On-the-Job Learning Styles

Conceptualization and Instrument Development for the Nursing Profession

Marjolein Berings

On-the-Job Learning Styles

Conceptualization and Instrument Development for the Nursing Profession

Marjolein Berings

Doctoral Committee

Promotores	Prof. dr. R.F. Poell Prof. dr. P.R.J. Simons
Other members	Dr. S.M. Bolhuis Prof. dr. J.W.M. Kessels Prof. dr. J. Paauwe Prof. dr. J.B. Rijsman

Berings, Marjolein Geertruida Maria Catharina

On-the-job learning styles: Conceptualization and instrument development for the nursing profession
(Werkplek-leerstijlen: Conceptualisering en instrument ontwikkeling voor de verpleegkundige beroepsgroep)
Proefschrift Universiteit van Tilburg: 2006 – figuren, tabellen - met literatuuropgave – met samenvatting in het Nederlands

ISBN-10: 90-9020938-7
ISBN-13: 978-90-9020938-8
NUR 841

Keywords: continuing professional development, human resource development, learning content, learning process, learning style, nurses, on-the-job learning
Trefwoorden: leerinhoud, leerproces, leerstijl, verpleegkundigen, werkplek leren

On-the-Job Learning Styles

Conceptualization and Instrument Development for the Nursing Profession

Werkplek-Leerstijlen

Conceptualisering en Instrument Ontwikkeling voor de Verpleegkundige Beroepsgroep

(met een samenvatting in het Nederlands)

Proefschrift

ter verkrijging van de graad van doctor aan de Universiteit van Tilburg, op gezag van de rector magnificus, prof. dr. F.A. van der Duyn Schouten, in het openbaar te verdedigen ten overstaan van een door het college voor promoties aangewezen commissie in de aula van de Universiteit op

woensdag 4 oktober 2006 om 14.15 uur

door

Marjolein Geertruida Maria Catharina Berings
geboren op 31 december 1976 te Sint Oedenrode

Promotores: Prof. dr. R.F. Poell
Prof. dr. P.R.J. Simons

Preface

Thank you for taking an interest in my thesis. I hope you will enjoy reading it. I enjoyed writing it, even though sometimes it was hard to remain disciplined since I had many dreams I wanted to follow. But writing this thesis was definitely one of these dreams, and here is the result.

First of all, I would like to thank my supervisors, Rob Poell and Robert-Jan Simons. Rob, I am glad you gave me the opportunity to follow you to Tilburg, it was nice to receive your support and useful comments while exploring the different aspects of academic life. I learnt a lot from you. Robert-Jan, I also learnt a lot from you, perhaps mostly from your openness to all possible ideas, combined with your capacity to reduce emerging entanglements to main messages. Thanks for that.

Next, I would like to thank my other co-authors. Anja Doornbos, writing with you was great fun, it made me realize that I wanted to write more articles in co-authorship, to learn from others and feel other people's encouragement. John Gelissen, it was excellent to explore the process of qualitative research and analyze data together. This not only made the process more solid, but also more fun and challenging to do. Marc van Veldhoven, thank you for your critical comments and encouraging view on conducting survey research.

Many thanks to my colleagues of the Department of Education in Nijmegen, I had a good time working at your department. Henny, you were a great roommate! Eddy and Chris, after leaving for Tilburg, it was nice to remain linked to the department through teaching with you. Sanneke and Ferd, it was inspiring to keep sparring now and then. Maarten, I am glad we kept meeting through mutual contacts. Also many thanks to all the others, who continued to make me feel welcome when I came back for a chat now and then.

Thanks Birgit, Geertje, Luc, and Thijs, for having me combining work in Tilburg with great afternoons and evenings with sports, drinks, diners, music, and interesting conversations. Also many thanks to my other colleagues in Tilburg, Audrey, Brigitte, Chad, Elaine, Eva, Gerard, Jaap, Jacques, Joyce, Karen, Karin, Karin, Karina, Levien, Marc, Marianne, Marinus, Marloes, Mirjam, Nuray, Paul, Renée, Rob, and Roos for providing such a comfortable and challenging atmosphere to work in. And thanks, Iris, Lisanne, Suzan, and the other student assistants, for the data entries. Not to forget my colleagues of the Department of Methodology and Statistics. The expertise of John, Joost, Klaas, Luc, and Marcel has been very useful.

Aimee, Anja, Cindy, Derk-Jan, Elise, Isabel, Kariene, Manuela, Marjan, Marloes, Thomas, Renate, Sanne, and Suzanne, I definitely enjoyed elaborating on workplace learning and lots of other stuff with you in the pub. You were also great congress-mates!

I would like to thank all nurses, supervisors, and nurse educators, who participated in this research project. Thank you for showing me your departments, for telling me about your experiences, and for filling in the questionnaire. Special thanks to Annemieke and José, who have often used their extensive nursing experience to provide feedback on my ways of framing observations and questions in a 'nursing language'.

Thanks Koos and Suzanne, for your useful comments and encouragements. Thank you Dennis, for the corrections. Thanks Judith and Ronald, for your contribution to the cover of this thesis. We had great fun working on it!

Thank you, Anja, Geertje, and Sanne, to stand by my side during the ceremony and the preparations for it. You have been fantastic sparring partners and friends during my PhD-period!

Last, but certainly not least, I would like to thank my friends and family for your ongoing support and loving care. You are great! Thank you for your encouragement when I needed it, and thank you for toning me down when that was needed… Also many thanks for your support in the next dream I will follow, Malawi. I am so lucky having you!

Marjolein

Contents

Chapter 1

General Introduction

Until recently, HRD mainly focused on formal education and training, even though the challenges of work itself and the interactions with other people in the workplace are significant sources of learning for employees (e.g., Eraut, 2004; Poell, van Dam, & van den Berg, 2004). Interest in on-the-job learning, where learning is integrated into work tasks, has been growing over the last ten years. However, we still know little about methods that can be used to improve on-the-job learning. The purpose of this PhD research was to develop a greater understanding of individual on-the-job learning processes in general and particularly for the nursing profession. We aimed to develop and validate an instrument to measure employees' on-the-job learning styles in such a way that the instrument offers opportunities for employees to improve their on-the-job learning. In this chapter, illustrations were drawn from the nursing profession, since that is the context in which the research was conducted.

'It seems like everything is changing all the time. One week we got a new computer system, the next week a new approach to avoid decubitus [bedsores] was introduced, then the task division on our ward changed, we got new equipment for lifting patients, the task division changed again, the treatment protocols after hernia surgery changed, etcetera, etcetera. And this was just in the last couple of months! We need to keep on learning how to deal with these changes'.

As this nurse illustrates, work contexts keep changing. It is therefore important for organizations and individual workers in organizations that employees, after finishing their professional education, continue learning throughout their career (e.g., Ellström, 2001; Furnham, Jackson, & Miller, 1999; Lankhuijzen, 2002; van der Sluis-den Dikken, 2000; van Woerkom, 2003). It is critical for organizations that employees learn because many of them are attempting to develop from traditional Taylorist models of work organization into more humanistic, flexible, and integrated work systems (Steijn, 2001). The complexity of the information society is growing and efficient use of an organization's human resources is becoming more and more important (van Woerkom, 2003). Organizations increasingly recognize that their greatest asset is the knowledge capital embedded in their employees (Harrison & Kessels, 2004). It is important to employees that they learn because the competences that work requires from them are continuously changing and employability is becoming increasingly important to them (Lankhuijzen, 2002). Organizations are no longer able to guarantee job security or long-term career opportunities, making it essential for employees to be employable in other organizations as well as their own. Employees need to learn to enhance their marketable skills in the labour market. In addition to these economic reasons for the importance of learning in organizations,

many psychological reasons should also be mentioned. Employee learning contributes to the development of, among other things, broader role orientations, higher self-efficacy (Parker & Wall, 1998), greater job satisfaction and organization commitment, fewer intentions to leave, and lower stress rates (Kleinman, Siegel, & Eckstein, 2002).

As a result, the need for continuous learning is now greater than ever. Therefore, in many countries lifelong learning is placed high on the political agenda (Skule, 2004). Within organizations, many training opportunities are being developed for employees to learn new competences. However, such formal educational and training opportunities are not always available to everyone and in many situations training has several disadvantages: it does not have an impact unless it is well timed, it often seems difficult to transfer what has been learned to everyday work situations and it is expensive (van Woerkom, 2003).

A nurse told us: *'We hardly have any budget to attend courses or conferences. We keep on asking for it because we feel it is important, but mostly there is just no money available'*. We asked her if she was able to transfer what she had learned in courses or at conferences to daily work practices and she told us the following: *'I usually get some great ideas, which need to be elaborated later. When I'm back at work I need to reflect on them and talk about them with colleagues. And then… yes, I think there has been some sort of transfer. It's just hard to continue reflection when you're back at work. To be honest, I don't always manage to do this. I have never learned to do this…'*.

In addition to continuously learning new competences, employees should also learn how to learn efficiently, in order to adjust to new situations (e.g., Chalofsky, 1996; Onstenk, 1997). They need to learn to identify skill gaps and anticipate how changes elsewhere in the organization or industry may affect work demands and skill requirements. It is doubtful whether formal training can produce this sort of impact on employee learning skills (Baldwin & Ford, 1988). As the nurse continues *'…I can observe a difference between me, I'm 54 years old, and the young nurses. At school, they have learned how to learn. I never learned how to do this. I wouldn't say I can't learn, I just need some help'*.

Over the last ten years, there has been an evolving shift in the field of human resource development from training to learning, with increasing attention being paid to on-the-job learning (e.g., Billett, 2002a; Doornbos, 2006; Eraut, 2004). In addition to formal training, the most significant sources of learning are the challenges of work itself and interactions with other people in the workplace. All work-related activities can be regarded as (implicit or explicit) learning activities (Elkjaer, 2004; Simons, van der Linden, & Duffy, 2000) and making better use of on-the-job learning can be considered essential for organizations and employees.

So far, little is known about on-the-job-learning (Doornbos, 2006; Marsick & Volpe, 1999). How do people actually learn on the job and how can on-the-job learning be stimulated? Few studies have been conducted on the learning process similarities between learners and even fewer studies have focused on individual differences in on-the-job learning (Poell et al., 2004).

On-the-job learning

Many different terms are used in the literature to describe learning related to work, such as work-based learning, work-related learning, informal learning, non-formal learning, workplace learning, and on-the-job learning. The specific content of these terms varies from term to term and differs between different studies. The discussion on the definitions of these terms is further elaborated by Streumer & Kho (2006). These definitions substantially differ on whether formal learning is included.

At the beginning of the process of writing this thesis, we regarded on-the-job learning as 'implicit or explicit mental and/or overt activities and processes, embedded in working and work-related performance, leading to relatively permanent changes in knowledge, attitudes or skills' (Berings & Doornbos, 2003, p.48). This definition did not include activities and processes which are not embedded in work processes, such as training and courses. Later in the process of writing this thesis, however, we became interested in the broader area of employee learning. We became interested in all learning arising from the daily work process, learning in designed learning programmes (such as courses, workshops, coaching, etc.) and learning outside work relevant for work processes. We believe that in order for employees to improve their learning, it is important for them to be aware of how they learn, or more specifically, the learning activities they perform. People in work situations often have the opportunity to choose from a variety of learning activities, which can be embedded in the ongoing work process, in specially designed learning programmes, or in situations outside work (Eraut, Alderton, Cole, & Senker, 1998). All learning that improves the quality of the employees' work, their employability or their personal development thus received our attention (cf. van der Krogt, 2006). Hence, in this thesis, we discuss on-the-job learning in a broad sense as being 'all implicit or explicit mental and/or overt activities and processes, *performed in the context of work*, leading to relatively permanent changes in knowledge, attitudes or skills' (Berings, Poell, & Simons, submitted).

The nursing profession

We have conducted the present research into a particular profession because it is currently recognized by many scholars that learning at work is best understood in terms of the nature of the task itself, the cultural and social relations that characterize the workplace and the experiences and social world of the participants (Billett, 2002b; Illeris, 2002). It is only possible to take all these characteristics into account by locating the research in a particular context.

We chose the nursing profession because the need for continuous learning in this profession is particularly high. In the healthcare sector in the Netherlands, 45% of the employees and 68% of the supervisors feel that the need for learning is increasing (den Boer & Hövels, 2003). Examples of changes in their work environment that demand continuous learning by nurses include

- the development of new technologies in nursing equipment, such as new drip systems, new beds, and new equipment for lifting patients (Clark, 2001)

- changing disease patterns and treatment methods and knowledge about them, such as different methods to avoid decubitus [bedsores], different medicines and different, often shorter, treatment after surgery (Clark, 2001)
- changing task divisions, such as a shift from task-centred nursing to patient-centred nursing or to a new task rearrangement, or the shift from internal medical care to care that is, at least partly, provided externally, or the changing boundaries between the work carried out by nurses and that of junior hospital doctors (Allen, 2001)
- changing task views, such as expectations of question-based and patient-centred working (den Boer & Hövels, 2001), critical thinking (Colucciello, 1999) and autonomous decision-making (Clark, 2001).

The training nurses initially receive is insufficient to be able to adapt to these new work situations. Therefore, they need to keep learning during their careers (Lawton & Wimpenny, 2003). Consequently, the nursing profession is a prime example of a work environment that needs and provides opportunities for continuous learning.

The need for life-long learning is also visible from the perspective of the nurses themselves. The nursing profession would be more attractive to nurses if they were given better learning opportunities (Maurer, Weiss, & Barbeite, 2003). Research in the Netherlands has shown that there is a clear relationship between a lack of learning opportunities and nurses leaving the profession (Dik & van Splunder, 2002). Furthermore, continuing development is important for nurses to remain employable (Lawton & Wimpenny, 2003).

We can conclude that for several reasons the profession could benefit from methods that can be used to improve on-the-job learning. Nurses who are unable to direct their own learning will not have the skills necessary to meet all ongoing changes in health care (O'Shea, 2003).

The nurse continued: *'I know that on-the-job learning is a key plank of hospital policy, but I have not noticed anything of that on the work floor. My supervisor does not stimulate or facilitate me in any way to put effort into on-the-job learning. For my part, I would really like to put more effort into it, and hopefully obtain the opportunities, but I wouldn't know where to start'.*

Awareness

To be able to actively direct their own learning, employees should first become aware of *the fact that* they learn and *how* they do it (Barrie & Pace, 1998). People are usually not aware of these issues (Boekaerts, 1996). Therefore, raising awareness of on-the-job learning styles could be a method to help employees improve their learning skills. When we asked a nurse about how she had developed herself in her job she answered: *'I notice improvement in my work, but I can't say how and why it has taken place. I suppose I've just carried on with my job and have therefore been able to pick up new things'.*

If we were to develop an instrument that would provide insight into peoples' on-the-job learning styles, this would raise their awareness of their options and choices in learning behaviour and thus offer opportunities for adaptations. It would offer them a lexicon that would enable verbal expression of individual differences in learning behaviour (Coffield, Mosely, Hall, & Ecclestone, 2004; Desmedt & Valcke, 2003).

Furthermore, it can improve communication and collaboration between team members and offer opportunities to tailor guidance by human resource professionals or managers.

Problem statement and research questions

The purpose of this PhD research was to develop a greater understanding of individual on-the-job learning processes in general and particularly for the nursing profession. We aimed to develop an instrument to measure nurses' on-the-job learning styles in such a way that the instrument will offer opportunities for nurses to improve their on-the-job learning.

The main research question was thus as follows:

'How can on-the-job learning styles be conceptualized and measured in the nursing profession?'

This main research question was divided into the following sub-questions:

1. How can learning styles be conceptualized in on-the-job learning situations?
2. How can we develop a valid and reliable questionnaire measuring nurses' on-the-job learning styles?

Overview of the thesis

The *second chapter* of this thesis is a literature study on the conceptualization of on-the-job learning styles and how this can be used to improve employees' on-the-job learning. We define an on-the-job learning style as the tendency to use a particular combination of implicit and explicit learning activities that a person can and likes to perform on the job. The person adapts the combination of learning activities to each situation differently. This particular combination is called the actualized learning strategy.

The *third chapter* investigates three self-report instruments that have been most widely used in previous studies on on-the-job learning to measure learning styles: Kolb's Learning Style Inventory (1976, 1985), Honey and Mumford's Learning Style Questionnaire (1986, 1989), and Allinson and Hayes' Cognitive Style Index (1996). It investigates whether these instruments are actually adequate to be used in on-the-job settings.

Chapter 4 reviews other instruments that are used in contemporary research on on-the-job learning processes (learning styles, strategies, activities, tactics, behaviours, orientation, and approaches). We investigated the methodological practices used in those studies, paying attention to the research instruments, informal learning perspectives, paradigms, goals, researcher roles, and quality and rigour considerations. The chapter ends with the formulation of tentative guidelines for research in on-the-job learning processes.

In the *fifth chapter* we describe two interview studies in which we explored nurses' on-the-job learning activity and content. The learning activities provide insight into the possible dimensions of nurses' on-the-job learning strategies. The learning content provides significant information about the on-the-job learning situation. In the first

study, we conducted a grounded theory analysis of interviews with twenty nurses from different departments of a general academic hospital in the Netherlands. We summarized the results in a classification of nurses' on-the-job learning activity and learning content. In the second study, we interviewed seventeen supervisors and eight educators from different hospitals in the Netherlands and confirmed and improved the classification of the above explorative study.

Since the empirical studies in Chapter 5 mostly revealed the overt dimensions of on-the-job learning styles and hardly any mental dimensions while literature in learning styles mainly focus solely on mental dimensions, we investigated these mental dimensions more thoroughly in *Chapter 6*. We reviewed the different (mental) dimensions of learning styles in the literature on educational psychology and analysed which of these dimensions would offer opportunities for use in on-the-job learning situations. Then we translated the selected dimensions to these situations.

In *Chapter 7* we selected the dimensions that would provide most opportunities for nurses' awareness of their on-the-job learning styles and constructed a questionnaire, the On-the-job Learning Styles Questionnaire for the Nursing profession (OLSQN). We studied the factor structure, internal consistency, construct validity, and criterion validity of the OLSQN scales and investigated the added value of the situation-response design of this questionnaire.

Chapter 8 concludes with the research questions of this PhD research and discusses the dilemmas that were tackled during the research process. It reflects on the decisions that were taken and their implications for this study at conceptual, methodological, empirical, and practical levels. Finally, challenges for future research are discussed.

Literature

Allen, D. (2001). *The changing shape of nursing practice: The role of nurses in the hospital division of labour*. London, UK: Routledge.

Baldwin, T. T., & Ford, J. K. (1988). Transfer of training: A review and directions for future research. *Personnel Psychology, 41*, 63-105.

Barrie, J., & Pace, R. W. (1998). Learning for organisational effectiveness: Philosophy of education and human resource development. *Human Resource Development Quarterly, 9*, 39-54.

Berings, M. G. M. C., & Doornbos, A. J. (2003). Exploring instruments mapping workplace learning processes. In *Proceedings book VI: Theme 8: Learning and learners at work. Work and lifelong learning in different contexts. Proceedings of the 3rd international conference of Researching Work and Learning* (pp. 48-58). Tampere, Finland: University of Tampere.

Berings, M. G. M. C., Poell, R. F., & Simons, P. R. J. (submitted). Dimensions of on-the-job learning styles.

Billett, S. (2002a). Toward a workplace pedagogy: Guidance, participation, and engagement. *Adult Education Quarterly, 53*, 27-43.

Billett, S. (2002b). Workplace pedagogic practices: Co-participation and learning. *Journal of Educational Studies, 50*, 457-481.

Boekaerts, M. (1996). Personality and the psychology of learning. *European Journal of Personality, 10*, 377-404.

Chalofsky, N. (1996). A new paradigm for learning in organizations. *Human Resource Development Quarterly, 7*, 287-293.

Clark, J. (2001). *De lerende verpleegkundige [The learning nurse]*. May 8th 2001, Anna Reyvaan Lezing [Anna Reyvaan Lecture]. Amsterdam, The Netherlands: Academisch Medisch Centrum.

Coffield, F., Mosely, D., Hall, E., & Ecclestone, K. (2004). *Learning styles and pedagogy in post-16 learning*. London, UK: Learning and Skills Research Centre.

Colucciello, M. L. (1999). Relationships between critical thinking dispositions and learning styles. *Journal of Professional Nursing, 15*, 294-301.

den Boer, P., & Hövels, B. (2001). *Benutting van competenties in de zorg- en welzijnssector [Utilization of competences in health care] (OSA Publicatie ZW15)*. Tilburg, The Netherlands: OSA.

den Boer, P., & Hövels, B. (2003). *Leer- en loopbaanmogelijkheden in de zorgsector [Learning and career possibilities in health care] (OSA Publicatie ZW41)*. Tilburg, The Netherlands: OSA.

Desmedt, E., & Valcke, M. (2003). Learning style awareness: Why would it work? In S. Armstrong, M. Graff, C. Lashley, E. Peterson, S. Raynor, E. Sadler-Smith, M. Schiering & D. Spicer (Eds.), *Bridging theory and practice. Proceedings of the 8th annual ELSIN conference 2003* (pp. 139-150). Hull, UK: University of Hull.

Dik, M. M., & van Splunder, R. (2002). Employability leeft onvoldoende in Nederland. [Concern for employability in the Netherlands is low]. *Tijdschrift voor Arbeidsvraagstukken, 18*, 147-153.

Doornbos, A. J. (2006). *Work-related learning at the Dutch police force*. PhD-thesis, Apeldoorn, The Netherlands: Police Academy of the Netherlands.

Elkjaer, B. (2004). Organizational learning. *Management Learning, 35*, 419-434.

Ellström, P. E. (2001). Integrating learning and work: Problems and prospects. *Human Resource Development Quarterly, 12*, 421-435.

Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education, 26*, 247-273.

Eraut, M., Alderton, J., Cole, G., & Senker, P. (1998). *Development of knowledge and skills in employment*. East Sussex, UK: University of Sussex.

Furnham, A., Jackson, C. J., & Miller, T. (1999). Personality, learning style and work performance. *Personality and Individual Differences, 27*, 1113-1122.

Harrison, R., & Kessels, J. (2004). *Human resource development in a knowledge economy: An organisational view*. Hampshire, UK: Palgrave MacMillan.

Illeris, K. (2002). *The three dimensions of learning. Contemporary learning theory in the tension field between the cognitive, the emotional and the social*. Frederiksberg, Denmark: Roskilde University Press.

Kleinman, G., Siegel, P., & Eckstein, C. (2002). Teams as a learning forum for accounting professionals. *Journal of Management Development, 21*, 427-460.

Lankhuijzen, E. S. K. (2002). *Learning in self-managed management career: The relation between managers' HRD-patterns, psychological career contracts and mobility perspectives*. PhD Thesis, Utrecht, The Netherlands: University of Utrecht.

Lawton, S., & Wimpenny, P. (2003). Continuing professional development: A review. *Nursing Standard, 17*(24), 41-44.

Marsick, V. J., & Volpe, F. M. (1999). The nature and need for informal learning. *Advances in Developing Human Resources, 3*, 1-9.

Maurer, T. J., Weiss, E. M., & Barbeite, F. G. (2003). A model of involvement in work-related learning and development activity: The effects of individual, situational, motivational, and age variables. *Journal of Applied Psychology, 88*, 707-724.

O'Shea, E. (2003). Self-directed learning in nurse education: A review of the literature. *Journal of Advanced Nursing, 43*, 62-70.

Onstenk, J. (1997). *Kernproblemen, ICT en didactiek van het beroepsonderwijs [Core problems, ICT and didactics of vocational education]* (SCO-report No. No. 475). Amsterdam, The Netherlands: SCO-Kohnstamm Instituut.

Parker, S., & Wall, T. (1998). *Job and work design: Organizing work to promote well-being and effectiveness*. London, UK: Sage Publications.

Poell, R. F., van Dam, K., & van den Berg, P. T. (2004). Organising learning in work contexts. *Applied Psychology: An International Review, 53*, 529-540.

Simons, P. R. J., van der Linden, J., & Duffy, T. M. (2000). New learning: Three ways to learn in a new balance. In P. R. J. Simons, J. Van der Linden & T. Duffy (Eds.), *New learning* (pp. 1-20). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Skule, S. (2004). Learning conditions at work: A framework to understand and assess informal learning in the workplace. *International Journal of Training and Development, 8*, 8-20.

Steijn, B. (2001). *Werken in de informatiesamenleving [Working in the information society]*. Assen, The Netherlands: Koninklijke van Gorcum.

