	Closed	1 = Excellent 2 = Good 3 = Neutral 4 = Poor 5 = Insufficient
	8	How do you rate the practical education tools? (Cont_4)	Closed	1 = Excellent 2 = Good 3 = Neutral 4 = Poor 5 = Insufficient 6 = N/A (Missing value)
	9	How do you rate the length of the training program? (Cont_5)	Closed	1 = Excellent 2 = Good 3 = Neutral 4 = Poor 5 = Insufficient
	10	How do you rate the tempo of the training program? (Cont_6)	Closed	1 = Excellent 2 = Good 3 = Neutral 4 = Poor 5 = Insufficient
	11	How do you rate the variation (theory and practice) during the training program ? (Cont_7)	Closed	1 = Excellent 2 = Good 3 = Neutral 4 = Poor 5 = Insufficient 6 = N/A (Missing value)
N/A	12	Which subjects did you find useful of this training?	Open ended	N/A
	13	Which subjects didn't get enough attention or are after explanation still not clear to you (and why?)	Open ended	N/A
	14	Which subjects did get too much attention during this training (and why)?	Open ended	N/A
Information Transfer	15	How do you rate the group size?(IE_1)	Closed	1 = Excellent 2 = Good 3 = Neutral 4 = Poor 5 = Insufficient
	16	How well do you think you are able to put the knowledge of the training program into practice?	Closed	1 = Excellent 2 = Good 3 = Neutral

		(IE_2)		4 = Poor 5 = Insufficient
Testing	17	Are you satisfied with the method of testing? (Test_1)	Closed	1 = Very Satisfied 2 = Somewhat satisfied 3 = Neutral 4 = Somewhat dissatisfied 5 = Very Dissatisfied
	18	Were the criteria used for judging/grading the test clear to you? (Test_2)	Closed	1 = Completely 2 = Yes 3 = No 4 = Absolutely not
	19	Did you get enough feedback during (or before) working on you test? (Test_3)	Closed	1 = Completely 2 = Yes 3 = No 4 = Absolutely not
Overall Conclusion	20	Is it likely that you would recommend this training to a colleague?	Closed	Not relevant for analysis
	21	By what grade would you mark this training with all its aspects? (Overall_rating)	Closed	Likert scale (1 -10 ) rating scale
	22	Have you enjoyed the course?	Closed	Not relevant for analysis
	23	By which grade would you mark this online evaluation?	Closed	Not relevant for analysis
	24	Notes and /or suggestions	Open ended	N/A