Streumer, J. N., & Kho, M. (2006). The world of work-related learning. In J. N. Streumer (Ed.), *Work-related learning* (pp. 3-50). Dordrecht, The Netherlands: Springer.

van der Krogt, F. J. (2006). *Organiseren van leerwegen in dienstverlenende organisaties: Strategieën van werknemers, managers en leeradviseurs*. Utrecht, The Netherlands: Lemma.

van der Sluis-den Dikken, E. C. (2000). *Management learning and development: The role of learning opportunities and learning behavior in management development and career success*. Rotterdam, The Netherlands: Erasmus Universiteit.

van Woerkom, M. (2003). *Critical reflection at work: Bridging individual and organisational learning*. PhD Thesis, Enschede, The Netherlands: Twente University.

Chapter 2

Conceptualizing On-the-Job Learning Styles*

Abstract
The broad aims of this study are to gain insight into employees' on-the-job learning activities to help them improve their on-the-job learning. The authors define on-the-job learning styles and operationalize the concept to include both mental and overt learning styles and both interpersonal and intrapersonal learning styles. Organizations and employees can benefit from an awareness of employees' on-the-job learning styles, by developing an adaptive flexibility in the use of on-the-job learning strategies.

* This chapter has been published as: Berings, M. G. M. C., Poell, R. F., & Simons, P. R. J. (2005). Conceptualizing on-the-job learning styles. *Human Resource Development Review, 4*, 373-400.

Introduction

The broad aims of this study are to gain insight into employees' on-the-job learning activities, which can be used to help them improve their on-the-job learning. Due to the increasing rate of change in the world of work, life-long learning is high on the political agenda in many countries. Policies are mostly directed to education and formal training (Skule, 2004). However, these are not always available to everyone, and in many situations they have several disadvantages: it does not have an impact unless it is well-timed; it often seems difficult to transfer what has been learned to the daily work situation; and it is expensive (van Woerkom, 2003). Furthermore, besides continuously learning new competencies, employees should also learn how to learn efficiently, in order to adjust to new situations (e.g., Chalofsky, 1996; Onstenk, 1997a; Poell, Chivers, van der Krogt, & Wildemeersch, 2000). It is doubtful whether formal training or education can have such an impact on employee learning skills (Baldwin & Ford, 1988).

Therefore, in the field of human resource development, a shift is currently taking place from a training orientation to a learning orientation, with growing attention for on-the-job learning (Poell, van Dam, & van den Berg, 2004). On-the-job learning refers to "implicit or explicit mental and/or overt activities and processes, embedded in working and work-related performance, leading to relatively permanent changes in knowledge, attitudes or skills" (Berings & Doornbos, 2003, p.48). It does not refer to on-the-job training or professional education. So far, there is a paucity of studies of on-the-job-learning. How do people actually learn on the job? And how can on-the-job learning be stimulated? Few studies have been conducted on similarities in learning processes between learners and even less studies have focused on individual differences in on-the-job learning (Poell et al., 2004). In the literature on educational psychology, however, individual differences in learning processes are often studied, namely in research on "learning styles". Research in this area, however, hardly focuses on on-the-job learning.

In this paper, we conceptualize learning styles in on-the-job settings. We investigate the applicability of learning styles in on-the-job learning situations and to what extent the original concept should be transformed to be applicable in this situation. To gain more insight into these issues, we have formulated the following research question: "How can learning styles be conceptualized in on-the-job learning situations?". This main research question can be divided into four sub-questions:

1. How are learning styles defined and categorized, in general?
2. How does learning in on-the-job settings differ from learning in educational settings?
3. To what extent should the definition and categorization of learning styles be adapted to be feasible to on-the-job learning situations?
4. How can organizations and employees benefit from knowledge of employees' on-the-job learning styles?

We start our exploration of the conceptualization of learning styles in on-the-job settings with an examination of the many terms that are used in style research to cover concepts that are closely related to the concept of learning styles. Then, we explain the

definition of learning styles in general and in on-the-job learning situations in particular. Next, we propose a categorization of on-the-job learning styles and finally, we discuss how this knowledge can be implemented to improve on-the-job learning, by making people aware of their on-the-job learning styles and by promoting adaptive flexibility.

Style research

Many terms in style research that could be applied in (on-the-job) learning situations cover topics closely related to learning styles: personality types, cognitive styles, thinking styles, and decision-making styles. Below, we will explain our preference for the term learning styles by describing the meanings of the different terms related to this concept. Personality types are sets of orientations and attitudes that describe basic individual preferences accompanying a person's interaction with the environment (Jung, 1923). They are used to describe deep-seated individual differences exercising a wide but somewhat loose control over the domains of cognitive function, interest, values, and personality development (Ross, 1962). Cognitive styles represent individual differences in how a person perceives, thinks, solves problems, and learns (Witkin, Moore, Goodenough, & Cox, 1977). They are characteristic self-consistencies in information processing that develop in congenial ways around underlying personality trends (Messick, 1984). Thinking styles refer to the ways in which people choose to use or exploit their intelligence and their knowledge. A thinking style is a preferred way of thinking (Sternberg, 1994). A decision-making style is an individual's characteristic mode of perceiving and responding to decision-making tasks (Harren, 1979). The term "learning styles" is commonly used for all these topics; it is a notion that contains the former concepts, concentrating on the learning aspects of the style distinctions (as indicated in Figure 2.1). However, it is used for other concepts as well, such as environmental preferences and learning orientations.

Learning styles, cognitive styles, thinking styles, decision-making styles, and personality types are closely related. In the literature, the terms are often used as synonyms (Sadler-Smith, 2001b). Disparate measures are used to assess ostensibly the same styles. On other occasions, highly similar instruments serve to measure purportedly distinct styles (Messick, 1984). Especially the terms "cognitive style" and

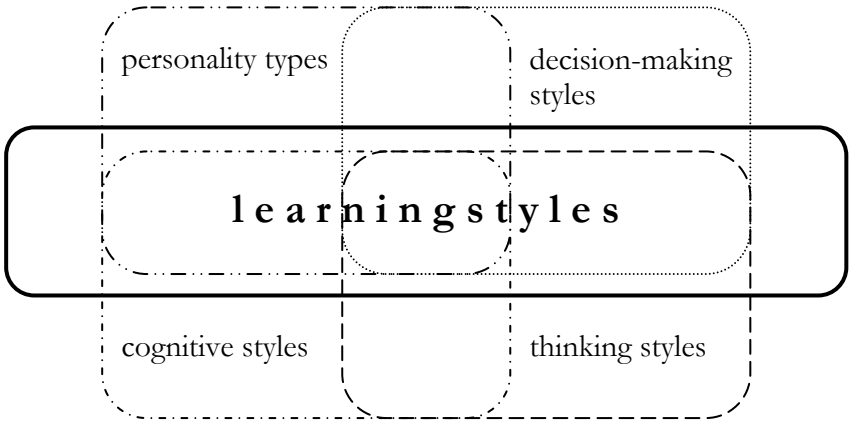


Figure 2.1. Learning styles in relation to other style types

"learning style" are often used for the same concept (Cassidy, 2004). The distinction is that cognitive styles are more related to theoretical or academic research, whereas learning styles are more related to practical applications (Riding & Cheema, 1991; Swanson, 1995). Cognitive styles are usually described in bipolar dimensions, such as Allinson and Hayes' (1996) intuition-analysis and Cohen's (1967) splitters-lumpers distinction, whereas learning styles are mostly described in combinations of dimensions, which are not mutually exclusive (Riding & Cheema, 1991). In one sense, the term learning style can be regarded as a broader term that includes the construct of cognitive style and other dimensions of learning. In another sense, the term learning style can be regarded as a narrower term that concentrates on the domain of learning only, whereas the term cognitive style is used also when there is no learning involved. For example, Ramirez and Castaneda's (1974) learning style dimensions of field dependency and field independency relate to Witkin's cognitive styles using the same label (1962) and to the cognitive wholist - analytic style dimension (Riding, 1991). Ramirez and Castaneda broaden both Witkin's and Riding's perspectives by combining the two and by including the way in which people approach their environment in addition to their perceptions. They narrow down Witkin's and Riding's perspectives, however, by applying them to the learning environment only.

In workplace learning contexts, the distinction between different style types is even more complicated than in educational contexts. Whereas in educational contexts learning is usually the main activity that learners perform, in workplace learning contexts people are working, thinking, making decisions, innovating, and learning at the same time. In this study, therefore, we consistently use the term learning style, as we are interested in comprehensive on-the-job learning processes.

In the literature, the various learning style models and definitions have different origins. Some models and definitions are based on learning preferences, some on learning conceptions, learning motivations, learning orientations, or learning behaviour. For both theoretical and practical reasons, we opt for a behaviour model and definition. The original meaning of the word "style" is "a manner of executing a task or performing an action" or "a mode of deportment or behaviour" (Murray, Bradley, Craigie, & Onions, 1970, p.1207), and thus refers to overt or mental behaviour. Further, the aim of this study is to gain more insight into on-the-job learning processes. Learning processes refer to a succession of actions, and thus, behaviour. Finally, we expect that insight into learning *behaviour* will offer most opportunities for the improvement of on-the-job learning, because behaviour can actively be directed by the learners themselves.

Definition of learning styles

Studies on learning styles are part of a complex research field. As indicated above, in this research field many terms are used to cover closely related topics, addressing an enormous number of theories, models, and instruments. Many definitions are used. In this paper, we define on-the-job learning styles as follows: an on-the-job learning style is *the tendency to use a particular combination of implicit and explicit learning activities that a person can, and likes to, perform. The person adapts the combination of learning activities to each situation*

differently. This particular combination is called the actualized learning strategy. This definition was constructed in three steps, which we will explain below: first, the choice of an organismic interaction model for describing the distinction between learning strategy and learning style is elaborated. Second, the underpinning mechanism of learning styles is illuminated on a more detailed level. Finally, after the explanation of our general definition of learning styles, in the next section, we make a shift to the on-the-job learning situation for a definition and further conceptualization of on-the-job learning styles.

Learning styles should, in our view, be represented in an interaction model, as learning is a social process that is influenced by both individual characteristics and the psychological meaning of the learning situation (cf. Kwakman, 1999; Wierstra, 2000; Wierstra & Beerends, 1996). More specifically, we believe learning styles should be represented in an organismic interaction model, in which the cause and effect or situation and organism stand in a relationship of reciprocal action, in which each member affects and changes the other (Kwakman, 1999; Overton & Reese, 1973). Pervin (1968) calls this transaction, because there is continuous mutual influence between the different individual and situational factors.

Therefore, applying the model to learning, the "perceived situation" can be defined as the "perceived learning situation". The "individual factors" can be defined as "learning style", following, for example, Wierstra's (2000, p. 158) definition of learning style: "The habitual tendency at a particular moment of time, in a particular learning situation, to manifest a particular learning strategy [translated]" and Keefe's (1979, p. 4) definition of learning style: "characteristic cognitive, affective, and psychological behaviours that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment". People with different learning styles use different learning strategies (Busato, 1998). Thus, in the model "behaviour", the configuration of actual activities can be further specified as the "actualized learning strategy".

As Figure 2.2 illustrates, learning strategies are the result of the interaction between personal factors like learning styles, which are responsible for the relative stability, and situational factors, which are responsible for the variability in the use of learning strategies (van der Sluis & Poell, 2002; Vermunt, 1992; Wierstra & Beerends, 1996). People use the same strategy in most, but not all, of their learning situations (Kolb, 1983).

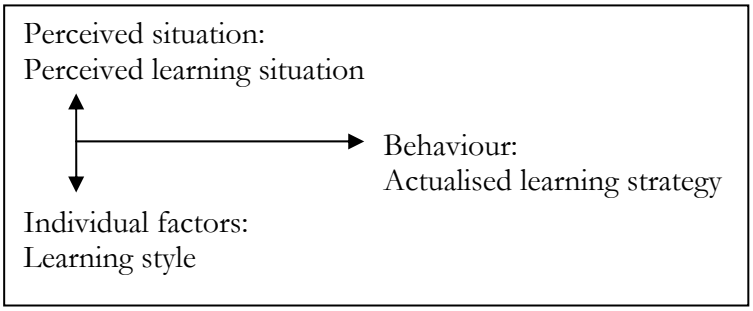


Figure 2.2. Organismic interaction model of learning behaviour

This explanation of the difference between learning styles and learning strategies can offer clarification in the ongoing "state-or-trait" debate in the learning style literature. Some authors regard learning styles as stable over time - a trait -, whereas other authors regard them as changing with each learning situation - a state - (Cassidy, 2004; Coffield, Mosely, Hall, & Ecclestone, 2004; Loo, 1997). Applying the organismic interaction model, learning strategies can be regarded as a state, changing with each learning situation, and learning styles can be regarded as relatively stable personality characteristics or traits. Since the perceived learning situation and learning style influence each other, they are changeable over a longer period (cf. Hayes & Allinson, 1997; Kolb, 1984a; Loo, 1997; Schmeck, Geisler-Brenstein, & Cercy, 1991; Vermunt, 1992; Witkin, Goodenough, & Karp, 1967). The degree of changeability is dependent on the person's flexibility (Cashdan & Lee, 1977).

Thus, by distinguishing learning styles and learning strategies in our definition, we made clear that a learning style is the disposition with which a learner enters every learning situation. A learning style is consistent over time and contexts; it is a habitual tendency at a particular moment to learn in a particular way in a particular learning situation. People actualize different learning strategies in different situations (Wierstra & Beerends, 1996). In the next paragraph, we explicate the underpinning mechanism of learning styles.

According to Sternberg and Grigorenko (1997), a style is a bridge between people's cognitive factors and their personality factors. Simons (1997, 1999) describes learning style as the nature and combination of learning strategies that a person is inclined and also able to employ. It is a combination of learning strategies that a person (in their own view) *can* and *likes to* perform. In other words, learning style is a tendency to learn in a particular way stemming from a mixture of preferences and perceived capabilities, which should be clear in our definition. As shown in Figure 2.3, these two factors interact (Bolhuis & Simons, 1999).

We can conclude on the following definition of learning style: a learning style is *the tendency to use a particular combination of learning activities that a person can, and likes to, perform. The person adapts the combination of learning activities to each situation differently. This particular combination is called the actualized learning strategy.*

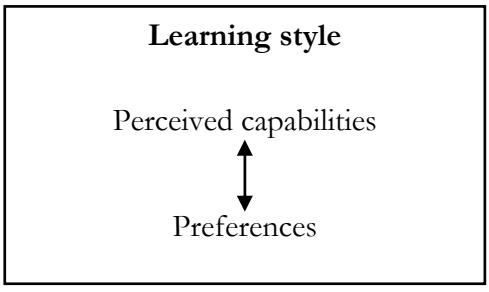


Figure 2.3. Underpinning mechanism of learning styles

Definition of learning styles in on-the-job situations

To use the concept of learning styles in on-the-job learning situations, the same definition could be used. However, since there are many differences between learning processes in educational contexts - what most literature on learning styles is primarily about - and on-the-job learning contexts, a few supplements are needed. These differences in learning processes are described below, resulting in a definition of *on-the-job* learning styles.

First, on-the-job learners have more opportunities to choose their own learning activities. In educational settings, these are mostly chosen by the teacher. Second, in educational settings learning is mainly an individualistic activity, while in on-the-job learning situations learning is often a collaborative or collegial activity (Beckett & Hager, 2002). For employees, interaction with others is the main source of learning (Doornbos, Bolhuis, & Simons, 2004; Eraut, Alderton, Cole, & Senker, 1998; Gear, McIntosch, & Squires, 1994). Finally, in educational settings, most learning is an explicit process, while in on-the-job settings many implicit learning processes take place (cf. Berings & Doornbos, 2003; Bolhuis & Simons, 1999; Eraut, 2000). Berry and Dienes (1993) and Reber (1993), who are often cited in this context, describe the difference between explicit and implicit learning based on intentionality and awareness of the learning outcomes. Implicit learning is unintentional and the resulting knowledge is difficult to express. Explicit learning is typically hypothesis-driven and fully conscious. Eraut (2000) places these concepts on a continuum from implicit learning to deliberate learning, with reactive learning in the middle. The latter is explicit, but takes place almost spontaneously in response to recent, current, or imminent situations.

In conclusion, there are three aspects of on-the-job learning processes that need particular attention in the conceptualization of on-the-job learning styles. The fact that learners can choose their own learning activities and that learning is often a collegial or collaborative activity deserves special attention in the operationalization of different aspects of on-the-job learning styles. The fact that on-the-job learning not only concerns explicit learning, but also, and perhaps even more, implicit learning, needs to be addressed in the definition. Adding this fact, an on-the-job learning style can be defined as *the tendency to use a particular combination of implicit and explicit learning activities that a person can, and likes to, perform on the job. The person adapts the combination of learning activities to each situation differently. This particular combination is called the actualized learning strategy.* This definition is illustrated in Figure 2.4.

The perceived on-the-job learning situation

Although many authors claim that the on-the-job learning situation is an important determinant of the actualized learning strategy (e.g. Kolb, 1984a) few attempts have been made in learning style research to investigate the significant factors of the on-the-job learning situation (Wierstra, 2000). Nevertheless, several situational factors concerning workplace learning are elucidated in the literature on workplace learning. It should be noted that research on the effects of different learning situations are still scarce and have ambivalent results (Poell et al., 2004). Further, it should be kept in

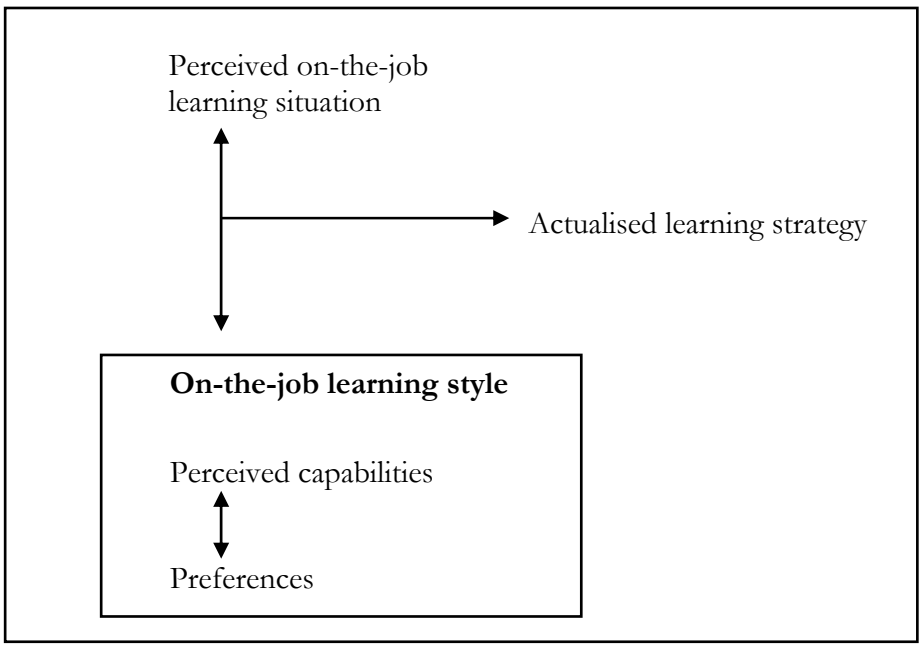


Figure 2.4. Expanded organismic interaction model of on-the-job learning behaviour

mind that although all factors of the on-the-job learning situation are discussed in a more or less "objective" sense in the literature, interactionism suggests that people's learning strategies are influenced by their perception of the learning situation rather than by the objective learning situation (cf. Boekaerts, 1996; Entwistle, 1991; Meyer & Parsons, 1989; Pervin, 1968; Ramsden, 1988; Wierstra, 2000). All factors of the on-the-job learning situation discussed should, therefore, be regarded as they are perceived by the learning employee. This means that the extent to which the learning situation determines the learner's learning strategy is dependent on how the learner perceives that the learning situation models, provokes, regulates, enables, and supports possible learning strategies (Wierstra, 2000). The actualized on-the-job learning strategy is determined by the employees' on-the-job learning style and the *perceived* on-the-job learning situation.

We distinguish five different categories of factors of the on-the-job learning situation: (1) the task and job content, (2) the information environment, (3) the social work environment, (4) the learning climate, and (5) coincidental factors. The first three categories are derived from Onstenk's (1997b) study on learning opportunities. The task and job content are the breadth and variety of tasks, the degree of innovation, and the amount of problem-solving required. This category also includes the amount of task feedback (Goodman, 1998; Skule, 2004), the amount of challenge (McCauley, Ruderman, Ohlott, & Morrow, 1994), and the degree of control and autonomy of the employee in tasks, methods, procedures, and results (see also Karasek & Theorell, 1990). Differences in the degree of autonomy will provoke different ways of learning (Ellström, 2001). Van der Sluis and Poell (2002) also mention the level of responsibility and transitions in job content, status, or location. The information environment comprises the physical characteristics of the working environment, including the

presence of manuals, job aids, and so forth. Also opportunities for extensive professional contacts, such as professional networks and conferences could be added to this category (Skule, 2004). Finally, the social work environment comprises daily communication and cooperation with, guidance from, and organized meetings with, supervisors and colleagues (Poell, 1998), including external feedback (Goodman, 1998; Kluger & De Nisi, 1996).

Using van der Krogt's learning network theory (1998), we added a fourth category of factors of the on-the-job learning situation: the learning climate. Poell and van Moorsel define the learning climate as follows (Poell & van Moorsel, 1998, p. 35): "The temporary manifestation of the dominant norms, insights and rules regarding learning of a group, department or organization in shared practices in the field of learning which implicitly influences the learning activities employees undertake". According to Baars-van Moorsel (2003), the learning climate involves learning objectives, the learning content, didactics, composition (content structure), and organization (who has the responsibility for providing learning opportunities?). We add the rewarding of professional skills to this category (Skule, 2004). From the perspective of workplace learning we also consider more informal aspects of the learning climate to be important, such as feedback culture (Argyris & Schön, 1996) and error management (van Dyck, 2000).

The on-the-job learning situation categories described above are considered as relatively stable characteristics of the on-the-job learning situation. However, working, and, therefore, on-the-job learning, is also determined by coincidental aspects, such as the temperature and the noise outside (Meijman & Mulder, 1998). These coincidental aspects are the fifth category of the on-the-job learning situation.

A categorization of on-the-job learning style dimensions

Above, we proposed a definition of on-the-job learning styles and described the components of the on-the-job learning behaviour model. In the next section, we will describe which aspects of learning styles should be distinguished in on-the-job learning situations, by reviewing existing categorizations and introducing an alternative categorization of aspects of on-the-job learning styles. Although many articles about on-the-job learning refer to learning styles, few attempts have been made to define the (combinations of) aspects that are well suited to on-the-job learning situations. Mostly, aspects that were distinguished in educational settings originally are simply transferred to workplace settings (Berings & Poell, 2002). Although some of the learning styles distinguished can also be found in work contexts, the same person may have different styles in learning and work contexts.

In the literature, numerous aspects of learning styles are described and many overviews are presented (Cassidy, 2004; Coffield et al., 2004; Rayner & Riding, 1997; Riding & Cheema, 1991; Sadler-Smith, 1997). Many of these aspects can be regarded as relevant in a comprehensive definition of learning styles. Four categorizations of learning styles aspects that have been proposed in the literature and are often cited are presented here: the different schools that Grigorenko and Sternberg distinguish (1995) a further breakdown by Rayner and Riding (1997), Curry's (1983) onion metaphor, and

Grasha's categorization (1983). We examine the usefulness of these categorizations, in view of our definition of on-the-job learning styles, to provide a basis for deriving opportunities to improve employees' on-the-job learning processes by awareness of their learning style. None of these four categorizations was fully satisfactory. We therefore suggest an alternative categorization that meets our definition and is suited to on-the-job learning contexts. This alternative categorization can be used in future research to differentiate between most relevant aspects of *on-the-job* learning styles.

Grigorenko and Sternberg's categorization

Most authors on styles refer to the different schools that Grigorenko and Sternberg distinguish (1995). They divided style research into three broad categories:

1) the cognition-centred approach, which is based on differences in cognitive processes and perception;
2) the personality-centred approach, which involves trait type measures; and
3) the activity-centred approach or learning-centred approach, which defines learning and instruction styles.

This distinction has many similarities with the different style types mentioned above. The first two approaches do not necessarily concern learning. The latter and most complex approach, the activity-centred approach, represents learning styles. Rayner and Riding's subcategories (1997), and Curry's onion metaphor (1983) offer more insight into this approach.

Rayner and Riding's framework and Curry's onion metaphor

Rayner and Riding divide the activity-centred approach in Grigorenko and Sternberg's framework into three subcategories:

a) cognitive-based models of learning styles;
b) process-based models of learning styles; and
c) preference-based models of learning styles.

Rayner and Riding (1997) provide many examples of these styles, but do not present a description of the categories. We therefore refer to Curry (1983), whose onion metaphor provides insight into Rayner and Riding's division. The layers of the onion are analogous to the different degrees of stability in a person's learning style. At the core of the onion is the cognitive style, which comprises the approaches to acquiring and integrating information. This layer is the most stable one. The second layer is the information-processing style, which is less stable and more susceptible to change. This is the process that the person goes through in assimilating information. The outermost layer of the onion is the person's preferred environment for learning. This is the least stable and most readily influenced layer of a person's learning style. Claxton and Murrell (1987) added a fourth layer between the information-processing style and preferred environment. This in-between layer represents social interaction and deals with how learners tend to interact and behave in a group. This extra layer is especially important in workplace contexts, since interaction is one of the most important sources of learning at the workplace. Figure 2.5 shows the onion with four layers.

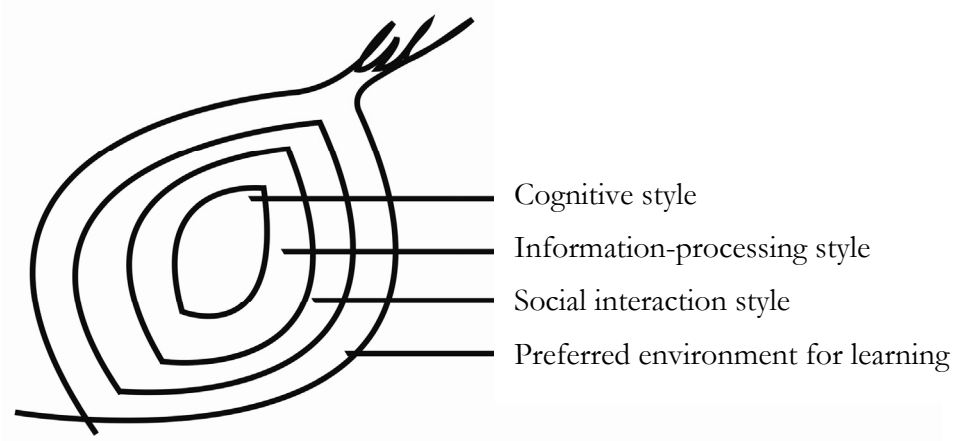


Figure 2.5. The four layers of the onion of learning styles

Grigorenko and Sternberg's categorization (1997) is very abstract. The activity-centred approach meets our comprehensive definition of learning styles best. Rayner and Riding's and Curry's further division could then provide a useful categorization. However, this more detailed categorization of the activity-centred approach does not fit our definition of on-the-job learning styles. Since we consider on-the-job learning styles in a behaviour model, thus concerning learning processes, only the two middle layers of the onion could be appropriate. Additionally, our definition articulates that learning styles are a tendency to learn in a particular way (the learning process) stemming from a *mixture* of preferences and perceived capabilities. It is a combination of learning strategies that a person (in their own view) can, and likes to, perform. In Rayner and Riding's and Curry's categorization, some style dimensions concern preferences and other dimensions concern learning processes or cognitive aspects. These issues are considered separately and are not treated as a mixture. The layer added by Claxton and Murell (1987), social interaction, could be useful for our purpose, but needs supplements, since a lot, but not all, of on-the-job learning occurs through social interaction. Grasha (1983) offers a framework that includes a social interaction category, which is called "interpersonal styles", and other relevant categories.

Grasha's categorization

Grasha (1983) offers an alternative, more content-based categorization of the style literature. He divides the different style dimensions into five categories:

1) cognitive styles;
2) sensory styles;
3) interpersonal styles;
4) intrapersonal styles; and
5) environmental styles.

Cognitive styles influence an individual's acquisition, retention, and retrieval of information. Sensory styles are the modalities through which a person prefers to acquire information (visual, auditory, et cetera). Styles that derive from social interaction (roles and role expectations, imitation of models, group norms, leadership, and discourse) are called *inter*personal styles. *Intra*personal styles reflect individuals'

needs and motives and the thoughts and actions directed toward self-control, for example, goal setting and establishing deadlines. The use of external feedback and reinforcement, the physical environment in which learning occurs, and formal structures used to promote learning are categorized as environmental styles.

We defined learning styles in terms of activities, because awareness of concrete activities in the learning process provides opportunities for improvement of on-the-job learning. The categories of sensory and environmental styles are not activity related. The other categories, i.e., cognitive styles, interpersonal styles, and intrapersonal styles, seem relevant. Together, however, they do not offer a comprehensive framework.

We support the presence of an interpersonal category. Only few authors in style research have taken interpersonal learning aspects into account (Berings & Poell, 2002), although learning, and especially on-the-job learning, is a social process. Knowledge and skills have a social life, in that they originate in and can be distributed only through social interactions (Brown & Duguid, 2000). Even learning that seems an individual process almost always entails some social mediation (Salomon & Perkins, 1998).

The category of intrapersonal styles could be used to describe the activities employees can, and like to, perform on their own. In that case, this category should be used in a more narrow meaning than Grasha (1983) originally intended, because motives and needs are not activities and, therefore, do not match our definition of on-the-job learning styles.

Furthermore, there seems to be an overlap between the dimensions of intrapersonal and interpersonal styles and the third residual dimension, cognitive styles. Cognitive styles refer to an individual's acquisition, retention, and retrieval of information in both individual and social learning situations. They refer to mental activities.

All categorizations described above focus on mental learning activities or preferences. The literature on learning style in educational settings pays little attention to overt activities, which is probably because overt activities in educational settings are mostly directed by teachers and are not chosen by the learners themselves. In on-the-job learning, employees mostly choose their own learning activities. Therefore, besides having an awareness of mental activities, it could also be useful for employees to gain more awareness of their overt learning strategies. What are the concrete activities employees tend to perform in order to reach a learning goal? Thus, paying attention to overt activities seems to be very relevant in researching *on-the-job* learning styles.

A new categorization of on-the-job learning styles

A categorization of on-the-job learning style dimensions needs adaptations of Grasha's categorization. The new categorization should address *on-the-job* learning processes in terms of activities, stemming from a mixture of preferences and perceived capabilities. Similar to Grasha's (1983) framework, a distinction should be made between intrapersonal and interpersonal learning styles. Furthermore, in addition to mental activities, it should also include overt activities. Therefore, the categorization we propose combines the distinction between intrapersonal and interpersonal activities

with the distinction between mental and overt activities (as indicated in Figure 2.6). The categorization we propose distinguishes different types of learning activities. Each cell of the categorization, or each type of activity, contains a number of different dimensions of on-the-job learning activities. In literature on educational psychology, learning style characteristics are usually described in bi-polar or multi-polar dimensions. However, for the sake of coherence, we defined the different dimensions contained in each cell of our categorization one-dimensionally, as is common on literature on on-the-job learning. In our opinion, on-the-job learning styles should not be defined as bipolar dimensions that exclude one another, but as singular dimensions of which people possess few or many characteristics (cf. Riding & Cheema, 1991; Vermunt, 1992).

	Intrapersonal Activities	Interpersonal Activities
Mental Activities	e.g., the extent to which employees ▪ assimilate ▪ explore ▪ view learning and work situations holistically ▪ reflect on their actions	e.g., the extent to which employees ▪ depend on other people ▪ are inclined to work with other people ▪ strive for competition ▪ reflect on others' actions
Overt Activities	e.g., the extent to which employees ▪ seek information on the Internet or from other sources ▪ practise new skills ▪ keep up with specialist journals ▪ create action plans	e.g., the extent to which employees ▪ seek feedback ▪ collaborate ▪ ask others for information ▪ exchange knowledge and experiences ▪ observe others

Figure 2.6. New categorization of on-the-job learning style dimensions

In the learning style literature, mostly mental learning style characteristics are described, usually defined in bi-polar or multi-polar dimensions. In our categorization, for instance, Riding's (Riding, 1991) wholist-analytic style dimension would be categorized as referring to mental intrapersonal activities. This dimension describes whether people view situations as a whole, or as a collection of parts, only stressing one or two aspects at a time. Another example of a style dimension that would fit in this category is the distinction between assimilators and explorers (Kaufmann, 1979). Extreme assimilators always seek familiarity and structure. They try to adapt to a situation by fitting the situation into standard schemes. Extreme explorers seek novelty and dislike structure. They seek new solution alternatives spontaneously, even when faced with problems that can be solved by applying standard schemes. This example

perfectly matches distinctions that have been made in the workplace learning literature. For instance, Ellström (2001) distinguishes between adaptive and developmental learning. The learning style literature pays little attention to interpersonal characteristics of learning styles. One example of a dimension that describes mental interpersonal learning activities is dependence on other people and the inclination to collaborate with them (see also Riechmann & Grasha, 1974).

The literature on on-the-job learning mostly focuses on overt learning activities (e.g., Eraut et al., 1998; e.g., Gerber, 1998). These activities are usually described one-dimensionally. Overt intrapersonal learning activities are the activities that a person tends to perform alone, such as finding information in the library or on the Internet. Overt interpersonal learning activities are the activities that a person undertakes together with, or with the help of, other people, such as feedback seeking (London & Smither, 2002) or manners of collaboration.

Now that we have defined and categorized on-the-job learning styles, the remaining issue in the conceptualization of on-the-job learning styles concerns the practical implications. How can knowledge about on-the-job learning styles be used in organizations?

Implications for improving on-the-job learning

We believe that organizations and employees can benefit from an awareness of the employees' learning styles. People learn all the time, it cannot be avoided (Elkjaer, 2004; Simons, van der Linden, & Duffy, 2000). To a larger or smaller extent, they are engaged at work in "implicit or explicit mental and/or overt activities and processes, embedded in working and work-related performance, leading to relatively permanent changes in knowledge, attitudes or skills" (Berings & Doornbos, 2003, p.48). They have different learning styles and therefore actualize different learning strategies. Most people are highly unconscious of their learning style (Boekaerts, 1996). The main part of on-the-job learning processes and outcomes generally remains implicit. In one sense, that is a good thing: people would get an overload of information if all their learning processes and the complexity of the outcomes were made explicit. On the other hand, opportunities for improvement of on-the-job learning should not be disregarded.

Awareness of on-the-job learning processes

We believe that awareness of on-the-job learning styles can support employees' on-the-job learning (cf. Berings & Poell, 2002; Desmedt & Valcke, 2003; Kolb, 1974; Pheiffer, Andrew, Green, & Holley, 2003, July; Sadler-Smith, 2001a). People can improve their way of learning only if they know *that* and *how* they learn. They should be conscious of their learning (Barrie & Pace, 1998; Kolb, 1974; Simons & Ruijters, 2004). Therefore, to improve their work-related learning, employees should gain awareness of their on-the-job learning styles. Self-awareness is "the degree to which people comprehend their own strengths and weaknesses and what they could become" (London, 2003, p.276) and offers people the ability to recognize their presuppositions, opportunities, and boundaries. It empowers people to make the most of their opportunities and to

recognize the true reasons for their failures and successes, so they can consider them in future and choose challenging but realistic goals.

Being aware of their on-the-job learning styles offers people a lexicon that enables verbal expression of individual differences in their learning behaviour (Coffield et al., 2004; Desmedt & Valcke, 2003). It enables them to self-direct their learning, to reflect on the learning strategies they choose, can make learning outcomes sharable, and can make critical learning possible (Coffield et al., 2004). Further, it can offer people a feeling of satisfaction and pride (Apter, 2001) and makes the creation of new knowledge possible (Nonaka & Takeuchi, 1995). The reflection that can emerge can be regarded as reflection-on-action in the sense that it happens after its conclusion and that not only the learning outcomes are evaluated, but also the way these outcomes are achieved (cf. Cortese, 2005). In conclusion, awareness of on-the-job learning styles and learning outcomes offers employees opportunities for more efficient and better on-the-job learning.

Apart from the individual employee, managers, HRD practitioners, and colleagues can also use knowledge of employees' on-the-job learning styles. For example, managers and HRD practitioners can use this information to improve communication and build strong teams. A study by Poell, Berings, and van der Krogt (2004, May) in the healthcare sector shows that currently HRD practitioners use relatively few strategies to customize their interventions to individual employees. If they are aware of the employees' on-the-job learning styles, these HRD practitioners could customize their strategies and offer employees better guidance, that is, guidance suitable to the individual employee's learning style. Colleagues can compare their learning styles, helping them to understand each other's learning perspectives better. When two people approach a problem from opposite angles, they will suggest different solutions. This can be irritating, but is less so if they know that they have different learning styles (Briggs Myers, 1962). Used in a group setting, knowledge of on-the-job learning styles enables team members to understand how the team functions effectively and where the team may need outside assistance. Group members' understanding of each other's strengths and weaknesses can enhance group development processes (London, 2003). Although people are inclined to collaborate with people who have similar learning styles (Martin & Halstead, 2001), it can be enriching to collaborate with people who have different learning styles as well. Authors of learning style literature do not agree as to whether knowledge about employees' learning styles should be used for recruitment, selection or promotion at work (Coffield et al., 2004). Kolb (2000), for instance, suggests that certain professions should attract people with certain learning styles. Honey and Mumford, on the other hand, counsel against this practice (Coffield et al., 2004).

In summary, reflecting on one's learning style and the resulting knowledge may provide awareness of the learning process in relation to the content of what was learnt. This offers opportunities for improvement of on-the-job learning, which in turn can contribute significantly to the efficiency and effectiveness of organizations (Barrie & Pace, 1998).

Using awareness of on-the-job learning styles

Above, we argued that individuals' awareness of their on-the-job learning styles, and thus their habitual use of on-the-job learning strategies, may increase job efficiency. This section deals with the different ways in which people can cope with this awareness. Employees can benefit from being aware of the consequences of their learning styles and of the alternative learning modes available to them (Berings & Poell, 2002; Kolb, 1974; Sadler-Smith, 1999, 2001a, 2001b). Job efficiency increases when employees, their colleagues, and managers are aware of their own and each other's learning styles and of the learning opportunities provided by their job (Coffield et al., 2004; van der Sluis-den Dikken, 2000). However, once they have become aware of their own and other possible on-the-job learning styles, how should employees deal with this awareness? And how could organizations deal with this awareness?

In the next section, we distinguish four ways of dealing with this awareness. The first is that awareness can be used to reinforce the use of particular learning strategies that are generally considered as best practices. The second is that it offers opportunities for (self-)reflection about one's strengths and weaknesses. Third, it can help to acquire a varied repertoire of learning strategies, to use in different learning situations. And fourth, people can adapt these different learning strategies to different learning situations. This most comprehensive way of dealing with awareness of learning styles is called "adaptive flexibility".

Encouraging particular learning strategies. Some authors (e.g., Kolb, 1984a, 2000) suggest that particular learning styles should be encouraged. This can be regarded as a plea to change employees' on-the-job learning styles by training them to adopt certain, perhaps non-habitual learning strategies. The relevance of such change is supported by the literature suggesting that on-the-job learning styles have a significant effect on on-the-job learning outcomes (e.g. Furnham, Jackson, & Miller, 1999; Hayes & Allinson, 1997; Jackson, 2002). The strategies represented by these learning styles could be encouraged. For example, in a sample with two hundred tele-sales employees, Furnham et al. (1999) found a relationship between learning styles using the Learning Styles Questionnaire (Honey & Mumford, 1989) and development and performance. They reported a positive correlation of development and performance with the "theorist" learning style, and a negative correlation of development and performance with the "reflector" learning style. Van der Sluis-den Dikken (2000) suggests that learning styles are related to perceived career development and subjective and objective job performance.

There are four reasons for reserve in valuing certain overt and mental learning styles above others. First, in educational contexts, where more research has been done on learning styles and strategies, researchers have not been able to identify, and agree upon, the learning styles most relevant to learners (Curry, 1991). Second, it can be questioned whether these existing instruments are well suited to measure the concept of *on-the-job* learning styles (Berings & Poell, 2002). Third, the indistinct notion that some on-the-job learning styles are better than others disregards the significant influences of personal characteristics like individual abilities and preferences. And

fourth, the effects of style on performance are dependent on the nature of the learning situation (Cassidy, 2004).

Reflection about one's strengths and weaknesses. Concerning the reservations in the desirability of the encouragement of particular learning strategies, indications for optimizing the use of learning strategies could be provided on a more individual level. The awareness of on-the-job learning styles could be used for reflection about one's strengths and weaknesses. Just as the learning styles of students call for different instructional styles (Beutell & Kressel, 1984; Vermunt, 1992), various on-the-job learning styles of employees call for different learning possibilities and, therefore, different material facilities and treatment by their colleagues and managers. To stress someone's strengths, the environmental conditions matching his or her learning styles should be available (Witkin et al., 1977). This way of dealing with awareness of on-the-job learning styles is based on Aptitude-Treatment-Interaction theory (Cronbach & Snow, 1977), which assumes that people learn best if they are able to use their habitual strategies. On the other hand, a "mismatch" in learning style and learning situation, or constructive friction, can also offer opportunities for growth (Grasha, 1983; Kolb, 1984a; Vermunt & Vermetten, 2004). People can be encouraged to overcome their weaknesses by practising non-habitual learning strategies. For example, employees who have a tendency to be very analytic could be encouraged to look at the whole picture by having them supervise a small project. This could improve their performance (Barker & Barker, 2001). More research is needed to find out if or when "matching" or "mismatching" strategies are most appropriate. This is a complicated task, because the few studies that have been conducted show no uniform reaction (Juch, 1983; Smith, Sekar, & Townsend, 2002).

Juch (1983) argues that people naturally sense only what they want or need to perceive. They often tend to reinforce their own innate or initial preferences, and neglect those abilities that are harder to develop. In other words, most people will prefer to stress their strengths rather than overcome their weaknesses. But is this the best way to deal with this awareness? Should employees strengthen the positive aspects of their learning style, or should they overcome their weaknesses and learn new learning strategies?

Developing a varied repertoire and adaptive flexibility. The third and fourth approaches in using awareness of on-the-job learning styles are less confusing and more accepted in the literature. In the former approach, whether it was about stressing strengths or overcoming weaknesses, it is suggested that an awareness of learning styles is brought about by adapting the learning environment to the employee's learning style. However, in practice, for many reasons, it is not always possible for employees or their manager to change the learning situation and possibilities. Therefore, employees should be able to adapt their learning strategies to the learning environment. They need to develop a broad variety of learning strategies (cf. Grasha, 1983; Kirby, 1988). Further, they should be able to adapt their use of the various learning styles in their repertoire to particular learning situations. In other words, they need to obtain a high degree of

adaptive flexibility. Adaptive flexibility is "the degree to which one changes his or her learning style to meet the varying learning demands of different situations" (Kolb, 1984b, p.10). Boyatzis and Kolb (1993) developed an instrument to measure adaptive flexibility. Although their empirical findings do not support the influence of adaptive flexibility on learning skills, they suggest this relationship may exist (Mainemelis, Boyatzis, & Kolb, 2002). If employees have a broad repertoire of learning strategies and if they are flexible in using these strategies, then they are more self-directed, more able to adapt their attitude and behaviour to different learning situations, and thus become better learners (Kolb, 1984a). Ertmer and Newby (1996) and Weinstein and Van Mater Stone (1996) call people expert learners to the extent that they have a broad repertoire of learning strategies, combined with meta-cognitive knowledge of when and how to use these strategies, and the flexibility to change their strategy whenever necessary. People who are unaware of their learning styles are unlikely to start learning in new ways (Merrill, 2002). According to Sadler-Smith (2001b) employees can be taught to monitor their choice of different learning strategies.

In each dimension of on-the-job learning styles, various overt and mental learning strategies can be actualized, from which the employee can choose. It is not possible to ascertain a priori whether one is better than another. In various learning situations, the use of different learning strategies can be appropriate (Berings & Poell, 2002). Although each style can be equally good for problem-solving, each style is likely to be associated with greater efficiency in specific tasks (Schmeck, 1988). For example, in some situations, employees should assimilate and in other situations they should explore (Kaufmann, 1979). Take, for instance, nurses who have problems with a specific drip system. They should *assimilate* to this system in a situation where they need to use it quickly on a patient. In a meeting with their colleagues, they should try to *explore* their working with this drip system, for instance by rewriting the system's protocol, to prevent problems on future occasions. In some situations, employees should instantly seek feedback in the case of uncertainty; in other situations, it is better to wait for more appropriate circumstances. Take police officers, for instance. Uncertainties in writing their end-of-shift reports can best be discussed immediately with their partner. However, uncertainties in verbally addressing hooligans had better not be discussed while arresting them, but before (if this is to be anticipated) or afterwards. In different learning situations, different on-the-job learning strategies can be more appropriate, but the best strategy in each situation is also dependent on the person's learning style.

A good way of using knowledge on on-the-job learning styles for employees could therefore be to organize a coaching session, together with their supervisor, HRD professional or peer-colleagues, and reflect on their own use of learning strategies in different learning situations. In this small group, different alternative learning strategies can be discussed. New learning strategies in addition to their current personal preferences can be tried and developed in the every-day working and learning process, in order to develop a varied repertoire of learning strategies and adaptive flexibility.

The concept of adaptive flexibility shows the value of having an understanding of one's on-the-job learning style, of other possible styles, and of how different situations

require different approaches. If employees can be made aware of their habitual combination of learning strategies (their on-the-job learning styles), and of other possible learning strategies, they will learn to recognize these situations and adapt their attitude and behaviour to the specific learning situation. They can adapt the learning strategy that they actualize to fit each new situation. Unfortunately, there is no empirical evidence, yet, to support the assumptions above (Coffield et al., 2004).

Conclusion and discussion

We can conclude that a number of supplements to a general definition of learning styles are needed for the concept to be feasible in on-the-job situations. A definition of on-the-job learning styles should emphasize the specific on-the-job learning situation and the difference between explicit and implicit learning. On-the-job learning styles are therefore defined as *the tendency to use a particular combination of implicit and explicit learning activities that a person can, and likes to, perform on the job. The person adapts the combination of learning activities to each situation differently. This particular combination is called the actualized learning strategy*. In the categorization of on-the-job learning styles, attention should be paid to both mental and overt learning styles and to both inter- and intrapersonal learning styles.

Organizations and employees can benefit from an awareness of the employees' on-the-job learning styles, by trying to develop an adaptive flexibility in using on-the-job learning strategies. It is expected that a higher level of adaptive flexibility will lead to an improvement of the employees' on-the-job learning.

In this study, we used theory from the educational psychology and workplace learning literatures to conceptualize on-the-job learning styles. We realize that the topic of on-the-job learning has connections with other disciplines as well, such as work and organizational psychology and management sciences. However, we expect to have covered the most relevant literature on the topic in this study. We also realize that the conceptualization of on-the-job learning styles that we proposed in this study, should be verified with empirical evidence. First, more research is needed to distinguish the different aspects of on-the-job learning styles in all cells of the categorization. Then, future research could address specific research methods that can be used to support and specify our conceptualization of on-the-job learning styles empirically and to investigate the use of different on-the-job learning strategies in different learning situations. At this time, no learning style instruments are available that are well suited to on-the-job learning situations (Berings & Poell, 2002). We encourage the development of research methods that include research instruments covering both overt and mental on-the-job learning styles and both interpersonal and intrapersonal on-the-job learning activities. The method should focus not only on the dominant on-the-job learning strategies that people use. It should also emphasize the broadness of their learning repertoire and their flexibility in using different on-the-job learning strategies, that is, adaptive flexibility. Using such a research method, it should be possible to identify the individual learning styles of employees, thus offering them opportunities to improve their performance. Additionally, it would be very useful to empirically investigate whether a higher level of adaptive flexibility actually leads to an

improvement of employees' on-the-job learning, or whether other suggested ways of dealing with awareness of on-the-job learning styles would be better. Are some learning styles better than others in particular learning situations? Finally, it would be very useful to investigate the specific characteristics of the on-the-job learning situation that stimulate adaptive flexibility and how such a learning situation could be created.

References

Allinson, C. W., & Hayes, J. (1996). The Cognitive Style Index: A measure of intuition-analysis for organisational research. *Journal of Management Studies, 33*, 119-135.

Apter, M. J. (2001). *Motivational styles in everyday life: A guide to reversal theory*. Washington, DC: American Psychological Association.

Argyris, C., & Schön, D. A. (1996). *Organizational Learning II: Theory, method and practice*. Reading, MA: Addison-Wesley.

Baars-van Moorsel, M. (2003). *Leerklimaat: De culturele dimensie van leren in organisaties. [Learning climate: The cultural dimension of learning in organisations]*. PhD-Thesis, Tilburg University, Delft, The Netherlands: Eburon.

Baldwin, T. T., & Ford, J. K. (1988). Transfer of training: A review and directions for future research. *Personnel Psychology, 41*, 63-105.

Barker, T., & Barker, J. (2001). How a multimedia application can be configured to support individuals based on Riding's wholist/analytic cognitive style dimension. In M. Graff, S. Armstrong, A. Francis, J. Hill, S. Rayner, E. Sadler-Smith & D. Spicer (Eds.), *Proceedings of the 6th annual ELSIN conference 2001* (pp. 32-42). Glamorgan, UK: University of Glamorgan.