## 2. Scree Plot: Existing Feedback Evaluation questionnaire

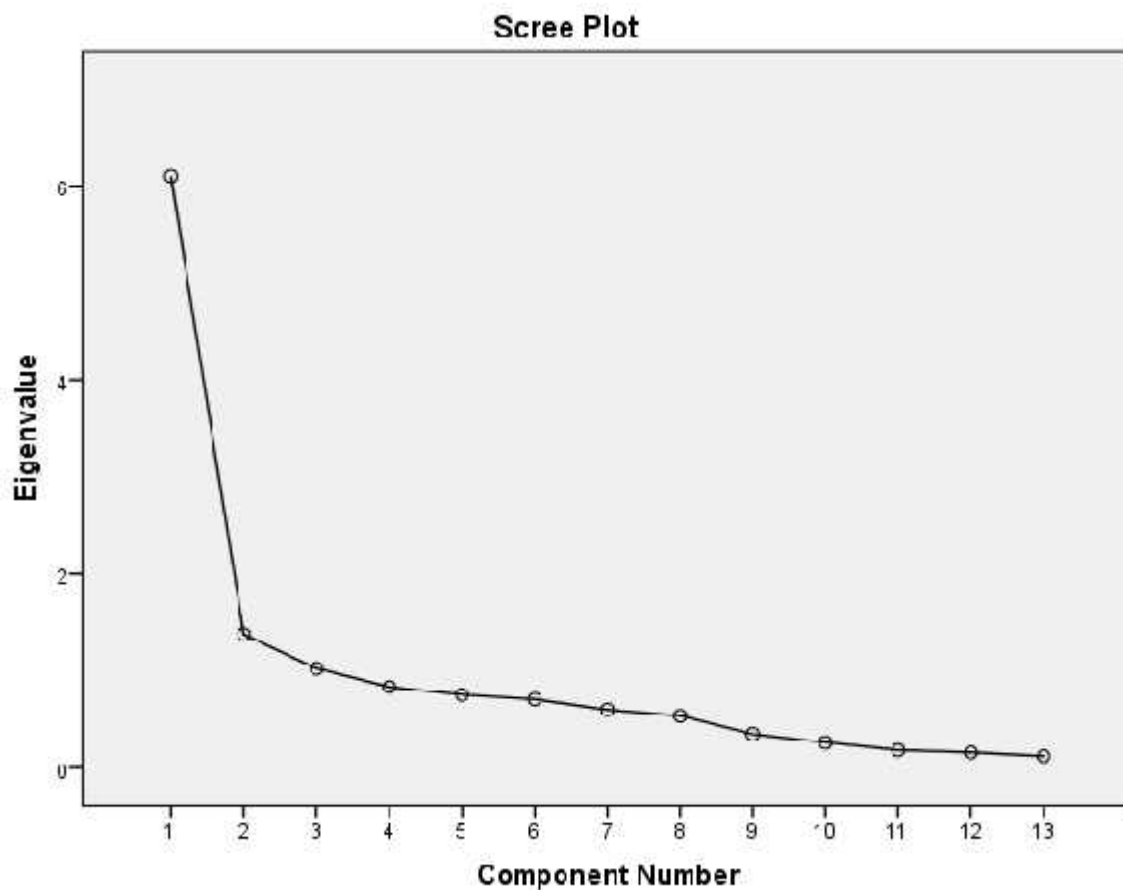


Figure 8: Scree Plot: Old feedback evaluation form

### 3. Structure matrix: Old Feedback evaluation questionnaire

Table 40: Structure matrix: Old feedback evaluation (N=13)

Item(s)	Rotated Factor Loadings		
	Content/Trainer	Training Aspects	Other Aspects
How do you rate the accommodation?			,744
How do you rate the provided information about the training program by the Academy?	,519		,641
How do you rate the skills of the trainer?	,406	,540	,707
How do you rate the interaction with the trainer?	,709	,584	,571
How do you rate the material of the training program?	,832	,517	,502
How do you rate the content of the training program?	,827	,628	,494
How do you rate the level of the training program?	,735	,607	,374
How do you rate the practical education tools?	,422	,614	,766
How did you rate the length of the training program?	,523	,876	,427
How did you rate the tempo of the training program?	,500	,849	,379
How do you rate the variation (theory and practice) during the training program	,486	,749	,405
How do you rate the group size		,418	,562
How well do you think you are able to put the knowledge of the training program into practice	,832	,413	

### 4. Component Correlation matrix: Old Feedback evaluation questionnaire

Table 41: Component Correlation matrix: Old feedback evaluation (N=13)

Component(s)	Content/Trainer	Training Aspects	Other Aspects
Content/Trainer	1,000	,473	,403
Training Aspects	,473	1,000	,513
Other Aspects	,403	,513	1,000

## APPENDIX VII: Survey Editor Design Requirements

### 1. Survey Design Editor

Survey design ideas presented in this section are derived on observing survey creation and evaluation software's across the web. The ideas mentioned below are up-to date and the Academy must consider incorporating these tips to make the survey design more interactive and user

friendly. The design wizard, which is nothing but an editor should provide a variety of functionalities such as “Add question”, “Add question group with labels”, “Line spaces”, “Pole labels” “Text Box”, “Picture/Logo”, “Page Break”, “Font” , “Size and alignment”, “Milestone markers/progress bars” etc. The Editor window should also have tabs for specifying “Form properties”, “Layout settings”, “Filter settings”, “Required Questions”.

The “Form properties” tab should provide options for choosing the appropriate question type such as multiple choice, single choice, Open ended, yes/no etc. , specifying the appropriate measurement scale for every questions ( 5 or 7 point Likert scale / Slider format) along with tabs for left , middle and the right pole values.

The upgraded tool should prompt a “Quick preview” option in a printable pdf version or HTML (online) which enables a regular check during the design process. In order to accelerate the design process, questions can be imported into an integrated library and the questions can be simply added the survey in the click of a button.

## **2. Appearance**

The use of colors representing the researchers or the respondent’s organizations lends credibility to the survey (Singh et al, 2009). However it is good to avoid too many colors as they can create a clutter. Demarcation between sections of the questions can be added with the help of thin grey lines. It is recommended to use professional fonts such as Arial or Times new roman with a font size of either 11 or 12 points (Singh et al, 2009).

## **3. Scrolling vs paging concept**

Survey creation should cater in a way that prompts design depending on the number of questions per page. The survey can either have all questions in one page or multiple questions grouped in several pages and certainly not one question per page. Design considerations must prevent the usage of horizontal scroll bars in case of single page surveys and vertical/horizontal scroll bars in case of multipage surveys as it requires extra effort for the respondent to view the questions. In case of multiple page surveys, session keys can be used to ensure that the respondents follow a defined sequence as intended by the researchers.

## **4. Server timeout option**

When the survey remains idle for continuous periods of time, the existing questionnaire remains open until and unless the page is closed. Hence a server timeout option should be used her to avoid standalone/ obsolete responses.