Barrie, J., & Pace, R. W. (1998). Learning for organisational effectiveness: Philosophy of education and human resource development. *Human Resource Development Quarterly, 9*, 39-54.

Beckett, D., & Hager, P. (2002). *Life, work and learning: Practice in postmodernity*. London, UK: Routledge.

Berings, M. G. M. C., & Doornbos, A. J. (2003). Exploring instruments mapping workplace learning processes. In *Proceedings book VI: Theme 8: Learning and learners at work. Work and lifelong learning in different contexts. Proceedings of the 3rd international conference of Researching Work and Learning* (pp. 48-58). Tampere, Finland: University of Tampere.

Berings, M. G. M. C., & Poell, R. F. (2002). Measuring on-the-job learning styles: A critique of three widely used questionnaires. In S. Armstrong, A. Francis, M. Graff, J. Hill, S. Rayner & E. Sadler-Smith, et al. (Eds.), *Proceedings of the 7th annual ELSIN conference 2002* (pp. 53-60). Ghent, Belgium: Ghent University.

Berry, D. C., & Dienes, Z. (1993). *Implicit learning: Theoretical and empirical issues*. Hove, UK: Lawrence Erlbaum Associates.

Beutell, N. J., & Kressel, S. S. (1984). An investigation of Kolb's Learning Styles Inventory: Social desirability and normative scoring. *Psychological Reports, 55*, 89-90.

Boekaerts, M. (1996). Personality and the psychology of learning. *European Journal of Personality, 10*, 377-404.

Bolhuis, S., & Simons, P. R. J. (1999). *Leren en werken [Learning and working]*. Deventer, The Netherlands: Kluwer.

Boyatzis, R. E., & Kolb, D. A. (1993). *Adaptive Style Inventory: Self scored inventory and interpretation booklet*. Boston, MA: Hay/McBer, Training Resources Group.

Briggs Myers, I. (1962). *Introduction to type: A description of the theory and applications of the Myers-Briggs Type Indicator* (4 ed.). Palo Alto, CA: Consulting Psychologists Press, Inc.

Brown, J. S., & Duguid, P. (2000). *The social life of information*. Boston, MA: Harvard Business School Press.

Busato, V. V. (1998). *Leerstijlen nader geanalyseerd [Learning styles further analysed]*. Amsterdam, The Netherlands: Universiteit van Amsterdam.

Cashdan, A., & Lee, V. (1977). *Leerstijlen [Learning styles]*. Groningen, The Netherlands: Wolters-Noordhoff.

Cassidy, S. (2004). Learning styles: An overview of theories, models and measures. *Educational Psychology, 24*, 419-444.

Chalofsky, N. (1996). A new paradigm for learning in organizations. *Human Resource Development Quarterly, 7*, 287-293.

Claxton, C. S., & Murrell, P. H. (1987). *Learning styles: Implications for improving educational practices*. ASHE-ERIC Higher Education Report, 4. Washington: Association for the study of Higher Education.

Coffield, F., Mosely, D., Hall, E., & Ecclestone, K. (2004). *Learning styles and pedagogy in post-16 learning*. London, UK: Learning and Skills Research Centre.

Cohen, R. A. (1967). *Primary group structure, conceptual styles and school achievement*. Unpublished Doctoral Dissertation: University of Pittsburg, PA.

Cortese, C. G. (2005). Learning through teaching. *Management Learning, 36*, 87-115.

Cronbach, L. J., & Snow, R. E. (1977). *Aptitudes and instructional methods*. New York: Wiley.

Curry, L. (1983). An organization of learning style theory and constructs. In L. Curry (Ed.), *Learning style in continuing medical education* (pp. 115-131). Halifax, Canada: Dalhousie University.

Curry, L. (1991). Patterns of learning styles across selected medical specialities. *Educational Psychology, 11*, 247-277.

Desmedt, E., & Valcke, M. (2003). Learning style awareness: Why would it work? In S. Armstrong, M. Graff, C. Lashley, E. Peterson, S. Raynor, E. Sadler-Smith, M. Schiering & D. Spicer (Eds.), *Bridging theory and practice. Proceedings of the 8th annual ELSIN conference 2003* (pp. 139-150). Hull, UK: University of Hull.

Doornbos, A. J., Bolhuis, S., & Simons, P. R. J. (2004). Modeling work-related learning on the basis of intentionality and developmental relatedness: A non-educative perspective. *Human Resource Development Review, 3*, 250-274.

Elkjaer, B. (2004). Organizational learning. *Management Learning, 35*, 419-434.

Ellström, P. E. (2001). Integrating learning and work: Problems and prospects. *Human Resource Development Quarterly, 12*, 421-435.

Entwistle, N. J. (1991). Approaches to learning and perceptions of the learning environment: Introduction of the special issue. *Higher Education, 22*, 201-204.

Eraut, M. (2000). Non-formal learning, implicit learning and tacit knowledge in professional work. In F. Coffield (Ed.), *The necessity of informal learning* (pp. 12-31). Bristol, UK: The Policy Press.

Eraut, M., Alderton, J., Cole, G., & Senker, P. (1998). *Development of knowledge and skills in employment*. East Sussex, UK: University of Sussex.

Ertmer, P. A., & Newby, T. J. (1996). The expert learner: Strategic, self-regulated, and reflective. *Instructional Science, 24*, 1-24.

Furnham, A., Jackson, C. J., & Miller, T. (1999). Personality, learning style and work performance. *Personality and Individual Differences, 27*, 1113-1122.

Gear, J., McIntosch, A., & Squires, G. (1994). *Informal learning in the professions*. Hull, UK: School of Education, The University of Hull.

Gerber, R. (1998). How do workers learn in their work. *The Learning Organization, 5*, 168-175.

Goodman, J. S. (1998). The interactive effects of task en external feedback on practice performance and learning. *Organization Behavior and Human Decision Processes, 76*, 223-252.

Grasha, A. F. (1983). Learning style: The journey from Greenwich Observatory (1796) to Dalhousie University (1981). *Improving College & University Teaching, 32*(1), 46-53.

Grigorenko, E. L., & Sternberg, R. J. (1995). Thinking styles. In D. H. Saklofske & M. Zeidner (Eds.), *International handbook of personality and intelligence* (pp. 205-230). New York: Plenum Press.

Harren, V. A. (1979). A model of career decision making for college students. *Journal of Vocational Behavior, 14*(2), 119-133.

Hayes, J., & Allinson, C. W. (1997). Learning styles and training and development in work settings: Lessons from educational research. *Educational Psychology, 17*, 185-193.

Honey, P., & Mumford, A. (1989). *The manual of learning opportunities*. Maidenhead, UK: Peter Honey Publications.

Jackson, C. J. (2002). Predicting team performance from a learning process model. *Journal of Managerial Psychology, 17*(1), 6-13.

Juch, B. (1983). *Personal development: Theory and practice in management training*. Chichester, UK: Wiley.

Jung, C. G. (1923). *Psychological types*. London, UK: Kegan Paul.

Karasek, R. A., & Theorell, T. (1990). *Healthy work: Stress, productivity and the reconstruction of working life*. New York: Basic Books.

Kaufmann, G. (1979). The explorer and the assimilator: A cognitive style distinction. *Scandanavian Journal of Educational Research, 23*, 101-108.

Keefe, J. W. (1979). Learning style: An overview. In NASSP (Ed.), *Diagnosing and prescribing programs* (pp. 1-17). Reston, VA: National Association of Secondary School Principals.

Kirby, J. R. (1988). Style, strategy, and skill in reading. In R. R. Schmeck (Ed.), *Learning strategies and learning styles* (pp. 229-274). New York: Plenum Press.

Kluger, A. N., & De Nisi, A. (1996). The effects of feedback interventions on performance: An historical review, a meta-analysis, and a preliminary feedback intervention theory. *Psychological Bulletin, 119*, 254-284.

Kolb, D. A. (1974). On management and the learning process. In D. A. Kolb, I. M. Rubin & J. M. McIntyre (Eds.), *Organizational psychology: A book of readings* (pp. 27-42). Englewood Cliffs, NJ: Prentice-Hall.

Kolb, D. A. (1983). *Experience, learning, and development: The theory of experiential learning.* Boston, MA: McBer.

Kolb, D. A. (1984a). *Experiental learning. Experience as the source of learning and development.* Englewood-Cliffs, NJ: Prentice Hall.

Kolb, D. A. (1984b). *Strategic management development: Using experiential learning theory to assess and develop managerial competencies.* Paper presented at the World Congress on Management Development, London, UK.

Kolb, D. A. (2000). *Facilitator's guide to learning.* Boston, MA: Hay/McBer.

Kwakman, C. H. E. (1999). *Leren van docenten tijdens de beroepsloopbaan [Teacher learning during the career]*. PhD Thesis, Nijmegen, The Netherlands: Nijmegen University.

London, M. (2003). Antecedents and consequences of self-verification: Implications for individual and group development. *Human Resource Development Review, 2*, 273-293.

London, M., & Smither, J. W. (2002). Feedback orientation, feedback culture, and the longitudinal performance management process. *Human Resource Management Review, 12*, 81-100.

Loo, R. (1997). Evaluating change and stability in learning styles: A methodological concern. *Educational Psychology, 17*, 95-100.

Mainemelis, C., Boyatzis, R. E., & Kolb, D. A. (2002). Learning styles and adaptive flexibility: Testing experiential learning theory. *Management Learning, 33*, 5-33.

Martin, L., & Halstead, A. (2001). Learning styles and selection preferences in small firms. In M. Graff, S. Armstrong, A. Francis, J. Hill, S. Rayner, E. Sadler-Smith & D. Spicer (Eds.), *Proceedings of the 6th annual ELSIN conference 2001* (pp. 418-429). Glamorgan, UK: University of Glamorgan.

McCauley, C. D., Ruderman, M. N., Ohlott, P. J., & Morrow, J. E. (1994). Assessing the developmental components of managerial jobs. *Journal of Applied Psychology, 79*, 544-460.

Meijman, T. F., & Mulder, G. (1998). Psychological aspects of workload. In P. J. D. Drenth, H. Thierry & C. J. Wolff (Eds.), *Handbook of work and organizational psychology* (2nd ed., Vol. 2, pp. 5-33). Hove, UK: Psychology Press.

Merrill, M. D. (2002). Instructional strategies and learning styles: Which take precedence? In R. Reiser & J. Dempsey (Eds.), *Trends and issues in instructional technology* (pp. 99-106). Columbus, OH: Prentice Hall.

Messick, S. (1984). The nature of cognitive styles: Problems and promise in educational practice. *Educational Psychologist, 19*, 59-74.

Meyer, J. H. F., & Parsons, P. (1989). Approaches to studying and course perceptions using the Lancaster Inventory. A comparative study. *Studies in Higher Education, 14*(2), 137-153.

Murray, J. A. H., Bradley, H., Craigie, W. A., & Onions, C. T. (Eds.). (1970). *The Oxford English Dictionary* (3rd ed. Vol. X). London, UK: Oxford University Press.

Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company*. Oxford, UK: Oxford University Press.

Onstenk, J. (1997a). *Kernproblemen, ICT en didactiek van het beroepsonderwijs [Core problems, ICT and didactics of vocational education]* (SCO-report No. No. 475). Amsterdam, The Netherlands: SCO-Kohnstamm Instituut.

Onstenk, J. (1997b). *Lerend leren werken: Brede vakbekwaamheid en de integratie van leren, werken en innoveren. [Learning to work in a learning way: Broad occupational competence and the integration of learning, working and innovating]*. PhD Thesis, Katholieke Universiteit Nijmegen, Delft, The Netherlands: Eburon.

Overton, W. F., & Reese, H. W. (1973). Models of development: Methodological implications. In J. R. Nesselroade & H. W. Reese (Eds.), *Life-span developmental psychology* (pp. 65-86). New York: Academic Press.

Pervin, L. A. (1968). Performance and satisfaction as a function of individual-environment fit. *Psychological Bulletin, 69*, 56-68.

Pheiffer, G., Andrew, D., Green, M., & Holley, D. (2003, July). *The value and use of learning styles: A case study*. Paper presented at the ELSIN conference, Hull, UK.

Poell, R. F. (1998). *Organizing work-related learning projects: A network approach*. PhD Thesis, Nijmegen, The Netherlands: Nijmegen University.

Poell, R. F., Berings, M. G. M. C., & van der Krogt, F. J. (2004, May). *Tailoring learning programmes to every-day employee learning: Customisation strategies of HRD Practitioners in health care*. Paper presented at the European HRD Research Conference, Limerick, Ireland.

Poell, R. F., Chivers, G. E., van der Krogt, F. J., & Wildemeersch, D. A. (2000). Learning-network theory: Organizing the dynamic relationships between learning and work. *Management Learning, 31*, 25-49.

Poell, R. F., van Dam, K., & van den Berg, P. T. (2004). Organising learning in work contexts. *Applied Psychology: An International Review, 53*, 529-540.

Poell, R. F., & van Moorsel, M. A. A. H. (1998). The learning network theory: Its contribution to our understanding of work-related learning projects and learning climate. In R. F. Poell & G. E. Chivers (Eds.), *Continuing professional development in Europe: Theoretical views, fields of application, and national policies* (pp. 27-36). Sheffield, UK: University of Sheffield.

Ramírez, A. I., & Castaneda, A. (1974). *Cultural democracy: Bicognitive development and education*. New York: Academic Press.

Ramsden, P. (1988). Context and strategy: Situational influences on learning. In R. R. Schmeck (Ed.), *Learning strategies and learning styles* (pp. 159-184). New York: Plenum Press.

Rayner, R., & Riding, R. (1997). Towards a categorisation of cognitive styles and learning styles. *Educational Psychology, 17*, 5-28.

Reber, A. S. (1993). *Implicit learning and tacit knowledge: An essay on the cognitive unconscious*. New York: Oxford University Press.

Riding, R. (1991). On the nature of cognitive style. *Educational Psychology, 17*, 29-49.

Riding, R., & Cheema, I. (1991). Cognitive styles: An overview of integration. *Educational Psychology, 11*(1-2), 193-215.

Riechmann, S. W., & Grasha, A. F. (1974). A rational approach to developing and assessing the validity of a student learning styles instrument. *Journal of Psychology, 87*(2), 213-223.

Ross, J. (1962). Factor analysis and levels of measurement in psychology. In S. Messick & J. Ross (Eds.), *Measurement in personality and cognition* (pp. 69-81). New York: Wiley.

Sadler-Smith, E. (1997). 'Learning style': Frameworks and instruments. *Educational Psychology, 17*, 51-63.

Sadler-Smith, E. (1999). Intuition-analysis cognitive style and learning preferences of business and management students: A UK exploratory study. *Journal of Managerial Psychology, 14*(1), 26-38.

Sadler-Smith, E. (2001a). The relationship between learning style and cognitive style. *Personality and Individual Differences, 30*, 609-616.

Sadler-Smith, E. (2001b). A reply to Reynolds's critique of learning style. *Management Learning, 32*, 291-304.

Salomon, G., & Perkins, D. N. (1998). Individual and social aspects of learning. *Review of Research in Education, 23*, 1-24.

Schmeck, R. R. (1988). Strategies and styles of learning: An integration of varied perspectives. In R. R. Schmeck (Ed.), *Learning strategies and learning styles* (pp. 317-347). New York: Plenum Press.

Schmeck, R. R., Geisler-Brenstein, E., & Cercy, S. P. (1991). Self-concept and learning: The revised inventory of learning processes. *Educational Psychology, 11*, 343-362.

Simons, P. R. J. (1997). Ontwikkeling van leercompetenties [Development of learning competences]. *Opleiding & Ontwikkeling, 9*, 17-20.

Simons, P. R. J. (1999). Leervermogen: Vaardigheden, belemmeringen, ontwikkeling [Learning ability: Skills, obstructions, development]. In P. Schramade (Ed.), *Handboek effectief opleiden* (Vol. 11.1.1, pp. 1-20). Den Haag, The Netherlands: Delwel.

Simons, P. R. J., & Ruijters, M. C. P. (2004). Learning professionals: Towards an integrated model. In H. P. A. Boshuizen, R. Bromme & H. Gruber (Eds.), *Professional learning: Gaps and transitions on the way from novice to expert* (pp. 207-229). Deventer, The Netherlands: Kluwer Academic Publishers.

Simons, P. R. J., van der Linden, J., & Duffy, T. M. (2000). New learning: Three ways to learn in a new balance. In P. R. J. Simons, J. Van der Linden & T. Duffy (Eds.), *New learning* (pp. 1-20). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Skule, S. (2004). Learning conditions at work: A framework to understand and assess informal learning in the workplace. *International Journal of Training and Development, 8*, 8-20.

Smith, W., Sekar, S., & Townsend, K. (2002). The impact of surface and reflective teaching and learning on student academic success. In S. Armstrong, A. Francis, M. Graff, J. Hill, S. Rayner & E. Sadler-Smith, et al. (Eds.), *Proceedings of the 7th annual ELSIN conference 2002* (pp. 407-418). Ghent, Belgium: Ghent University.

Sternberg, R. J. (1994). Thinking styles: Theory and assesment at the interface between intelligence and personality. In R. J. Sternberg & P. Ruzgis (Eds.), *Personality and intelligence* (pp. 169-187). New York: Cambridge University Press.

Sternberg, R. J., & Grigorenko, E. L. (1997). Are cognitive styles still in style? *American Psychologist, 52*(7), 700-712.

Swanson, L. J. (1995). *Learning styles: A review of the literature* (Eric Reports No. 387067). Washington, DC: Office of Educational Research and Improvement.

van der Krogt, F. J. (1998). Learning network theory: The tension between learning systems and work systems in organizations. *Human Resource Development Quarterly, 9*, 157-178.

van der Sluis-den Dikken, E. C. (2000). *Management learning and development: The role of learning opportunities and learning behavior in management development and career success*. Rotterdam, The Netherlands: Erasmus Universiteit.

van der Sluis, L. E. C., & Poell, R. F. (2002). Learning opportunities and learning behavior. *Management Learning, 33*, 291-311.

van Dyck, C. (2000). *Putting errors to good use: Error management culture in organizations*. PhD Thesis, Amsterdam, The Netherlands.

van Woerkom, M. (2003). *Critical reflection at work: Bridging individual and organisational learning*. PhD Thesis, Enschede, The Netherlands: Twente University.

Vermunt, J. D. H. M. (1992). *Leerstijlen en sturen van leerprocessen in het hoger onderwijs: Naar procesgerichte instructie in zelfstandig denken [Learning styles and directing learning processes in higher education: Towards proces-oriented instruction in self-directed thinking]*. Lisse, The Netherlands: Swets & Zeitlinger.

Vermunt, J. D. H. M., & Vermetten, Y. J. (2004). Patterns in student learning: Relationships between learning strategies, conceptions of learning, and learning orientations. *Educational Psychology Review, 16*, 359-384.

Weinstein, C. E., & van Mater Stone, G. (1996). Learning strategies and learning to learn. In E. de Corte & F. E. Weinert (Eds.), *International encyclopedia of developmental and instructional psychology* (pp. 419-423). Oxford, UK: Elsevier Science Ltd.

Wierstra, R. F. A. (2000). Leeromgeving, leerstrategie en leerdeskundigheid: Een nieuw paradigma in het onderzoek naar leerstijlen [Learning environment, learning strategy, and learning expertise]. In K. Stokking, G. Erkens, B. Versloot & L. Van Wessum (Eds.), *Van onderwijs naar leren. Tussen het aanbieden van kennis en het faciliteren van leerprocessen.* (pp. 157-170). Leuven, Belgium: Garant.

Wierstra, R. F. A., & Beerends, E. P. M. (1996). Leeromgevings-percepties en leerstrategieën van eerstejaars studenten sociale wetenschappen [Learning environment perceptions and learning strategies of freshman social science students]. *Tijdschrift voor Onderwijsresearch, 21*(4), 306-322.

Witkin, H. A. (1962). *Psychological differentiation: Studies of development*. New York: Wiley.

Witkin, H. A., Goodenough, D. R., & Karp, S. A. (1967). Stability of cognitive style from childhood to young adulthood. *Journal of Personality and Social Psychology, 7*, 291-300.

Witkin, H. A., Moore, C. A., Goodenough, D. R., & Cox, P. W. (1977). Field-dependent and field-independent cognitive styles and their educational implications. *Review of Educational Research, 47*(1), 1-64.

Chapter 3

Measuring On-the-Job Learning Styles
A Critique of Three Widely Used Questionnaires*

Abstract

This paper argues that more insight into on-the-job learning styles has great theoretical and practical importance. The various existing instruments to measure on-the-job learning styles are not well suited for their purpose. This papers discusses the most famous self-report instruments that are widely used for measuring on-the-job learning styles: Kolb's Learning Style Inventory (1976, 1985), Honey and Mumford's Learning Style Questionnaire (1986, 1989), and Allinson and Hayes' Cognitive Style Index (1996). There is a pressing need for new, well-examined and validated instruments for measuring on-the-job learning styles, since the existing instruments do not fulfil this need. These instruments should measure not only the dominant characteristics of someone's learning style, but also the breadth of the learning repertoire – that is, a person's flexibility in using learning strategies. The questionnaire should include social factors, such as dependency on, and collaboration with, other people. Finally, caution should be exercised in using the term 'learning' in the items, since this term does not make people think about on-the-job learning.

* This chapter has been published as Berings, M. G. M. C., & Poell, R. F. (2005). Measuring on-the-job learning styles: A critique of three widely used questionnaires. *British Journal of Occupational Learning, 3,* 3-12. An earlier version was presented at the ELSIN Conference in Ghendt, Belgium, June 2002.

The increasing importance of on-the-job learning

The increasing rate of change in the world of work suggests that learning in work contexts is becoming important for the organisation as well as for the individual co-workers in the organisation (for example, Furnham, Jackson, & Miller, 1999). For organisations it is important to learn because of the unpredictability and speed of change in the world of work, the increasing complexity of the knowledge and information society, the efficient use of the organisation's human resources, and their strategic importance on the labour market (Bolhuis & Simons, 1999). For organisations it is important that employees learn to be able to remain profitable and customer oriented. Organisations are no longer able to guarantee job security or long-term career opportunities, which makes it important for employees to be employable in other organisations. They need experience and training to enhance their market skills in an insecure labour world.

Since the world of work is changing constantly, the driving force for learning should be the learning process (learning how to learn) rather than performance (learning technical skills). Employees need to learn to identify skill gaps and anticipate how changes elsewhere in the firm or industry may affect work demands and skill requirements. Organisations can provide resources that enable individual learning. Structured development plans, however, are often costly and impractical (London & Smither, 1999). Therefore, employees' self-directed on-the-job learning is very important. In order to encourage employees' self-directed on-the-job learning, organisations should provide an atmosphere that involves three essential elements: the availability of behavioural choices, the knowledge that others understand the employee's perspectives, and informational – not threatening – feedback (Deci, Connell, & Ryan, 1989).

Relevance of on-the-job learning styles

A convenient way of creating the atmosphere to improve self-directed on-the-job learning is to make employees aware of their learning styles in work related activities (their on-the-job learning styles). On-the-job learning style can be defined as the tendency to use a certain combination of implicit and explicit learning activities that a person can and likes to perform on the job. The person may use a different combination of learning activities in each different situation. This particular combination is called the 'actualised learning strategy'.

Knowledge about their own and other possible learning styles will make employees aware of their choices in learning behaviour, offering them opportunities to improve their current strengths while challenging them to improve their abilities in weaker areas and helping them to choose realistic goals. Furthermore, knowledge about individuals' on-the-job learning styles can improve communication and collaboration between team members. Colleagues can compare on-the-job learning styles, helping them to better understand their learning perspectives. When two people approach a problem from opposite angles, they will both suggest different solutions. This can be irritating to them, but more understandable if they know that they both have different learning styles (Briggs Myers, 1962). Colleagues with different on-the-

job learning styles can complement each other in finding the best solution. Knowledge about each other's learning styles enables team members to understand how the team can function effectively and where the team may need outside assistance. Employees are inclined to collaborate with people who have similar on-the-job learning styles (Martin & Halstead, 2001). Since people collaborating with people who have other on-the-job learning styles can complement each other in their work, managers and human resource professionals should stimulate collaboration between employees with different on-the-job learning styles. Furthermore, the human resource professional or manager can offer employees optimal guidance – that is, guidance most suitable to their individual on-the-job learning style, giving informational rather than threatening feedback.

Problems involved in measuring on-the-job learning styles

In educational psychology, learning styles of students and pupils in schools have been the subject of investigation. Many instruments for measuring learning styles have been developed. Many researchers and human resource professionals are well aware that measuring on-the-job learning styles has many advantages for employees, teams and organisations. So far, however, little research has been conducted about on-the-job learning styles of workers in organisations. Nevertheless, researchers and practitioners use various instruments to measure on-the-job learning styles. Many papers about on-the-job learning use learning styles as a significant aspect of their investigations (for example, Furnham et al., 1999; Jackson, 2002). However, so far, the construct learning style is not well established for *on-the-job* learning situations.

The problem is that only a few psychometrically validated instruments are available. Most of the existing instruments are not statistically validated or worse, these instruments are known to be invalid and unreliable (Snyder, 1998). Moreover, the psychometrically validated instruments available are not specifically geared to work situations. As a result, many people use questionnaires that measure learning styles in vocational and professional education in the work context. These instruments are not automatically suitable, however, for workplace learning contexts. Even though some of the learning styles distinguished can also be found in work contexts, the same person may have different styles in different learning contexts. Furthermore, the items in the questionnaire cannot always be applied to on-the-job learning situations. Supplements and adaptations are needed for several reasons. For example, there are differences in the regulation of learning processes, because students and workers have different goals and motivations. The status of learning is different. In schools learning is the first priority and at the workplace learning is *not* usually the first priority. Personal contacts with researchers of large organisations show that they have conducted some corporate research in work contexts, but usually the results are not publicly available for reasons of competition.

Another problem is that most existing instruments concern individual, psychological factors only. However, it should be recognised that learning, and especially on-the-job learning, is a social process. Knowledge and skills have a social life: they originate in and can be distributed only through social interactions (Brown &

Duguid, 2000). This suggests that social-interactive factors should be included, such as dependency on other people and the inclination to collaborate with them.

One more general problem is that the majority of researchers and practitioners in the area of learning styles in on-the-job settings, like most educational scientists, use methods that ignore the influence of the specific learning situation. This might be due to the lack of a learning theory, leaving aside the relationship between learning style, the specific learning situation, and characteristics of learners, such as experience and motivation (Bakker, 1985). People use different learning strategies in different learning situations. Again, this shows the importance of employees' awareness of their own on-the-job learning styles. Even if their learning style usually functions properly, in some situations it will not fit. If they can be made aware of their habitual combination of learning strategies (their on-the-job learning styles), and other possible learning strategies, they will be able to recognise these situations and adapt their attitude and behaviour. For example, in some situations nurses should assimilate and in other situations they should innovate. If they have problems with a specific drip system, they should *assimilate* to this system in a situation where they quickly need to use this system on a patient. If they are in a discussion of progress with their colleagues, they should try to *innovate* their working with this drip system – for instance, by rewriting the system's protocol, to prevent problems in future occasions.

Employees are more able to adapt their attitude and behaviour to different learning situations if they have a broad repertoire of learning strategies and if they are flexible in using these strategies (Kolb, 1984). Ertmer and Newby (1996) and Weinstein and van Mater Stone (1996) call people expert learners to the extent that they have a broad repertoire of learning strategies, combined with meta-cognitive knowledge about when and how to use these strategies and the flexibility to change their strategy whenever necessary.

In most questionnaires people are asked directly about learning. However, the word 'learning' conveys the wrong message. Employees start thinking about courses they attended, books they read, coaching they received and so on. Doornbos and Simons (2001, April) developed a better approach to investigating learning processes in on-the-job learning situations. People should be asked indirectly about their learning process, by asking them about work situations. Only when the word 'learning' was not used and instead the respondents were asked about changes in competences, did people start to realise that they had learned a lot in and from their work. By focusing on concrete changes in work processes or outcomes, they became aware of their learning processes. When they realised *what* they had learned, they started to talk about *how* they had learned.

In summary, the few psychometrically validated instruments used to measure on-the-job learning styles are mostly geared to measuring learning styles in other contexts and cannot automatically be applied to on-the-job contexts. Most instruments only concern individual psychological factors and do not involve the social process, which is very important in on-the-job contexts. Furthermore, they ignore the influence of specific learning situations and do not measure a significant aspect of on-the-job learning styles – that is, the breadth of the employees' repertoire of learning strategies.

In many questionnaires used, people are asked directly about their learning styles, but people should be asked indirectly about their on-the-job learning process.

In order to elaborate on the general comments made so far, the next section will describe three of the most famous self-report instruments that are widely used for measuring on-the-job learning styles: Kolb's Learning Style Inventory (1976, 1985), Honey and Mumford's Learning Style Questionnaire (1986, 1989), and Allinson and Hayes' Cognitive Style Index (1996). What will be examined in particular is to what extent these instruments can be used in on-the-job learning situations.

Kolb's Learning Styles Inventory

Kolb is one of the few researchers of learning styles who relies on a learning theory: the experiential learning theory (Kolb, 1984). In this theory he acknowledges the complex relationship between situational factors and the origin, development and alteration of learning styles. He describes the different forces that shape learning styles, which are, in chronological order: psychological type, educational specialisation, professional career, current job and adaptive competencies.

Kolb conceptualises experiential learning as a cyclical process. This cyclical process involves four distinct learning stages in sequence: concrete experience, observation and reflection, the formation of abstract concepts and generalisations, and active experimentation by testing hypotheses, leading to new concrete experience, and so forth in a new cycle. Kolb defines these stages as concrete experience, reflective observation, abstract conceptualisation and active experimentation.

Although people possess and use all four learning stages, there are differences between individuals in preference patterns or strengths and weaknesses. They start at different stages and tend to emphasise different stages of the learning cycle. These differences are mainly based on the distinction in preference for abstract versus concrete learning and active versus reflective learning. People can be characterised in terms of four basic learning styles: the converger, diverger, assimilator, and accommodator styles.

The convergent learning style depends mainly on the dominant learning capacities of active experimentation and abstract conceptualisation. The converger's greatest strength is in the practical application of ideas. Convergers tend to be relatively unemotional and prefer to deal with things rather than people. The divergent learning style has the opposite learning advantages over the convergent learning style. Divergers depend mainly on concrete experience and reflective observation. Their strengths lie in an imaginative ability. They tend to be interested in people and emotional elements. The assimilative learning style depends mainly on abstract conceptualisation and reflective observation. Assimilators' tend to be less interested in people and less concerned with practical applications of knowledge, more often concerned with abstract concepts. Their strengths lie in their ability to create theoretical models. The accommodative learning style has the opposite learning advantages over the assimilative learning style. Accommodators depend mainly on active experimentation and concrete experience. Their strengths lie in doing things and involving themselves

in new experiences. They adapt easily to specific immediate circumstances, solving problems intuitively, while relying on others for information.

The Learning Styles Inventory (LSI) (Kolb, 1976) consists of nine items of four single words that should be ranked according to how the respondents feel the words best describe their learning style. Although this inventory is widely adopted by researchers and practitioners, it has often been criticised for an apparent lack of reliability, temporal stability, and construct validity (see Allinson & Hayes, 1990; Sadler-Smith, 1997). Kolb developed a revised version of his inventory to overcome these weaknesses, the LSI2 (Kolb, 1985). But this inventory, which contains twelve items, with four alternatives for each item, seems to bring about little improvement (Allinson & Hayes, 1990). Researchers report mixed results in measuring reliability (see, for example, De Chiantis & Kirton, 1996; Willcoxson & Prosser, 1996). Atkinson (1988) reported that this revised version of the LSI is less stable than the original measure. Several studies show high face validity of the LSI2 (see Hermanussen, Wierstra, De Jong, & Thijssen, 2000). Construct validity has hardly been investigated. The little research conducted, however, shows poor construct validity. The underlying factor structure is not as clear as predicted (for example, Loo, 1996; Newstead, 1992).

The items used in both tests are short and multi-interpretable. Respondents are not instructed to think of a given context when filling out the questionnaire (Willcoxson & Prosser, 1996) and thus, the influence of the specific learning situation is ignored. Kolb approaches learning as an individual process. He does not involve social aspects of learning in his study and the relationship between thinking (or working) and learning is unclear. In both versions of the LSI, people are asked directly about learning, which is not the best way to ask people about learning in work situations. Furthermore, the LSI measures only which stage in the learning process people emphasise; it does not measure breadth in repertoire of learning strategies.

Honey and Mumford developed an instrument to be used as a more reliable alternative to Kolb's theory and instrument, in order to identify learning styles that are meaningful to the managerial population (Allinson & Hayes, 1988; De Chiantis & Kirton, 1996). They made a slight modification to Kolb's terminology.

Honey and Mumford's Learning Styles Questionnaire

Honey and Mumford (1986, 1989) developed their own view on the learning cycle, inspired by Kolb. Each step in this cycle represents a different learning strategy. In following this cycle, people repeat strategies and tactics that were found to be successful and discontinue strategies and tactics that were not. In this way preferences for certain strategies become habitual and, as a result, learning styles develop. In this way, the different stages in Honey and Mumford's learning cycle can also be seen as learning styles. The learning cycle can be positioned around the following learning styles: the activist, reflector, theorist and pragmatist styles.

Activists like doing and experiencing things. They involve themselves fully and without bias in new experiences, acting first and considering the consequences later. Reflectors are cautious. They like to stand back to ponder and observe experiences from many different perspectives, considering all possible angles and implications

before making a move. Theorists are rational and logical. They like to integrate observations into a conceptual framework, relying on rationality and logic to achieve a synthesis and to understand underlying reasons, concepts and relationships. Pragmatists, finally, are essentially practical. They try out ideas, theories and techniques to see if these work in practice, using them as a basis for decision-making and problem solving.

The Learning Styles Questionnaire (LSQ) is based on this learning cycle. It consists of 80 items, with only two alternatives per item, agree and not agree. The questions are focused on observable behaviour, rather than the psychological basis for that behaviour, as in Kolb's LSI. The LSQ has a better reliability and better face validity than the LSI (Allinson & Hayes, 1988). Construct validity has hardly been investigated (Swailes & Senior, 1999). Research conducted shows mixed results in factor analyses (compare Allinson & Hayes, 1988; Marshall & Merritt, 1986; Swailes & Senior, 1999).

Like in Kolb's LSI the specific learning situation is not addressed, the questionnaire does not involve social aspects of learning and breadth in repertoire of learning strategies. The respondents are asked more indirectly about learning than in the LSI, so the instrument is more useful for measuring on-the-job learning styles.

Another widely used, but more cognitive, questionnaire to measure styles in work situations is Allinson and Hayes' Cognitive Style Index.

Allinson and Hayes' Cognitive Style Index

In psychological literature a considerable array of dimensions of cognitive style† have been described. Many researchers share the idea that these various dimensions can be reduced to two qualitatively different types of thinking and suggest a connection with the two halves of the human brain (for example, Entwistle, 1981; Sperry, 1977). Allinson and Hayes (1996) use the terms 'intuition' and 'analysis' to describe right-brain and left-brain thinking.

Analytic individuals prefer structured approaches to decision making. They are especially comfortable when handling problems requiring a step-by-step solution. The thinking of intuitive individuals, on the other hand, relies on impulsive synthesis and lateral reasoning. Intuitives prefer rapid, open-ended approaches to decision making.

Allinson and Hayes (1996) introduced the Cognitive Style Index (CSI) as a measure of intuition and analysis for organisational research. The CSI is mostly used to measure cognitive styles of employees in training programmes and vocational and professional education. The inventory contains 38 items scored on a three-point scale of true – uncertain – false.

Psychometric studies show good evidence of reliability and construct validity of the CSI (for example, Allinson & Hayes, 1996; Murphy, Kelleher, Doucette, & Young, 1998; Sadler-Smith, Spicer, & Tsang, 2000).

† The terms cognitive style and learning style are often used for the same concept. Cognitive styles represent individual differences in how a person perceives, thinks, solves problems, and learns (Witkin, Moore, Goodenough, & Cox, 1977).

The CSI seems appropriate to be applied in on-the-job learning situations. However, the instrument does concern only individual psychological factors and does not involve the social process, ignores the influence of specific learning situation and does not measure the breadth of the employees' repertoire of learning strategies. It does not even distinguish between the different learning (or thinking) strategies the instrument intends to cover. The style 'intuition' contains concepts such as synthetic, inductive, expansive, unconstrained, divergent, informal, diffuse and creative. The style 'analysis' contains concepts such as analytic, deductive, rigorous, constrained, convergent, formal and critical (Allinson & Hayes, 1996).

Conclusion

More insight into on-the-job learning styles has great theoretical and practical importance. Knowledge about their own and other possible on-the-job learning styles will offer employees opportunities to improve their choices in learning behaviour, it will improve communication and collaboration between team members, and offer opportunities to receive specific guidance by human resource professionals or managers. Various self-report questionnaires are used to measure on-the-job learning styles of employees. These questionnaires have been strongly criticised, certainly if they are used to measure learning styles *on the job*. The most widely used instruments to measure on-the-job learning styles are not specifically geared to work situations. Even though some of the learning styles measured by these instruments are also found in work contexts, supplements and adaptations are needed to use these instruments in on-the-job learning situations.

Consequently, there is a pressing need for new, well-examined and validated instruments for measuring on-the-job learning styles, since the existing instruments do not meet this need. On the basis of a critique of the existing questionnaires described in this paper, three major recommendations can be made to accomplish this.

In different learning situations the use of different learning strategies can be appropriate. Employees should adapt their learning strategies to the specific learning situation. Therefore, the instrument should measure not only the dominant characteristics of someone's learning style, but also the breadth of the learning repertoire – that is, a person's flexibility in using learning strategies. To accomplish this, standardised items should be used in various specific work-based learning contexts‡.

Since social factors are a very important aspect of the on-the-job learning process, they should be included in on-the-job learning style questionnaires. Items should be added measuring the dependency on other people (colleagues, manager, human resource professional or external people) and the inclination to collaborate with them.

Finally, caution should be exercised in using the term 'learning' in the items, since this term does *not* make people think about *on-the-job* learning. Employees should be

‡ Boyatzis and Kolb (1993) have developed the Adaptive Style Inventory, which measures how people adapt to different situations. This instrument is based on the LSI (Kolb, 1976, 1985), but has not been used extensively, so far.

asked indirectly about their learning process, by asking them about work situations. They should be asked how they solve problems in their work situations and how they accomplish further development.

A new, well-examined and validated instrument intended to measure on-the-job learning styles should be developed, taking these three recommendations into account. This will offer researchers, human resource professionals, managers, and employees an opportunity to understand the ways in which employees develop knowledge and skills and thus offer opportunities for more effective on-the-job learning.

References

Allinson, C. W., & Hayes, J. (1988). The Learning Styles Questionnaire: An alternative to Kolb's Inventory? *Journal of Management Studies, 25*, 269-281.

Allinson, C. W., & Hayes, J. (1990). Validity of the learning styles questionnaire. *Psychological Reports, 67*, 859-866.

Allinson, C. W., & Hayes, J. (1996). The Cognitive Style Index: A measure of intuition-analysis for organisational research. *Journal of Management Studies, 33*, 119-135.

Atkinson, G. (1988). Reliability of the Learning Style Inventory - 1985. *Psychological Reports, 62*, 755-758.

Bakker, A. J. J. (1985). Leerstijlen: Verborgen thema's in opleidingen. [Learning styles: Hidden themes in education]. In J. W. M. Kessels & C. A. Smit (Eds.), *Handboek opleiders in organisaties* (pp. A.3.1.1, 1-29). Deventer, The Netherlands: Kluwer.

Bolhuis, S., & Simons, P. R. J. (1999). *Leren en werken [Learning and working]*. Deventer, The Netherlands: Kluwer.

Boyatzis, R. E., & Kolb, D. A. (1993). *Adaptive Style Inventory: Self scored inventory and interpretation booklet*. Boston, MA: Hay/McBer, Training Resources Group.

Briggs Myers, I. (1962). *Introduction to type: A description of the theory and applications of the Myers-Briggs Type Indicator* (4 ed.). Palo Alto, CA: Consulting Psychologists Press, Inc.

Brown, J. S., & Duguid, P. (2000). *The social life of information*. Boston, MA: Harvard Business School Press.

De Chiantis, S. M., & Kirton, M. J. (1996). A psychometric reexamination of Kolb's experiential learning cycle construct: A separation of level, style and process. *Educational and Psychological Measurement, 56*, 809-820.

Deci, E. L., Connell, J. P., & Ryan, R. M. (1989). Self-determination in a work organization. *Journal of Applied Psychology, 74*, 580-590.

Doornbos, A. J., & Simons, P. R. J. (2001, April). *Three ways of learning in the workplace.* Paper presented at the 82nd Annual Meeting of the American Educational Research Association, Seattle, WA.

Entwistle, N. J. (1981). *Styles of learning and teaching*. Chichester, UK: Wiley.

Ertmer, P. A., & Newby, T. J. (1996). The expert learner: Strategic, self-regulated, and reflective. *Instructional Science, 24*, 1-24.

Furnham, A., Jackson, C. J., & Miller, T. (1999). Personality, learning style and work performance. *Personality and Individual Differences, 27*, 1113-1122.

Hermanussen, J., Wierstra, R. F. A., De Jong, J. A., & Thijssen, J. G. L. (2000). Learning styles in vocational work experience. *The Journal of Vocational Education Research, 25*, 445-471.

Honey, P., & Mumford, A. (1986). *Using your learning styles*. Maidenhead, UK: Peter Honey Publications.

Honey, P., & Mumford, A. (1989). *The manual of learning opportunities*. Maidenhead, UK: Peter Honey Publications.

Jackson, C. J. (2002). Predicting team performance from a learning process model. *Journal of Managerial Psychology, 17*(1), 6-13.

Kolb, D. A. (1976). *Learning Style Inventory, self-scoring test and interpretation booklet*. Boston, MA: McBer and Company.

Kolb, D. A. (1984). *Experiental learning. Experience as the source of learning and development*. Englewood-Cliffs, NJ: Prentice Hall.

Kolb, D. A. (1985). *Learning Style Inventory: Self-scoring inventory and interpretation booklet*. Boston, MA: McBer and Company.

London, M., & Smither, J. W. (1999). Empowered self-development and continuous learning. *Human Resource Management, 38*(1), 3-15.

Loo, R. (1996). Construct Validity and classification stability of the revised Learning Style Inventory (LSI-1985). *Educational and Psychological Measurement, 56*, 529-536.

Marshall, J. C., & Merritt, S. L. (1986). Reliability and Construct Validity of the Learning Style Questionnaire. *Educational and Psychological Measurement, 46*(1), 257-262.

Martin, L., & Halstead, A. (2001). Learning styles and selection preferences in small firms. In M. Graff, S. Armstrong, A. Francis, J. Hill, S. Rayner, E. Sadler-Smith & D. Spicer (Eds.), *Proceedings of the 6th annual ELSIN conference 2001* (pp. 418-429). Glamorgan, UK: University of Glamorgan.

Murphy, H. J., Kelleher, W. E., Doucette, P. A., & Young, J. D. (1998). Test-retest reliability and construct validity of the Cognitive Style Index for business undergraduates. *Psychological Reports, 82*, 595-600.

Newstead, S. E. (1992). A study of two "quick and easy" methods of assessing individual differences in student learning. *British Journal of Educational Psychology, 62*, 299-312.

Sadler-Smith, E. (1997). 'Learning style': Frameworks and instruments. *Educational Psychology, 17*, 51-63.

Sadler-Smith, E., Spicer, D. P., & Tsang, F. (2000). Validity of the Cognitive Style Index: Replication and extenstion. *British Journal of Management, 11*, 175-181.

Snyder, R. P. (1998). *An assessment of the reliability and validity of scores obtained by six learning styles instruments.* Unpublished doctoral dissertation, Utah State University, Logan, UT.

Sperry, R. (1977). Bridging science and values: A unifying view of mind and brain. *American Psychologist, 32*, 237-245.

Swailes, S., & Senior, B. (1999). The dimensionality of Honey and Mumford's learning styles questionnaire. *International Journal of Selection and Assessment, 7*(1), 1-11.

Weinstein, C. E., & van Mater Stone, G. (1996). Learning strategies and learning to learn. In E. de Corte & F. E. Weinert (Eds.), *International encyclopedia of developmental and instructional psychology* (pp. 419-423). Oxford, UK: Elsevier Science Ltd.

Willcoxson, L., & Prosser, M. (1996). Kolb's Learning Style Inventory (1985): Review and further study of validity and reliability. *British Journal of Educational Psychology, 66*, 247-257.

Witkin, H. A., Moore, C. A., Goodenough, D. R., & Cox, P. W. (1977). Field-dependent and field-independent cognitive styles and their educational implications. *Review of Educational Research, 47*(1), 1-64.

Chapter 4

Methodological Practices in On-the-Job Learning Research*

Abstract
This paper compares and discusses aspects of methodological practices in on-the-job learning research. The focus is on contemporary research into on-the-job learning processes. Methodological practices refer to decisions of researchers in their research projects, to how they carry out the research, and how they report. This overview of methodological practices presents research instruments, on-the-job learning perspectives, paradigms, goals, researcher roles, and quality and rigour considerations. The results show that even though research in Human Resource Development stems from different kinds of disciplines with their own data collection tools, there is nevertheless a rather limited variety in the instruments (questionnaires and interviews only) used for mapping the process of on-the-job learning. This is probably due to the implicit nature of most on-the-job learning processes. The paper proposes to apply research instruments from related research fields that could provide opportunities for future research. Combining instruments seems to offer fruitful opportunities for obtaining a more profound understanding of the process of on-the-job learning. The paper ends with a set of tentative guidelines for sound methodological practices in future research.

* This chapter is currently in press as: Berings, M. G. M. C., Doornbos, A. J., & Simons, P. R. J. (2006). Methodological practices in on-the-job learning research. *Human Resource Development International, 9* (3).

Introduction

Key challenges in the mapping of on-the-job learning arise from the nature of such learning, which is frequently tacit. On-the-job learning is often not highly conscious, not intentional, and not well planned, because it is opportunistic and closely integrated with work activities. Therefore, it is difficult to determine how learning processes take place (Marsick, 2003). Yet, good methodological practices, which is the decisions researchers take in their research projects as reflected in their design and report, is central to the success of published research (Rocco, 2003). Instrument design and other data collection tools are especially important in relatively new research fields such as on-the-job learning, which interests an increasing number of researchers as well as practitioners (D'abate *et al.*, 2003; Rainbird *et al.*, 2004; Smith, 2003). The aim of this study is to provide an overview of the variety of methodological practices in on-the-job learning research in order to identify tentative guidelines for future research addressing the process of on-the-job learning.

On-the-job learning, also referred to in literature with terms such as workplace learning, work-based learning, work-related learning, informal learning, and non-formal learning, plays a major role in initial and ongoing competence development. It implies human change or growth that occurs primarily in activities and contexts of work (Fenwick, 2001). Marsick and Watkins (1990) describe it as a situation where people go about their daily activities at work or in other spheres of life. This on-the-job learning can be very effective and necessary to develop professional and vocational knowledge and skills. Employees themselves believe that they have acquired most of their productive competence through their work – not through the educational system – and that employers share this view. The basic idea of on-the-job learning is that it occurs outside the context of educational goals, and does not follow a formally organized learning program or event. It happens within the context of day-to-day learning and development, and is therefore often spontaneous and integrated with work activities (M. Eraut, 2000; Marsick & Watkins, 1990). *On-the-job learning is viewed as implicit or explicit mental and/or overt activities and processes, embedded in working and work-related performance, leading to relatively permanent changes in knowledge, attitudes or skills* (adapted from Bolhuis & Simons, 1999, p.16). Learning outcomes may vary from change, reinforcement, refinement, and extension to learning something new. What people learn may be of immediate value to them: for example, how to do the job in a less stressful or exhausting way. At other times, what they learn could be related to the nature of the work itself (Billett, 2002). On-the-job learning concerns, for example, learning by routine, from direct or indirect experience, and in interaction with other people. It is the implicit or spontaneous character of the learning process that makes it difficult to examine, because workers may not be aware of their learning processes. In these cases, learning can only be studied retrospectively, by looking back from learning outcomes realized to the processes that must have taken place unconsciously, and situations that have contributed to the learning outcome. Doornbos, Bolhuis and Simons (2004) differentiate between spontaneous and deliberate learning, based on the worker's intention to learn. They argue that spontaneous learning can occur when activities are performed with a goal other than learning in mind. The learning outcomes

may refer to changes in knowledge, skills, or attitudes as a result of such activities. They are typically unexpected and may therefore be described as by-products, discoveries, coincidences, or (sudden) realizations. The learner may also remain unaware of certain changes when, for example reflection does not occur (Marsick & Watkins, 1992). Deliberate learning, in contrast, refers to those activities performed with the goal of learning in mind. The resulting changes in behaviour, skills, and attitudes are planned, sought, and sometimes even premeditated.

There is still much to explore about the modes and processes of individual on-the-job learning. We know little about the kinds of learning employees make use of, especially those that are spontaneous. Current themes and research directions address the social and situational aspects of learning through the on-the-job learning cultures, texts and discourses, identities and differences, equity and ethics in work and workplaces (Fenwick, 2001). Given the emergent interest in on-the-job learning, researchers put their efforts into collecting data on its processes to contribute to theoretical notions regarding this construct. Research instruments address different kinds of on-the-job learning, such as explicit and planned learning, emergent learning, self-directed learning, experiential learning, learning strategies, team learning, innovative learning, distance learning, etc. Some instruments are also used in interventional practices, for example when human resource developers apply instruments for diagnostic purposes and take into account individuals' different ways of learning in their daily practices, to improve the process of learning and consequently enhance performance. Examples of these instruments may be questionnaires, interviews, observations, documents (portfolios), visual methods (such as concept maps and diagrams) or personal narratives (e.g., logs and diaries) (Denzin & Lincoln, 2000).

With this growing body of research instruments and accompanying practices, the importance increases of accumulating the variety of instruments. Moreover, it seems important to formulate generic standards for methodological practices to be used in on-the-job learning research, since the current literature does not provide a systematic description of standards or guidelines for research. In this study, we will first propose and describe aspects of methodological practice. Then, we will provide an overview of the variety of instruments used to measure individual on-the-job learning processes, and the accompanying methodological practices. The overview provides an insight into the contemporary state of research, and can serve as a starting point for further development. Next, to study what other instruments provide possibly useful opportunities for future research on individual on-the-job learning, we have examined literature covering a broader definition of on-the-job learning processes and literature on on-the-job learning outcomes. Based on our conclusions, we will formulate a set of guidelines of methodological practice, which is helpful in terms of quality improvement and for comparability reasons.

Research questions

In this paper, methodological practices in on-the-job learning research are explored to gain an insight into their variety and qualities. These methodological practices may

stem from different research paradigms. In line with Lincoln and Guba (2000) we choose not to follow one specific research paradigm, but follow how various paradigms 'interbreed' and inform one another's argument (p. 164). The aim is to provide an overview of this variety in order to identify tentative guidelines for future research addressing the process of on-the-job learning.
Therefore, the main research question of this study is twofold:

1. What is the variety of methodological practices in contemporary research on on-the-job learning?
2. What instruments not used in current research on on-the-job learning provide possibly useful opportunities for its future research?

Variety of paradigms

A paradigm can be defined as a philosophical template or framework that guides the production of knowledge (Kuhn, 1962). It concerns beliefs about what can be known about the world and how we can come to know it. Within each paradigm, several research methodologies are possible, each drawing on a number of methods or techniques for data collection and interpretation (Lincoln & Guba, 2000). The explicit or implicit paradigm and strategy are related to the applied methodological practices. A useful categorization of paradigms could be based on a combination of Melles's (1999) and Lincoln and Guba's (2000) categorizations, and includes the (post) positivistic, interpretative, critical, and participatory approach. In our description of the variety of methodological practices in on-the-job learning research, we will often follow Lincoln and Guba (2000) in a more rough division of social scientists: classical researchers and new-paradigm inquirers. Classical researchers are scientists from the (post-) positivistic paradigm, and new-paradigm inquirers from the other paradigms mentioned above. Classical researchers have foundational ideas that are discovered and imply certain final, ultimate criteria for testing the truth. New-paradigm researchers have non-foundational ideas, and argue that there are no such criteria, only those that we can agree upon at a certain time and under certain conditions; criteria that are negotiated (Lincoln & Guba, 2000).

Aspects of methodological practice

Methodological practice can be used as a concept to describe decisions researchers take in their research projects, how they carry them out, and report on them. Therefore, in our view, methodological practice goes beyond the researcher's decisions to use a particular research method or instrument, and refers to the operationalization of research concepts, research goals, researcher roles, and how to maintain rigour and quality (inspired by Lincoln & Guba, 2000). These decisions are dependent on the underlying paradigm. Furthermore, methodological practice does not only include the decisions researchers take, but also how these decisions are reflected in their design and report. The next section describes the aspects of methodological practice distinguished above.

Operationalization of the research concept. Researchers investigating on-the-job learning processes have different perspectives in their operationalization of the research concept. Some focus on deliberate learning only, some focus on spontaneous learning, too. They focus on, for example, styles, activities, strategies, tactics, behaviours, orientations, and approaches. According to Berings & Poell (2005), an on-the-job learning style is the tendency to use a certain combination of implicit and explicit learning activities that a person is able to and likes to engage in on the job. The person may use a different combination of learning activities in each different situation. This particular combination is called the actualized learning strategy. Dalton (1999) describes learning tactics as the behaviours that individuals have reported using, when engaged in the task of learning. Learning orientations refer to how people think about learning. It indicates a cross-situational consistency in approach to learning (Entwistle, 1988). A learning approach can be described as learning processes that stem from a learner's perception of a particular learning situation, and as being influenced by their personal characteristics (compare Biggs, 1988). All the above perspectives describe a rich variety of on-the-job learning processes and can focus on both mental and overt, and both spontaneous and deliberate learning activities.

Research goals. The goals of research can be to predict, explain, explore, describe, or perform action (Dane, 1990). New-paradigm inquirers are increasingly concerned with singular experiences. Classical researchers generalize their findings towards their particular research population (Lincoln & Guba, 2000).

Classical researchers are mostly focused on *prediction or explanation*. Predictive research identifies relationships that enable us to speculate about one thing by knowing about other things. Explanatory research involves examining a cause-effect relationship between two or more phenomena. It is used to determine whether or not an explanation (a cause-effect relationship) is valid, or to determine which of two or more competing explanations is the more valid.

New paradigm researchers have other research goals. Critical theorists and interpretativists are mostly directed towards *explorations and descriptions*. Exploratory research involves an attempt to determine whether or not a phenomenon exists. Descriptive research involves examining a phenomenon to more fully define it or differentiate it from other phenomena. The goal of participatory researchers is *action*. Action research refers to research conducted to solve a social problem. Marsick and Watkins (1990) describe it as a cyclical process by which a group of people jointly identify a problem, experiment with a solution, monitor the results, reflect on the process, and use the resultant information to reformulate the problem, which may lead to another cycle of research.

Researcher's role. The researcher's role can be described in terms of interaction with others involved in the research project (Lincoln & Guba, 2000). The inquirer posture of a classical researcher is that of an *informant* of decision makers, policy makers and change agents. Classical researchers merely control their research, and deny their own influence. In contrast, new paradigm inquirers admit their influence and report about

this (Lincoln & Guba, 2000). They share control with the participants. Interpretativists are *'passionate participants',* who are facilitators of multi-voice reconstruction, share their control of the research, and are involved with the participants. A third role that can be distinguished is the role of an *'activist'*, where the participating researcher's primary voice is manifest through conscious self-reflective action, and his or her secondary voices is manifest in illuminating theory through which shared control of the research becomes salient in varying degrees. Lincoln and Guba (2000) do not describe the role of critical researchers. In our view, critical researchers can be described as '*reflexivists'*, who continuously elucidate the means by which their own *and* respondents' value suppositions guide the framing of theory and fact. Critical researchers do not take for granted and reproduce, but reflect on dominant institutions and ideologies as a way to emancipate from frozen social and ideational patterns (Alvesson & Sköldberg, 2000).

Maintaining rigour and quality. Classical researchers mainly perform quantitative research, and new-paradigm inquirers mainly perform qualitative research (Lincoln & Guba, 2000). However, within each paradigm, mixed methodologies may make perfectly good sense (Guba & Lincoln, 1981; Lincoln & Guba, 2000). Instruments that can be used are for example questionnaires, interviews, observations, documents (portfolios), visual methods (such as concept maps and diagrams), or personal narratives (e.g., logs and diaries) (Denzin & Lincoln, 2000). The underlying paradigm may have major impact on how researchers maintain quality and rigour of their research, that is, what effort they put into achieving credibility in design, analysis and report. Significant aspects will be briefly mentioned here.

Classical researchers can use conventional benchmarks of rigour (validity, reliability and objectivity). In our review, we used the definitions of Messick (1980) and Allen and Yen (1979). We will discern: *content-, construct-,* and *criterion validity*. Furthermore, we distinguish *test-retest reliability, alternate form reliability,* and *internal consistency*. *Objectivity* refers to procedures for minimizing investigator bias.

New paradigm researchers can maintain rigour and quality by validity, generalizability (Maxwell, 2002), rigorous methods, and authenticity (Lincoln & Guba, 2000; Patton, 2002). Maxwell (2002) provides a typology of understanding and validity in qualitative research including *descriptive validity* (factual accuracy of participants' accounts), *interpretative validity* (inferences drawn from participants' actions and words: the participants' perspectives in terms of intention, cognition, belief, affect, and evaluation), *theoretical validity* (a theory that the researcher brings to, or develops during the study of some phenomenon in terms of concepts or categories and the relationships thought to exist between these concepts), and *evaluative validity* (application of an evaluative framework to the objects of study). Yin (1994) offers a very straightforward protocol approach for case study research, emphasizing field procedures, case study questions, and a guide for reporting. Yin claims such steps are a major tactic for increasing the reliability of the research endeavour. *Generalizability* refers to the extent to which one can extend the account of a particular situation or population to other persons, times, or settings than those directly studied. *Rigorous methods* yield high-quality data that are systematically analyzed with attention to issues

of credibility such as searching for rival explanations, explaining negative cases, and triangulation. *Authenticity* is the 'reflexive consciousness about one's own perspective, appreciation for the perspective of others, and fairness in depicting constructions in the values that triggered them' (Patton, 2002). In our view, this refers to the consideration of investigator effects, such as training, experience, status, and also representation of self.

In the next section of the paper, we describe how we reviewed the variety of all above mentioned aspects of methodological practice in contemporary research on on-the-job learning. Finally, we will discuss what can be learned from this for future research.

Procedure

Variety of methodological practices

To identify the variety of methodological practices in contemporary research on on-the-job learning, a four-step procedure was used to select instruments to be included in our overview. First, the instruments, gathered unsystematically in our research projects during the last two years, served as a starting point for the exploration. Second, we thought about descriptions under which on-the-job learning instruments could be categorized, such as on-the-job learning, workplace learning, work-based learning, work-related learning, informal learning, non-formal learning, vocational or occupational learning, skill development, growth or acquiring know-how, competence, ability, mastery and expertise in combination with descriptions of instruments, such as diary, journal, log, narrative, diagram, picture, chart, questionnaire, inventory, interview, critical incident, portfolio, and concept maps. These descriptions were used in searching ERIC, PsychINFO, and ABI/Inform. Third, we conducted a hand-search of each issue (1998-2004) of six major journals on this topic: Adult Education Quarterly, Human Resource Development International, Human Resource Development Quarterly, Journal of Workplace Learning, Lifelong Learning in Europe, and Studies in Continuing Education. Fourth, we examined reference lists of articles to identify additional, relevant sources. The studies of on-the-job learning processes and the accompanying methodological practices that will be included in the overview meet six selection criteria, to review a congruent set of studies sharing similar features. The studies should:

1. measure the *process,* and not the product, of on-the-job learning;
2. be applied in *employee learning*, that is learning confined to the context of an occupation;
3. measure *individual* employee learning (in a social context), and not group or organizational learning;
4. include *empirical* data collection and analysis;
5. be *clearly described* in published material;
6. contribute to the *variety* of instruments and accompanying methodological practices, and not to the quantity of instruments.

Studies needed to fulfil all of the criteria above to be selected for the overview.

In line with the above discussion, we describe the methodological practices of the studies included in the overview in terms of the specific instruments used, their perspective on on-the-job learning, the research goals, the researcher's role, the subjects examined, and how rigour and quality were maintained. This latter characteristic is further divided into method description, validity, reliability and objectivity for quantitative studies, and method description, validity, evaluation of the instrument and authenticity for qualitative studies. Furthermore, we included instrument samples and descriptions of the subjects.

This description of methodological practice follows the AHRD Standards on ethics and integrity (Russ-Eft et al., 1999). These standards suggest that 'HRD professionals who develop and conduct research with tests and other assessment techniques use research procedures and current professional knowledge for test and research design, standardization, validation, reduction or elimination of bias, and recommendations for use' (ibid, p. 8).

The tables present information explicitly described by the authors in normal print. Information we were only able to infer indirectly appears in italics. When the information is absent, the table cell remains blank.

Other instruments

To study which other instruments provide possibly useful opportunities for future research on on-the-job learning processes, we extended the first and second items of our selection criteria. The first criterion was extended to include learning outcomes as a result of on-the-job learning processes, descriptions of work activities, and experiences in which employees learn. The second criterion was extended to include student learning in apprenticeships and employee learning which is not job related. Our third, fourth, fifth and sixth criterion were kept unchanged.

Findings

Variety of methodological practices

The variety of methodological practices in contemporary research on on-the-job learning is listed in the overviews of Table 4.1 and 4.2. The overview shows variety (examples in all categories found), and is not meant to be all embracing or representative. In general, many studies did not report on all aspects of methodological practice. Especially, information as to quality and rigour was often incomplete. Appendix 4.1 and 4.2 present instrument samples and descriptions of the subjects examined.

We have only found questionnaires and interviews meeting the initial selection criteria, no other kinds of instruments. Researchers report the qualities of the instruments differently according to the kind of instrument.

The perspective on on-the-job learning applied in research conducted with *questionnaires* addresses deliberate learning in terms of strategies, behaviours, and approaches, as can be seen in Table 4.1. Deliberate learning is studied in specific learning events or as a relative stable set of activities that employees apply in all kinds

Table 4.1. Overview of variety of methodological practices of questionnaires in contemporary research in on-the-job learning

Questionnaire		1. Critical reflective work behaviour (CRWB) (van Woerkom, 2003)	2. Learning strategies (Holman *et al.*, 2001)	3. Learning strategies (Megginson, 1996)
Operationalization of On-the-job learning		CRWB is a set of connected activities, carried out individually or in interaction with others aimed at optimizing individual and collective practices, or critically analyzing and trying to change organizational or individual values	Learning strategies can be defined as the practices that people use to aid the acquisition and development of knowledge in any context	Learning strategies are defined as an approach to all experiences, and are not observable or amenable to regulation by others
Research goal		Validate the construct of CRWB and examine the relationships specified in the conceptual model *(describe and predict)*	Examine learning strategies in a non-educational organizational setting *(explore)*	Measure planned and emergent learning strategies as independent dimensions *(explore)*
Researcher's role		*Informant:* constructs conceptual model and collects anonymous information via mail questionnaire	*Informant*: adapts learning strategies that others gathered from literature, and collects data via mail questionnaire	*Informant:* constructs conceptual model and anonymous mailing
Quality and rigour	**Instrument description**	Based on case study, 47 items developed by researcher herself	Based on measures developed by Warr and Downing (2000) and in educational setting examined	From 25 original items, 9 were allotted to planned, and 8 to emergent learning. Finally, the best 12 items were kept
	Validity	*Construct* validity is illustrated with results of factor analysis	*Construct* validity is illustrated with results of exploratory and confirmatory factor analysis (cross-validation)	*Construct* validity is illustrated with intercorrelations. *Content* validity was assumed
	Reliability	Internal consistency measure alpha between .67 and .83	Internal consistency measure alpha between .70 and .82	Internal consistency is illustrated with inter-correlations between items in each scale and between the two scales
	Objectivity	Overcome subjectivity of self-report method by formulating items as much as possible in terms of concrete behaviour	Comments about possibility that individuals are not entirely cognizant of the particular strategies they use	x

Questionnaire		4. Learning tactics (Dalton, 1999)	5. Learning At Work Inventory (Hoeksema, 1995; Hoeksema *et al.*, 1997)	6. Motivated Self-directed Learning In Schools and Companies (Straka, 2003)
Operationalization of On-the-job learning		Learning is approached as a set of behavioural tactics that an individual employs to engage in learning from experience	A learning strategy is a combination of related tactics aimed at a change in knowledge and / or behaviour within a specific situation	Learning strategies are part of the behavioural dimension in a learning event
Research goal		Measure four kinds of learning tactics in challenging and unfamiliar work assignments in order to increase self-awareness of personal development *(action)*	Examine career success of individual managers as a complex positive or negative function of individual learning strategy and organizational structure (1997) *(explain)*	Test assumption of more dimensionality of self-directed learning based on interest strategies, control and emotion *(describe)*
Researcher's role		*Passionate participant*: uses inventory as educational tool	*Informant:* constructs hypothetical conceptual model and anonymous mailing	*Informant:* constructs conceptual model and anonymous mailing
Quality and rigour	**Instrument description**	Based on conversations with experts, journal entries, and literature	Based on measures by Selmes (1987) of school graduate learning behaviour and tested among 135 students	Based on a questionnaire originally developed for educational settings by Peter Nenninger and his research group
	Validity	*Construct* validity is illustrated with self-report data of comparative self-report and boss report instrument	*Construct* validity is questioned, and suggestions for alternatives are given	*Construct* validity is illustrated with results of means of principal components analysis and references to previous validation studies
	Reliability	Internal consistency measure alpha between .73 to .80	Internal consistency measures were .60 and .72 and test-retest correlations were .61 and .85	Coefficients between indicators and main constructs vary from .60 to .84
	Objectivity	x	x	x

of situations. Only the questionnaire of Megginson (1996) covers spontaneous learning (as well as deliberate learning). Research goals in the questionnaires vary from exploration to explanation. In five out of six surveys, the researcher performs the role of an informant, whereas in one case (Learning Tactics Inventory) a passionate

participant role was identified. As far as reporting on quality and rigour is concerned, most authors inform the reader on internal consistency of the different scales or on the intercorrelations between items within one scale.

Perspectives on on-the-job learning in the *interview studies* vary from directed and self-initiated learning (projects) to ubiquitous activity in work that is sometimes inseparable from learning. Thus, spontaneous learning is addressed more often in interview studies than in surveys. Interview goals are to describe and / or to explain, with the exception of one interview that also pursued to help people to take care of their own development. The researcher's role is mostly that of a passionate participant, but informant, reflexivist, and activist roles were also found. Interviews are sometimes pilot-tested, and are either semi-structured or follow a critical incident approach, as can be seen in Table 4.2. Remarks about interpretative and theoretical validity and generalizability were often reported. In contrast, evaluating the method or the authenticity of the study was less frequently found.

The four paradigms described above, one classical and three new paradigms, could not be unambiguously inferred from the reports. It appeared that paradigms do indeed interbreed on a methodological level (Lincoln & Guba, 2000). Moreover, in most cases, scholars were not explicit about the underlying paradigm. Thus, no data are reported on this issue in the tables.

Most of the information in the tables comes from the researchers themselves, some could be indirectly inferred from the reports (reported here in italics), and some is just lacking. The researchers' roles, in particular, could only be inferred indirectly, and information on quality and rigour was often lacking and could not be inferred from the reports. Researchers using questionnaires do mostly report about the validity and reliability of the instrument afterwards, whereas researchers using interview instruments mainly focus on rigour and quality beforehand.

Instruments for future research

Instruments from related literature provide possibly useful opportunities for on-the-job learning research in the future. Literature focusing on the (re)design of work, changing environmental conditions or employee competencies or pursuing improvement of work outcomes, are relevant, especially for research goals that relate to the innovative efforts of Human Resource departments in stimulating on-the-job learning.

Research instruments addressing on-the-job learning in relation to the various work-related activities employees carry out, are, for example, *observations* of managers' work activities (Mintzberg, 1970), *structured diaries* of bank apprentices activities (Noß, 2000), *concept maps* of adult learners' activities (Stevens, 1997), or *photographs* and *drawings* (Daniels, 2003). Faurfelt & Wichmann-Hanssen (1999) combined observations and diaries with interviews in a study of learning in apprenticeships to identify encouraging and inhibiting factors for learning processes in junior doctors' continuing education at a surgical ward. Observations focussed on the interaction between the task, the junior doctor, the teacher, and the work environment. In the diaries, the junior doctors recorded what they believed they had learned, and how they had experienced the

Table 4.2. Overview of variety of methodological practice of interviews in contemporary research in on-the-job learning

Interview instrument	**1. Semi-structured interviews (M. R. Eraut, 1998)**	**2. Semi-structured interviews about self-directed learning projects (SDLP) (Clardy, 2000)**	**3. Semi-structured interviews combined with observations (Collin, 2002)**
Operationalization of On-the-job learning	Working and learning cannot be separated from each other; a large part of learning is a tacit process, some is explicit. Focussed on learning rather than knowledge use.	SDLP operationalized based on Tough (1971) a self-initiated or directed set of activities with the primary purpose of learning about job, vocational or occupational subjects (≥ 7 hours)	Learning is understood as a ubiquitous, ongoing activity, though often unrecognized as such (Lave, 1993). It is informal, experiential, context bound, participation.
Research goal	Study what is being learned at work, how it is taking place and what other factors affect the amount and direction of learning in the workplace *(describe and explain)*	Explore types and occurrence of SDLP *(describe)*	Explore conceptions of learning in a work context from a process-oriented perspective *(describe)*
Researcher's role	*Passionate participants,* trying to gather data by interpreting the different voices of the participants, without being distracted by any preconceptions	*Passionate participant* in naturalistic research. Inductive articulate emergent categories through iterative process of constant comparison. Conceptual categories are grounded in a multi-voice reconstruction.	*Reflexivist* who continuously elucidates the means by which her own and respondents' value suppositions guide the framing of theory and fact
Quality and rigour Method description	Relation to theory, pilot test expert or peer review	Relation to theory by Tough (1971). Interview was pilot tested and revised. After each interview the researcher would evaluate the interview and make appropriate adjustments for future interviews.	According to phenomenological principles, too many questions or details were not formulated in advance. The point is to establish the phenomenon as experienced and to explore the different aspects of the experience jointly as fully as possible.

Interview instrument		1. Semi-structured interviews (M. R. Eraut, 1998)	2. Semi-structured interviews about self-directed learning projects (SDLP) (Clardy, 2000)	3. Semi-structured interviews combined with observations (Collin, 2002)
Quality and rigour	**Validity**	*Interpretative validity* was accounted for based on interviewee checks and further questioning in second interview *Theoretical* validity was enhanced by making comparisons of the outcomes with existing literature *Generalizability* of the outcomes was enhanced by including participants from different levels in different occupational areas	*Descriptive and interpretative validity* is illustrated by experiences of researcher with interviewing *Theoretical validity* is shown by a speculative model that integrates the processes affecting the occurrence of the types of SDLP G*eneralizability* of the conclusions is restricted due to the convenience sample	*Interpretative validity* was accounted for based on interviewee checks that are extensively reported *Theoretical validity* is tentative in hierarchically ordering the conceptions *Generalizability* since learning is assumed to relate to aims, tasks and context of work, it would be premature to draw conclusions for other contexts
	Evaluation	Interview helped to develop and extend previous research and construct comprehensive picture of learning at work: To reveal tacit knowledge a few weeks of field research or an ethnographical study.	Author mentions several problems with the research such as that self-report accounts of learning projects are suspect	Remarks about the value of integrating interviews and observations are stated. Ethnographic case studies will provide insight into participative and collective learning.
	Authenticity	Focus on a wider range of learning experiences than those captured by the projects approach.	The author explicitly mentions that interviewer training and skill are crucial.	Explicitly takes point of workers themselves as starting point and explains how researchers can never escape from own interpretations in the research process.

Interview instrument	4. Critical incident interviews (Billett, 2000)	5. Stimulated recall interview (Poskiparta *et al.*, 1999)	6. In depth interviews (Fenwick, 2004)
Operationalization of On-the-job learning	Learning is engagement in everyday activities in the workplace that provide ongoing access to goal-directed activities and support, which are instrumental in assisting individuals constructing or learning new work-related knowledge as well as the strengthening of that learning	Self reflection in improving communication skills in the areas of listening, interviewing methods, motivation, giving advice and feedback. Self-reflection is seen as a way of learning by doing in normal working processes and consists of seven of which four are seen as conscious levels and three as critical conscious levels of reflectivity.	Learning in general is practice based and participative. Innovative learning is an interplay of local choice-making and design within social relations constituted by material interests, cultural histories, and conflicting discourses.
Research goal	Determine whether guided workplace learning can assist the development of skills and knowledge required for workplace performance and understand how that learning can be maximized *(explain)*	Describe nurses' opinions of their communication skills in health counselling situations and analyze the levels of reflectivity in their evaluations according to Mezirow (1981) *(describe)*	Understand how portfolio workers learn *for* innovative work and *in* innovative work *(describe)*
Researcher's role	*Activist* who trials to guide learning strategies and reflects on their effectiveness through interviews with participants	*Passionate participant* Besides classification in levels of reflection, the author refers to the nurses' benefit from this method of data-gathering	*Reflexivist* who continuously elucidates the means by which her own and respondents' value suppositions guide the framing of theory and fact
Quality and rigour **Method description**	The interview approach focussed on three kinds of actual workplace incidents, namely 'high moments', 'problem-situations', and 'low moments' The approach was modelled on an earlier investigation, which used similar procedures to elicit	Stimulated recall interviews based on videotaped counselling and appended written evaluations	Three main topics of the interviews were: work histories, strategies and challenges, and skills and knowledge required. These were fully explored based on narratives of critical incidents and periods of lived experiences.

Interview instrument	4. Critical incident interviews (Billett, 2000)	5. Stimulated recall interview (Poskiparta *et al.*, 1999)	6. In depth interviews (Fenwick, 2004)
	data grounded in actual workplace problem-solving incidents. Relation to theory, expert or peer review.		
Validity	*Descriptive* validity of verbal data is held through actual events and changes in behaviour *Interpretative validity* was accounted for by additional data gathering in observations, visits, open questions about the perceptions of the participants, and questioning the mentors *Theoretical validity* is accounted for by grounding the interview questions in relevant literature using selected criteria *Generalizability:* differences in functions, products/services and organizational structures comprised the scope	*Interpretative:* Nurses' written evaluations and the video data supported the interpretation of counselling. Before and after analysing the data, the principles of analyses and basis of differences and agreement were discussed with the parallel recorder. *Theoretical:* The levels of reflectivity in nurses' evaluations of their counselling skills were analyzed by Mezirow's typology of reflection. Six out of seven levels could be used. The results correspond with earlier studies. *Generalizability:* x	*Interpretative:* a narrative was created based on the experiences and validated with the participants. The steps and decisions taken in the analysis process remain rather implicit. *Theoretical:* categorizing data at increasing levels of abstraction resulted in themes *Generalizability: x*
Evaluation	x	Nurses found it difficult to evaluate their counselling immediately after watching it on video. The videoing disturbed the interaction between nurse and patient only slightly.	Author mentions that the perspective of the individual worker is well captured, but that ethnographic methods involving the analysis of daily interactions and observations of changing practices over time throughout a system may reveal other perspectives on innovative learning.
Authenticity	x	x	x

Interview instrument		7. Informal learning project (ILP) interview (Gear *et al.*, 1994)	8. Narrative (life and work-history) interviews (Valkevaara, 2002)
Operationalization of On-the-job learning		Informal learning is learning that professional people may undertake, in and through their normal work and practice, intentionally or spontaneously. The method section shows focus on deliberate learning. ILP means spending at least one working day at developing some aspect of professional knowledge, skills and competence to the point where some of it could be passed on to a colleague.	Development of professional expertise is viewed as experienced performance and developed as an interactive constructive process based on the interpretation of experience and narratives in a variety of everyday situations at work as well as in other fields of life.
Research goal		Explore the pattern of learning in an ILP, the nature of the process, and influences *(describe and explain)*	Explore the construction of professional expertise through interpretations of experience in the practice of HRD-professionals *(describe)*
Researcher's role		*Informant* The researchers gather information about informal learning	*Passionate participant* Regards the interviews as beneficial for the interviewees: it offers space and time for reflection
Quality and rigour	**Method description**	Semi-structured interviews that ensured that all topics were covered in most cases, to minimize interviewer differences, and to provide enough freedom to pursue themes and topics that arose during the interview, in a relatively flexible manner	Narrative (life and work history), interviews to supplement an earlier held survey about the HRD professionals' experiences and conceptions in order to examine the quality and development of their expertise in HRD work
	Validity	*Interpretative*: one fifth of the interviews was analyzed by researchers as a group *Theoretical:* x *Generalizability:* no representativeness of the sample for the population (professions in the United Kingdom). However, no obvious influences affecting selection (there is an element of chance)	*Interpretative*: x *Theoretical*: the similarities in career stories found are related to findings in earlier studies *Generalizability:* More interviews of the whole group of 20 HRD professionals should be analyzed
	Evaluation	x	The framework should be offered to HR developers themselves to see whether it helps in analyzing and making sense of experiences
	Authenticity	x	x

learning situation. Carson and Longhini (2002) reported on a study in which diaries and discussions were combined. She used a learning diary, containing narratives of learning Spanish during an exchange in a Spanish-language country. The analyses of these narratives followed a preformatted structure of the language learning strategies, and a second researcher read the diary, discussed issues, and questioned the diary-writer. However, diaries may also be used in isolation, for example, when Reimers (1971) analyzed his own learning diary, in which he mapped his progress in a work-related course. Diary studies seem to be useful in understanding how people learn in interaction with their social context, and in relation to what they have learned, whether this is being analyzed in a pre-structured manner or not, by the writers themselves or a researcher, or in combination with other data collection tools. Alternatives to diaries are photographs and drawings, as Daniels (2003) used to strengthen her inquiry on women's capacity for leadership and community building in South Africa with interviews and observations. She gave her participants a disposable camera to take pictures of their home environment, family and life. Through the photographs the researcher gained a better understanding of the participants' visibility, strengths, and potentials in community building. With this data-collecting method, the decision-making power shifted away from the researcher and more to the participants. They served as elaborators of verbal dialogue and became rich sources of data on the participant's feelings about the topic of interest 'community' and encouraged collaborative inquiry.

Studies of learning products are another track of research that provides potentially useful instruments for future research on on-the-job learning. For example, Brown (2002) reports on portfolios of what adult students (re-) entering college have learned from their work experiences. Portfolios do not only provide an insight into what people have learned, but also into how they have learned through substantial descriptions of the experiences and the learning processes.

Conclusions and discussion

The main conclusion concerning the first research question is that in contemporary research into on-the-job learning, the research instruments used to map on-the-job learning processes are questionnaires and interview guides only. Inspired by Lincoln and Guba (2000), we investigated the rather limited variety of methodological practices in terms of the underlying paradigms, the operationalization of the research concept on-the-job learning, the research goals, the researcher's role, and how to maintain rigour and quality. The main conclusions concerning the variety in these aspects of methodological practices can be formulated as follows.

From the publications, the research paradigms adhered to could not be unambiguously inferred. It appeared that paradigms interbreed on a methodological level (Lincoln & Guba, 2000). In research into on-the-job learning many different operationalization of the research concept are used. Further, the variety of the broadness on which the concept is investigated is large. However, it is currently recognized by many scholars that learning at work is best understood by taking different perspectives into account: terms of the nature of the task itself, the cultural

and social relations that characterize the workplace, and the experiences and social world of the participants (Billett, 2002; Illeris, 2002). The publications we investigated use questionnaires and interview guides for a detailed investigation of specific aspects of learning processes for the goals of describing, explaining or exploring. Further, one questionnaire study was aimed at predicting and one questionnaire study was aimed at action. The researchers' roles could only indirectly be inferred from the publications. In the studies using questionnaires, the researchers are mostly informants. Only Dalton (1999) has the role of a passionate participant in her study on learning tactics, in which she uses the questionnaire as an educational tool. The variety of researcher's roles in the studies using interview guides is higher: we found an informant, passionate participants, reflexivists, and an activist.

Information on quality and rigour is often lacking, especially in the interview studies. Billett (2000), for example, used the same (modelled) interview strategy on several occasions, but does not report on the reason or type of adjustments. Reliability can be achieved by using detailed protocols and by checking for generalization. We do not want to suggest that the absent information is due to inadequate thinking on these aspects of methodological practice. It may result from incomplete reporting (in books) or limited space in articles. Maxwell's (2002) typology of validity seems a usable approach to get more information on validity. It stands out that researchers using questionnaires in most cases do afterwards report about the validity and reliability of the instrument, whereas researchers using interviews mainly focus beforehand on controlling rigour and quality. Sometimes, triangulation is used (see e.g. Faurfelt & Wichmann-Hanssen, 1999). We believe that validity and reliability should become a more important concern for new paradigm researchers. On the other hand, triangulation may be a good option for researchers using questionnaires too, especially in the case of investigating implicit on-the-job learning that seems difficult to catch anyhow. It can be checked if different instruments agree with each other, or at least, do not contradict (Miles & Huberman, 1994). Van Woerkom (2003) advised as follows: 'Further research could focus on inter-rater reliability, and on the possibilities that the 360-degree feedback method offers to increase the validity of the instrument, contrasting self-ratings with ratings of colleagues and immediate managers (p.170)'. Further, Holman Epitropaki, and Fernie (2001) concluded: 'Research needs to be conducted in a wider range of learning strategies and such studies would benefit from being multi-method and not relying on self-report questionnaire-based measures as it is possible that individuals are not entirely cognizant of the particular strategies they use (p. 680).' Observing what people actually do in addition to the inquiry of what they say they did may therefore raise rigour and quality of the data in terms of validity.

A reason for the observed preference of researchers into on-the-job learning for the use of questionnaires and interview guides may be that these instruments are commonly applied in scientific research, often standardized, and easier to report on compared to instruments that are less common. On-the-job learning is a relatively new field of study that benefits from available instruments. Furthermore, so far on-the-job learning is studied in the field with its practical time constrains as opposed to laboratory settings. Researchers probably only use interviews and questionnaires due to

the implicit nature of most on-the-job learning processes. These implicit processes can only be identified when reflection on these processes is stimulated. In observations, diagrams, personal narratives, etc. probably only the explicit learning processes would become visible.

The advantage of using questionnaires is that large groups of employees can be reached. The disadvantage is that on-the-job learning is measured restrictedly in terms of approaches, activities, and strategies and questionnaires do not provide insight in learning histories and meaning making of experiences or spontaneous learning. We can conclude that in questionnaires deliberate learning, whether it is mental or overt, is satisfyingly measured, but that it is more difficult to measure spontaneous learning using questionnaires, since one cannot ask individual follow-up questions in questionnaires. The advantage of using interview guides is that they can better provide insight into tacit processes and interpretations of experiences. This means, in our view, that employees are better recognized in their personal learning stories. The disadvantage is that it is difficult to reach a large group of people.

To answer the second research question, other instruments not used in current research on on-the-job learning that provide potentially useful opportunities for future research on on-the-job learning processes are observations, diagrams, personal narratives, and documents, often utilized in combination with interviews and / or questionnaires. In mapping learning outcomes and work experiences, these instruments are useful as a trigger for making explicit the learning processes embedded in these experiences, in interviews and / or questionnaires. This indirect questioning of the process may solve some practical problems related to researching on-the-job learning, such as the difficulty of talking about learning processes at work, often an unusual topic to share experiences about. Other difficulties are the willingness to disclose sensitive experiences in which mistakes were made, or the employees' feelings of insecurity about what experiences are relevant or interesting to the research. Furthermore, the instruments themselves may create a 'need' to talk about on-the-job learning since they direct the employees' attention to it, when putting down their experiences in narratives or diagrams. It is expected that this contributes to a better understanding on the part of both participants and researcher of experiences relevant to on-the-job learning processes.

We found examples of studies that used observation techniques to investigate communication patterns in workplace situations (e.g., Kubo *et al.*, 2001; Wheelan *et al.*, 1994). Observation techniques might offer opportunities for measuring interpersonal learning processes, even though communication patterns are a specific way of learning in which only knowledge sharing is being studied. These overt activities can be more easily observed than mental learning activities.

A final possibility for future research is inspired by research on collective learning. As noted earlier, there is a growing interest in how individual learning contributes to the larger collective of the organization. Barker and Neaily (1999) examined how collective learning (innovation) could be facilitated by starting with the individual awareness of what had been learned from explicating this in learning logs

and later on discussing this with fellow automotive manufacturing employees. For example, collective learning through knowledge sharing is studied through observations of communication patterns at a bank (Kubo et al., 2001), or conference session documents of professionals from a variety of fields (Wheelan et al., 1994).

This study does not have the ambition to review the methodological practices of the entire body of contemporary research on on-the-job learning. Instead, we have systematically searched the available literature, and selected cases representative of certain kinds of practice. Similar reports were not selected. The database, therefore, is not a representative overview of all the research available, but of the kinds of research instruments in use. It should be noted that this might have influenced the findings of this study.

With the growing body of research instruments and accompanying practices, the importance increases of listing the variety of instruments. Moreover, it seems important to formulate generic standards for methodological practices in on-the-job learning research, since the current literature does not provide research standards or guidelines.

Guidelines for future research

In this final section, we formulate a tentative set of guidelines for future research on methodological practices in on-the-job learning research. One might object that identifying general guidelines for rigour and quality in methodological practice is in contradiction with our attempts to connect paradigms and methodological practice. Yet, some important general guidelines can be identified whether researchers have classical or new paradigm approaches. The main underlying idea behind most of our guidelines is that researchers should be explicit about all aspects of methodological practice as conceptualized above.

Based on the overview of methodological practices found and in line with the ideas of Lincoln and Guba (2000), we recommend that future on-the-job learning researchers:

1. pay attention to on-the-job learning in terms of the nature of the task itself, the cultural and social relations that characterize the workplace, and the experiences and social world of the participants;
2. explicitly account for the relationships between the underlying paradigm and all aspects of the methodological practice used;
3. try to triangulate by using different kinds of data collection methods that provide different perspectives on on-the-job learning (e.g., observations provide insight in current activities and interviews provide insight in stories of the past and in peoples' intentions);
4. in addition, use other instruments, such as observations, diagrams, personal narratives and documents, besides questionnaires and interviews to study the complex interplay of the learner's deliberate and spontaneous internal process and the social environment;
5. are explicit about the role they themselves play in the research (informant, passionate participant, activist, reflexivist);

6. describe how they maintain rigour and quality, before, during, and after data gathering.
    a. For questionnaires, we propose that future researchers not only describe the internal consistency (coefficients alpha) of the questionnaires, but also: a) the process of item construction and selection, including the use they make of pre-existing instruments; b) example items for each subscale; c) how the data gathered with the questionnaire were analyzed, d) pilot-research they did to test the reliability and validity of the instrument; and e) indications of validity (e.g., content validity, construct validity, and criterion validity).
    b. For interviews, we propose that future researchers describe not only the interview questions used, but also: a) whether and how they were used flexibly depending on the answers received; b) how the questions were constructed and pre-tested and with whom; c) how the interview data were analyzed, d) what and how selections of interview data were made, and e) indications of validity (descriptive, interpretative, theoretical and / or evaluative validity and generalizability, cf. Maxwell, 2002).

One final guideline we would like to propose, not directly following from our findings, but from new paradigm researchers' literature (e.g., Alvesson & Sköldberg, 2000), is to use the opinions of subjects more explicitly. Respondents could, besides answering, also evaluate the questionnaires and interviews.

With this paper, we hope to contribute to the quality of future on-the-job learning research, by stimulating researchers in this field to take different perspectives on on-the-job learning into account: terms of the nature of the task itself, the cultural and social relations that characterize the workplace, and the experiences and social world of the participants. Further, we hope to encourage them to be more explicit on their use of methodological practice and to use a larger variety of instruments.

References

Allen, M. J., & Yen, W. M. (1979). *Introduction to measurement theory*. Monterey, CA: Brooks/Cole Publishing Company.

Alvesson, M., & Sköldberg, K. (2000). *Reflexive methodology: New vista's for qualitative research*. London, UK: Sage Publications Inc.

Barker, M., & Neailey, K. (1999). From individual learning to project team learning and innovation: A structured approach. *Journal of Workplace Learning, 11*, 60-67.

Berings, M. G. M. C., & Poell, R. F. (2005). Measuring on-the-job learning styles: A critique of three widely used questionnaires. *British Journal of Occupational Learning, 3*, 3-12.

Biggs, J. B. (1988). Approaches to learning and to essay writing. In R. R. Schmeck (Ed.), *Learning strategies and learning styles* (pp. 185-228). New York: Plenum Press.

Billett, S. (2000). Guided learning at work. *Journal of Workplace Learning, 12*, 272-285.

Billett, S. (2002). Workplace pedagogic practices: Co-participation and learning. *Journal of Educational Studies, 50*, 457-481.

Bolhuis, S., & Simons, P. R. J. (1999). *Leren en werken [learning and working]*. Deventer, The Netherlands: Kluwer.

Brown, J. (2002). Know thyself: The impact of portfolio development on adult learning. *Adult Education Quarterly, 52*, 228-245.

Carson, J. G., & Longhini, A. (2002). Focussing on learning styles and strategies: A diary study in an immersion setting. *Language Learning, 52*, 401-438.

Clardy, A. (2000). Learning on their own: Vocationally oriented self-directed learning projects. *Human Resource Development Quarterly, 11*(2), 105-125.

Collin, K. (2002). Development engineers' conceptions of learning at work. *Studies in Continuing Education, 24*(2), 133-152.

D'abate, C., Eddy, E. R., & Tannenbaum, S. I. (2003). What's in a name? A literature based approach to understanding mentoring coaching, and other constructs that describe developmental interactions. *Human Resource Development Review, 2*, 360-384.

Dalton, M. (1999). *Learning tactics inventory: Facilitators guide*. San Francisco, CA: Jossey-Bass/Pfeiffer.

Dane, F. C. (1990). *Research methods*. Pacific Grove, CA: Brooks/Cole.

Daniels, D. (2003). Learning about community leadership: Fusing methodology and pedagogy to learn about the lives of settlement women. *Adult Education Quarterly, 53*, 189-206.

Denzin, N. K., & Lincoln, Y. (2000). *Handbook of qualitative research*. Thousand Oaks, CA: Sage.

Doornbos, A. J., Bolhuis, S., & Simons, P. R. J. (2004). Modeling work-related learning on the basis of intentionality and developmental relatedness: A non-educative perspective. *Human Resource Development Review, 3*, 250-274.

Entwistle, N. J. (1988). Motivational factors in student's approaches to learning. In R. R. Schmeck (Ed.), *Learning strategies and learning styles* (pp. 21-51). New York: Plenum Press.

Eraut, M. (2000). Non-formal learning and tacit knowledge in professional work. *British Journal of Educational Psychology, 70*, 113-136.

Eraut, M. R. (1998). *Development of knowledge and skills in employment*. Brighton: University of Sussex Institute of Education, Education Development Building.

Faurfelt, K., & Wichmann-Hanssen, G. (1999). The doctor as a counsellor and as a learner: Learning processes at a hospital ward. *Lifelong Learning in Europe, 4*, 25-33.

Fenwick, T. (2001). Tides of change: New themes and questions in workplace learning. New directions for adult and continuing education. In T. Fenwick (Ed.), *Sociocultural perspectives on learning through work* (pp. 3-17). San Francisco, CA: Jossey-Bass.

Fenwick, T. (2004). Learning in portfolio work: Anchored innovation and mobile identity. *Studies in Continuing Education, 26*, 229-245.

Gear, J., McIntosch, A., & Squires, G. (1994). *Informal learning in the professions*. Hull, UK: School of Education, The University of Hull.

Guba, E. G., & Lincoln, Y. S. (1981). *Effective evaluation: Improving the usefulness of evaluation results through responsive and naturalistic approaches*. San Fransisco, CA: Jossey-Bass.

Hoeksema, L. H. (1995). *Learning strategy as a guide to career success in organizations*. PhD Thesis, Groningen, The Netherlands: Universiteit Groningen.

Hoeksema, L. H., van de Vliert, E., & Williams, A. R. T. (1997). The interplay between learning strategy and organizational structure in predicting career success. *The International Journal of Human Resource Management, 8*, 307-327.

Holman, D., Epitropaki, O., & Fernie, S. (2001). Understanding learning strategies in the workplace: A factor analytic investigation. *Journal of Occupational and Organizational Psychology, 74*, 675-681.

Illeris, K. (2002). *The three dimensions of learning: Contemporary learning theory in the tension field between the cognitive, the emotional and the social*. Frederiksberg, Denmark: Roskilde University Press.

Kubo, I., Saka, A., & Pam, S. (2001). Behind the scenes of knowledge sharing in a japanese bank. *Human Resource Development International, 4*, 465-485.

Kuhn, T. S. (1962). *The structure of scientific revolutions*. Chicago, IL: University of Chicago Press.

Lave, J. (1993). The practice of learning. In S. Chaiklin & J. Lave (Eds.), *Understanding practice: Perspectives on activity and context* (pp. 3-34). Cambridge, UK: Cambridge University Press.

Lincoln, Y., & Guba, E. G. (2000). Paradigmatic controversies, contradictions, and emerging confluences. In N. K. Denzin & Y. Lincoln (Eds.), *Handbook of qualitative research* (pp. 163-188). Thousand Oaks, CA: Sage Publications.

Marsick, V. J. (2003). Invited reaction: Informal learning and the transfer of learning: How managers develop proficiency. *Human Resource Development Quarterly, 14*, 389-395.

Marsick, V. J., & Watkins, K. E. (1990). *Informal and incidental learning in the workplace*. London, UK: Routledge.

Marsick, V. J., & Watkins, K. E. (1992). Continuous learning in the workplace. *Adult Learning, 3*, 9-12.

Maxwell, J. A. (2002). Understanding and validity in qualitative research. In A. M. Huberman & M. B. Miles (Eds.), *The qualitative researcher's companion* (pp. 37-64). Thousand Oaks, CA: Sage Publications.

Megginson, D. (1996). Planned and emergent learning. Consequences for development. *Management Learning, 27*, 411-428.

Melles, G. (1999). Methodologies in workplace research: Relevant paradigms for reform from the inside. In *Proceedings of the herdsa annual international conference* (Vol. 22). Melbourne, Australia.

Messick, S. (1980). Test validity and the ethics of assessment. *American Psychologist, 35*, 1012-1027.

Mezirow, J. (1981). A critical theory of adult learning and education. *Adult Education, 32*, 3-24.
Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage Publications.
Mintzberg, H. (1970). Structured observation as a method to study managerial work. *Journal of Management Studies, 7*, 87-104.
Noß, M. (2000). *Selbstgesteuertes lernen am arbeitsplatz [self-directed learning at the worksite]*. Wiesbaden, Germany: Gabler.
Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.
Poskiparta, M., Liimatainen, L., & Kettunen, T. (1999). Nurses' self-reflection via videotaping to improve communication skills in health counseling. *Patient Eduction and Counseling, 36*, 3-11.
Rainbird, H., Fuller, A., & Munro, A. (2004). *Workplace learning in context*. London, UK: Routledge.
Reimers, A. (1971). Excerpts from a learner's diary or seven months at the ontario institute for studies in education. *Continuous Learning, 10*, 2-14.
Rocco, T. S. (2003). Shaping the future: Writing up the method on qualitative studies. *Human Resource Development Quarterly, 14*, 343-349.
Russ-Eft, D., Burns, J. Z., Dean, P. J., Hatcher, T. G., Otte, F. L., & Preskill, H. S. (1999). Ahrd standards on ethics and integrity. Retrieved January 14, 2004, from http://www.ahrd.org/publications/ethics/ethics_standards.PDF
Selmes, I. (1987). *Improving study skills*. London, UK: Hodder and Stoughton.
Smith, P. J. (2003). Workplace learning and flexible delivery. *Review of Educational Research, 7*, 53-88.
Stevens, P. A. (1997). *Using concept maps for assessing adult learners in training situations*. Doctoral dissertation, Albuquerque, New Mexico: University of New Mexico.
Straka, G. A. (2003). Modeling a more-dimensional theory of self-directed learning. In G. A. Straka (Ed.), *Conceptions of self-directed learning* (pp. 171-190). Munster, Germany: Waxmann.
Tough, A. (1971). *The adult's learning projects*. Research in Education Series No. 1. Toronto: Ontario Institute for Studies in Education.
Valkevaara, T. (2002). Exploring the construction of professional expertise in hrd: Analysis of four hr developers' work histories ad career stories. *Journal of European Industrial Training, 26*(2/3/4), 183-195.
van Woerkom, M. (2003). *Critical reflection at work: Bridging individual and organisational learning*. PhD Thesis, Enschede, The Netherlands: Twente University.
Warr, P., & Downing, J. (2000). Learning strategies, learning anxiety and knowledge acquisition. *British Journal of Educational Psychology, 91*, 311-333.
Wheelan, S. A., McKeage, R. L., Verdi, A. F., Abraham, M., Krasick, C., & Johnston, F. (1994). Communication and developmental patterns in a system of interacting groups. In L. R. Frey (Ed.), *Group communication in context: Studies of natural groups* (pp. 153-178). Hillsdale, MI: Lawrence Erlbaum.
Yin, R. K. (1994). *Case study research: Design and methods* (2nd ed.). Newbury Park, CA: Sage Publications.

Appendix 4.1. Descriptive information and item samples of questionnaires

Questionnaire	Research subjects	Description + instrument samples
1. Critical reflective work behaviour (CRWB) (van Woerkom, 2003)	Sample consists of 742 Dutch employees in several sectors	Critical reflective work behaviour consists of seven dimensions. Reflection (9 items, e.g. 'I reflect on the way I do my work'), career awareness (8 items, e.g. 'I am continually occupied with my career development'), experimentation (6 items, e.g. 'I do not like to deviate from the prescribed working method'), critical opinion-sharing (7 items e.g. 'I come up with ideas how things could be organized differently here'), asking for feedback (10 items, e.g. 'I discuss with colleagues how I have developed'), challenging groupthink (5 items, e.g. 'When I do not agree with the way a colleague does his work, I keep quiet'), sharing knowledge (6 items, e.g. 'I think I have the right to keep my knowledge to myself'), and learning from mistakes (7 items, e.g. 'I get embarrassed if I make a mistake'). Responses on 6-point scale (1 = totally disagree, 6 = totally agree).
2. Learning strategies (Holman et al., 2001)	Sample consists of 628 UK call centre employees	Three cognitive and three behavioural strategies were measured with 22 items. Reproduction (4 items, e.g. 'I do my work without really questioning it'), extrinsic work reflection (3 items, e.g. 'I often think about how my work fits into the 'bigger picture' at X'), intrinsic work reflection (5 items, e.g. 'I generally try to understand how new information fits into how I do my work'), interpersonal help seeking (3 items, e.g. 'I ask others questions when I am uncertain about something'), seeking help from written material (3 items, e.g. 'I fill in the gaps in my knowledge by getting hold of the appropriate material'), and practical application (3 items, e.g. 'I try out new things by applying them in practice'). Responses on a 5-point scale from 'not at all', through 'quite often' to 'a great deal'.
3. Learning strategies (Megginson, 1996)	168 UK managers	The questionnaire contains 12 (2x6) items measuring two learning strategies. Planned learning: e.g. 'I set targets for my development' and 'I use learning contracts regularly to focus on my progress in developing'; Emergent learning: e.g. 'It is important to be open to experience, then learning will come' and 'most of my learning emerges unexpectedly from things that happen'. Responses on a 7-point scale from 0 = never true/you never agree to 6 = always true / you totally agree.
4. Learning tactics (Dalton, 1999)	274 military officers and 36 individuals from civilian population in the US	The questionnaire contains 32 (4x8) items measuring four learning tactics. 'When faced with an unfamiliar task I…' Action (e.g. 'briefly outline what needs to be done and do it'), thinking (e.g. 'ask myself how this is similar to other things I know'), feeling (e.g. 'confront myself if I am avoiding the challenge'), and accessing (e.g. 'get on-the-job tutoring from another person'). Responses on 5-point scale (1 = I have almost never used this approach, 5 = I have almost always used this approach).

5. Learning At Work Inventory (Hoeksema, 1995; Hoeksema et al., 1997)	127 Dutch managers in government related organizations	The questionnaire contains 12 items measuring two learning strategies. Deep learning, 5 items, e.g. 'I think about the consequences of my work for others' and 'I try to understand the reasons of things that happen around me', and surface learning, 7 items, e.g. 'I especially remember facts and data' and 'I like to be told exactly what is expected of me'. The 5-point response scale ranges from 1 = never or only rarely true of me to 5 = always or almost always true of me.
6. Motivated Self-directed Learning In Schools and Companies (Straka, 2003)	295 German employees	The questionnaire contains 18 (3x6) items measuring learning strategies. Organizing: e.g. 'When I discover that I lack information I know where to get it'; Sequencing: e.g. 'Before tackling a task I think about the order in which to carry it out'; Acquiring: e.g. 'I write short summaries of the subject I have to learn'. The 4-point response scale ranges from 1 = absolutely through 4 = not at all.

Appendix 4.2. Descriptive information and question samples of interviews

Interview Instrument	Research subjects	Description interview strategy
1. Semi-structured interviews (M. R. Eraut, 1998)	120 independent professionals in three occupational areas: engineering, health care, and business. 80 were interviewed twice.	1) Questions about the nature of their jobs, recent tasks, duties and problems, 2) The nature of expertise required to do it was discussed, 3) How was the expertise acquired and to what extent is it changing, 4) Questions about sources of learning. Respondents were encouraged to elaborate on salient learning episodes, or to exemplify general statements about learning.
2. Semi-structured interviews about self-directed learning projects (SDLP) (Clardy, 2000)	Intentional sampling of 56 adults working in 6 non-exempt positions (technical, clerical, administrative, labourer, inside sales - hourly employees) in a mix of organizations in the Mid-Atlantic	Interview guide: 1) identify without prompts a self-directed learning project based on the description provided by the researcher in the last year, 2) identify with specific prompts, such as duty change, new equipment, new procedure, special work assignments more SDLP, 3) estimate how much time was spent on planning, organizing, learning and evaluating, 4) Detailed report describing the learning project, 5) HR policies and practices played a role in encouraging or discouraging? 6) Other workplace conditions? 7) Biographical data.
3. Semi-structured interviews (Collin, 2002)	18 Finnish product designers and engineers	Observations were carried out after the interviews to describe the work setting and the context, the situations in which learning was assumed to take place, and how the people involved see their actions and those of others. Everyday practices and situations, and ways of dealing with them, become more visible through observations. The meaning attached to experiences in working contexts can be obtained from the interviews. Employees were asked questions such as: tell me about your current job, what kinds of competencies are needed in order to meet the challenges of your everyday job? Describe a challenging or problematic situation at work. How did you solve the problem? What did you learn from it?
4. Critical incident interviews (Billett, 2000)	15 Australian employees in mining and 24 employees in food manufacturing	Interviews were conducted with the mentees throughout the program (in all 4 interviews over a period of six months). Critical incidents were used to help the mentees recall and consider three kinds of workplace incidents, namely 'high moments', 'problem situations' and 'low moments'. These focus the data on problem-solving tasks that were likely to be generative of new knowledge

5. Stimulated recall interview (Poskiparta et al., 1999)	19 female nurses from seven hospital wards in Finland	After videotaping, nurses read educational materials, watched their counselling on video, and then immediately gave verbal feedback in an interview. The nurses also provided written evaluations. The nurses replied to two open questions: 'What communication skills do you know well?', and 'How would you improve your communication skills?'. Separate interviews were held both with nurses and patients. The patients' answers were used to support the interpretation of counselling.
6. In depth interviews (Fenwick, 2004)	28 portfolio workers (nurses and educators from Canada)	Interviews were semi-structured, informal, and conversational. Three main topics were explored through participants narratives of critical incidents and periods of lived experience: 1) individual's work histories, focussing on their vocational aspirations and transitional experiences in entering portfolio work; 2) challenges, strategies, and benefits of negotiating portfolio work; and 3) skills and knowledge required to negotiated portfolio work and their approaches to generating this knowledge.
7. Informal learning project interview (Gear et al., 1994)	130 professionals of six different sectors in urban locations in the United Kingdom	The interviews are divided into five stages. The first part is meant to gather background information, the second to identify a person's informal learning projects carried out in the past three years, the third to analyze one of such projects in detail, the fourth to explore the contextual factors which might affect the person's informal learning process in general, and the last part is about the relationship between formal and informal learning and general issues related to the topic.
8. Narrative (life and work-history) interviews (Valkevaara, 2002)	Narratives of 4 managers of HRD departments with different work histories are analyzed, selected out of interviews with 20 HRD professionals in Finland	Life and work-history: interviewees were encouraged to talk about their everyday working experiences and educational careers.

Chapter 5

Learning Activity and Learning Content in the Nursing Profession The Development and Validation of a Classification*

Abstract

Purpose. The purpose of this study is to develop and validate a classification of nurses' on-the-job learning activity and content.

Design/methodology/approach. Two successive studies were conducted for this purpose. In the first study we analysed in-depth interviews with twenty nurses in the Netherlands, using a grounded theory approach. The content validity of the categories found in the first study was investigated in the second study by interviewing seventeen supervisors and eight educators from different hospitals in the Netherlands.

Findings. The main categories of learning activity are learning by doing one's regular job, learning by applying something new in the job, learning by social interaction with colleagues, learning by theory or supervision, learning by reflection, and learning through life outside work. First order learning activities and second order learning activities can be distinguished. The main categories of on-the-job learning content are the technical-practical domain, the socio-emotional domain, the organizational domain, the developmental domain, and a pro-active attitude to work.

Research limitations. The validation study was conducted by the same researchers as the first study.

Practical implications. The categories can be used to develop comprehensive and structured intervention methods for the improvement of on-the-job learning, which do justice to the complexity and diversity of on-the-job learning by nurses.

Originality/value. The results of this study explicate the existing multidimensionality of learning activity and learning content in a complete and refined manner by grounding the classification and framework in the data and by the use of multiple sources.

---

* This chapter has been submitted as Berings, M. G. M. C., Gelissen, J. P. T. M., & Poell, R. F. (submitted). Learning activity and learning content in the nursing profession: The development and validation of a classification. The first study is based on a book chapter currently in press: Berings, M. G. M. C., Gelissen, J. P. T. M., & Poell, R. F. (2006). What and how do nurses learn on the job? Similarities and differences among nurses in on-the-job learning. In S. Sambrook & J. Stewart (Eds.), HRD in the public sector: The case of health and social care. London, UK: Routledge.

Introduction

Researchers, hospital directors, professional associations of nurses, and defenders of nurses' interests as well as HRD professionals all agree that nurses need to learn continuously and that on-the-job learning is significant if this is to be achieved. The main reason why they need to learn continuously is that the context of health care is constantly changing and nurses need to adapt to new working situations. Examples of changes that demand continuous learning by nurses are the development of new technologies in nursing equipment, changing disease patterns and the shift from internal medical care to care that is, at least partly, provided externally. There has been a shift from task-centred nursing to patient-centred nursing and the boundaries between the work carried out by nurses and that of junior hospital doctors are shifting as well. All these changes imply a growth in the complexity of the knowledge and skills required and an increase in the number of times that a nurse is faced with making a choice and with ethical dilemmas. Nurses require knowledge and intellectual skills for critical thinking. They need to be decisive and to work as competent and autonomous care-providers and as members of multi-disciplined and multi-professional teams (Clark, 2001), something which they often experience as difficult (Eliens & Strijbol, 2001). Another reason for the need for continuous learning by nurses is that the nursing profession will become more attractive to nurses if they are given greater learning opportunities (Maurer, Weiss, & Barbeite, 2003). Research in the Netherlands (Dik & van Splunder, 2002) has shown that there is a clear relationship between a lack of learning opportunities and nurses leaving the profession.

Although hospitals can provide education and training to enable individual learning, these opportunities are not always financially possible. Moreover, in many situations training or education has several other disadvantages: it does not have impact unless it is well-timed and it often seems difficult to transfer what has been learned to the daily work situation (van Woerkom, 2003). In addition to formal training and education, the most significant sources of learning are the challenges of the work itself and interactions with other people in the workplace (Eraut, Alderton, Cole, & Senker, 1998; Mumford, 1995; Tannenbaum, 1997). On-the-job learning overcomes the problems of training and education that have been mentioned above, so that it would appear to be useful to put more effort into improving this method of learning. At present, however, little is known about methods that can be used for such improvement. Learning is a very complex phenomenon (Akgün, Lynn, & Byrne, 2003) and more knowledge about nurses' every-day on-the-job learning contents and activities is needed in order to develop methods for intervention.

The aim of this article is to report on the development and validation of a classification of nurses' learning content and learning activity. Two successive studies were conducted for this purpose. The first study reveals six main categories of learning activity and six main categories of learning content from in-depth interviews with twenty nurses in the Netherlands. The content validity of these categories was investigated in the second study by consulting seventeen supervisors and eight educators from different hospitals in the Netherlands using semi-structured interviews. The findings of these studies leads to an extensive and refined classification of nurses'

learning activity and learning content, and to a framework that shows the relationship between nurses' on-the-job learning activities by distinguishing between first order and second order learning activities. This classification and framework can be used to develop intervention methods for the improvement of on-the-job learning.

The methods of data collection and interpretation used stem from the interpretive tradition, since they focus on multiple individual realities by using different informants. The quality of the interpretations of the interview data was enhanced by using observations and by provoking a dialogue with the participants of the two studies (Lincoln & Guba, 2000).

Study 1

Aim and research question of study 1

The aim of the first study was to investigate nurses' learning content and learning activity, seen from their perspective. The research questions were:

1. *What* do nurses, seen from their perspective, learn on the job (learning content)?
2. *How* do nurses, seen from their perspective, learn on the job (learning activity)?

Research method of study 1

Twenty highly educated and qualified nurses from different departments of a general academic hospital in the Netherlands were observed in 2003 during their work activities and interviewed afterwards about their on-the-job learning. These departments included three outpatient departments, six wards and one intensive care unit. The supervisors of the departments selected both novice and experienced nurses for participation in the research project. On average, the nurses had 11.68 years of experience in nursing (SD = 7.54). The observations were used as a trigger for making learning processes explicit in the interviews (cf. Berings & Doornbos, 2003). The semi-structured interviews were partly stimulated recall, about the nurses' last shift by using the observations made and partly about other experiences since their graduation. The researcher (the first author) asked questions about the nurses' learning activities after they had completed their initial nursing education. Questions were asked first about the variation in their work activities, followed by questions about what kind of knowledge, skills and attitudes the nurses thought they needed or would need to be able to show in order to perform these work activities well. Finally, the nurses were asked about how they had acquired the required knowledge, skills and attitudes or how they thought they could acquire these in the future. The interviews focused on the nurses' actual learning behaviours rather than their preferences or intentions. The interviews were recorded, transcribed and analyzed using Atlas-ti and a grounded theory approach.

The grounded theory approach is a qualitative research method that uses a systematic set of procedures to develop an inductively derived, grounded theory about

a phenomenon (Strauss & Corbin, 1998). Two coders (the first and second authors) independently read the transcripts of the interviews with the two research questions in mind, and assigned open codes to fragments that were related to learning content and learning activity. These open codes were intended to indicate the more general or conceptual idea shown in a given fragment. The coders also used memo-writing during this process as a means of immediately recording all thoughts and difficulties relating to the coding process to be used in the next procedure of consensual validation. In this procedure, the codes assigned were compared critically and all the differences in fragments and codes identified between the coders were discussed. Where differences were identified, the relevant parts of the transcripts and memos were read again and discussed extensively in order to evaluate clearly their relevance to learning content and learning activity. Where doubt remained about a code it was not incorporated into the final coding scheme.

In the next stage, all three authors explored the relationships between the categories identified in the open coding procedure by making connections between them. The more general categories or code families of the types of on-the-job learning content and on-the-job-learning activity were explored. The codes identified in the open coding stage could be seen as subcategories of these code families. Which particular codes could be assigned to each code family was discussed critically for the purpose of consensual validation (or reliability - Weston et al., 2001). This procedure resulted in a classification with six main categories of learning content and six main categories of learning activity. These categories were compared with existing theories on the issues at hand in order to validate the findings theoretically. The findings are presented in the next section.

Findings of study 1

The grounded theory analysis of the interviews revealed three main categories of learning content that are common in literature: the technical-practical domain, the social-emotional domain with respect to others, and the organisational domain. It also revealed three main categories of learning content that are less common: the social-emotional domain with respect to oneself (personal coping), the developmental domain, and the proactive attitude to work. The analysis also revealed six main categories of learning activity: learning by doing one's regular job, learning by applying something new in the job, learning by social interaction with colleagues, learning by theory or guidance, learning by thinking about work experiences, and learning through life outside work. This last category is relatively unknown in the literature. The main categories were divided into subcategories and illustrated with examples mentioned by the nurses. This first attempt to develop a classification of nurses' on-the-job learning content and activity is shown in Tables 5.1 and 5.2. These findings are discussed more extensively in Berings, Gelissen, and Poell (in press). The research method and findings of this study are discussed in the next section and the approach that will be used in the second study to improve the classification is introduced.

Table 5.1 First classification of nurses' on-the-job learning content

Nurses' on-the-job learning contents			Examples
technical-practical domain		general skills	computer skills, administrative skills
		nursing skills	technical nursing skills, methodological acting, following protocols
		knowledge of technical nursing	knowledge of pathology, knowledge of medication
		information transfer to patients	information transfer, answering questions, forwarding, writing brochures
		information transfer to colleagues	answering questions, teaching clinical classes, reporting, elaborating protocols
socio-emotional domain	with respect to others	socio-emotional contact with patients and family	empathy, empathic treatment, patience, dealing with aggressive people, emotional support
		socio-emotional contact with colleagues	emotional support, collaboration, diplomacy, giving feedback
		daring to communicate	assertiveness, honesty, prioritizing, drawing the line
		appearance	tranquil, enthusiastic
	with respect to oneself	personal coping	putting things in perspective, work-family balance, self-confidence, physical position
organizational domain		task-management skills	planning, elaborating nursing schemes, structured working
		co-ordinating tasks	offering guidance, leadership, structuring meetings, performance assessment of team members
		role and environment skills	transcending one's own tasks, understanding different roles in the organization, critical reflection on the organization
developmental domain		learning and collecting information	collecting information, asking questions, formulating learning objectives, studying learning opportunities
		self-knowledge	knowing your own weaknesses and strengths, knowing your own boundaries
proactive attitude to work			work ethic, decision-making, practical support to colleagues, independent work attitude, flexibility

Table 5.2 First classification of nurses' on-the-job learning activity

Nurses' on-the-job learning activities		Examples
learning by doing one's regular job	work-experience	learning by doing, learning from mistakes
	contact with patients and family	empathy, observing, conversations with patients and family
	observing colleagues	learning from negative or positive colleague behaviour (nurses, doctors or colleagues in other disciplines)
	exercising	exercising, trying out, skills dummy
	helping others with learning	preparing and teaching clinical classes, answering colleagues' questions, student supervision
learning by applying something new in the job	broadening tasks	doing other peoples' jobs, searching for new situations
	job rotation	working in different departments, temporarily doing someone else's job in one's own department
learning by social interaction with colleagues	asking questions	asking questions in or outside one's own department or organization of nursing colleagues, students, doctors or colleagues in other disciplines
	asking for feedback	asking for feedback from nursing colleagues, students or colleagues in other disciplines
	obtaining feedback	obtaining feedback from nursing colleagues, students, patients, doctors or colleagues in other disciplines
	exchanging knowledge and experience	brainstorming together, conferring, casuistry meetings, patient meetings, team meetings
learning by theory or supervision	checking media	books, specialist journals, the Internet, protocols (on the intranet)
	visiting information meetings	symposia, congresses, clinical classes
	taking courses	courses, workshops, training
	direct supervision	exercising with supervision, supervision during introduction, annual performance assessment interviews
learning by thinking about work experiences	structuring one's thoughts	reasoning, logical thinking, creating step-by-step plans, writing down
	reflection	retrospective, concurrent and prospective, at home or at work
learning through life outside work	life experience	having children, death in the family, personal conversations

Discussion of study 1

A classification of learning content and learning activity, both including six main categories and many subcategories and examples, was developed in this study. This classification provides many insights into nurses' learning content and activities and is more complete and more refined than existing classifications of on-the-job learning, and overcomes some overlap problems in existing classifications of on-the-job learning (e.g., Bolhuis, 2001; Collin, 2002; den Boer & Hövels, 2003; Doornbos, Eekelen, & Koopmans, 2006; Eraut et al., 1998; Gerber, 1998; Heikkila & Makinen, 2001). However, several shortcomings in this study can be identified.

Firstly, the classification does appear to overcome some overlap problems in existing classifications, but still contains some overlap itself. Approaching learning activity from a specific angle could reduce such overlap problems. A recent study in the field of nursing (Estabrooks et al., 2005), for example, overcomes these overlap problems in a classification of how nurses learn by approaching nurses' learning in terms of sources of practical knowledge. The study distinguished informal and formal social interactions, experience, documents, and a priori knowledge, and subsequently divided these categories into subcategories and further refinements. On the one hand, this classification does not contain overlap, but on the other hand it is, in our view, also incomplete as a classification of nurses' on-the-job learning activities. The classification is only about knowledge and disregards skills and attitudes. It also shows many similarities with the classification used here, but does not contain the categories of learning by thinking about work experiences and learning by applying something new in the job. Therefore, the 'specific angle' approach of Estabrooks et al. (2005) would not be a solution to the overlap problems mentioned above.

Another approach to dealing with overlap problems in the classification could be to make them explicit. It is important to gain insight in on-the-job learning processes and, therefore, in the interrelations between the different learning activities, in order to develop methods of improving on-the-job learning. If some overlap problems cannot be avoided, it is useful to make the overlap obvious and to provide a description of the overlap showing the interrelations between the different activities. This is the approach followed in the second study described in this paper.

Secondly, another criticism of this first study is that the grounded theory approach in the data collection technique used has a number of limitations. Although a broad variety of types of learning content and activities of nurses were identified, it is still questionable whether all types were found. It is conceivable that the interviewees did not remember the best examples of learning content and activities (Doornbos et al., 2006). They might not have mentioned those that hardly ever occur or the ones that occur so often that they have become self-evident. It is conceivable that some activities were not made explicit. This means that the list of examples provided in the classification may not provide a complete overview. In order to assess the validity of the existing classification and, if necessary, to complete this list, another data source was used in the second study.

Thirdly, since the study was conducted using interviews, it is questionable whether the interviewers completely understood the respondents' language. All

respondents have other ways of verbalizing their thoughts (Bernstein, 1983). Therefore, to increase the validity of the outcomes in the second study the findings and interpretations were verified with other people involved with nurses' learning but from another perspective.

Finally, all nurses in the sample of this study worked in different departments of the same academic hospital. It is possible that other hospitals provide other learning contents and learning activities. For instance, the learning opportunities in academic hospitals might be greater than those in peripheral hospitals, which could influence the range of different learning activities that the individual nurses used and reported. In the second study the findings were confirmed in different types of hospitals in order to improve external validity.

Study 2

Aim and research question of study 2

The aim of the second study was to validate, and if necessary, supplement the existing classification reported by Berings et al. (in press), in order to obtain a realistic classification of nurses' learning contents and learning activities. The following research questions were formulated:

1. To what extent does the classification of nurses' learning content and activity developed earlier present a valid overview of the relevant learning domains?
   a. Which categories or examples should, according to experts, be added to make the classification more complete?
   b. To what extent does overlap in the classification exist, and is it possible to reduce this overlap; if not, what are the consequences of this overlap?
   c. Are all categories and examples in the classification valid for most functions in the nursing profession?
2. What is the relationship between the various learning activities in the classification?

Research method of study 2

Miles and Huberman (1994) recommend obtaining feedback from earlier or new informants as a procedure for corroborating findings from qualitative studies. In accordance with this recommendation a content validation study was carried out at the end of 2004 by interviewing seventeen supervisors and eight educators from seven general peripheral, teaching, and academic hospitals using semi-structured interviews. All educators and some supervisors were selected at random from a database of a regional association for hospital education in the Netherlands. Additional supervisors from hospitals selected at random were included purposely in order to include respondents from different types of hospitals. All respondents were considered experts on nurses' on-the-job learning. The sample included fourteen men and eleven women, all of whom had many years of experience in health care ($M = 27.8$; $SD = 6.6$).

The interviewees were asked to react to the classification of learning content and learning activity that was established in the first study. They were asked initially for a

general reaction to the classification followed by specific questions about whether they recognised all the elements, whether they thought the terminology used was appropriate, whether all elements were placed at the right position in the classification, and whether they thought the classification was complete or whether they had suggestions for additions. The interviewees had received a copy of the classification by mail accompanied with instructions approximately one week before the interview so that they could prepare for it. Three of the interviewees did not manage to read these before their interviews.

The interviews were first summarized as suggested by Miles and Huberman (1994) in order to answer the first research question about how the classification of learning contents and learning activities can be improved. All remarks and suggestions made by the interviewees were then put in a table with cells representing all the possible combinations of interviewees and elements of the classification. The first author commented systematically on each acquired piece of feedback by asking herself whether it would lead to a significant change in the classification. These comments were based on the following criteria:

- Remarks concerning *new examples* – Are they truly new? Are they not refinements of existing examples? Do they not overlap with other examples? Are they relevant for most functions in the nursing profession? Are they defined from the perspective of the learner?
- Remarks concerning the *deletion of examples* or categories – Are they not relevant for most functions in the nursing profession?
- Remarks concerning *terminology* – Are they truly improvements? Are they not too narrow, or too broad?
- Remarks concerning the *organization of the classification* – Does the suggestion reduce the overlap in the different categories? Or does the suggestion improve the distinction between the different categories?

The first author then separated all the remarks into one group that would presumably lead to changes in the classification and one group of remarks that would not lead to an improvement of the classification. The position of each remark was motivated. All three authors then discussed these positions and their consequences for the existing classification intensively. The transcripts containing the recommendations suggested by the experts were used during these discussions to help reach informed consensus about (or a sufficient reliability of - Weston et al., 2001) the development of a new classification.

An analysis consisting of two separate steps was carried out to answer the second research question about the relationship between the various learning activities in the classification. The remarks of the respondents of this study were studied to find information on the basis of which a relationship between learning activities was suggested and, subsequently, the findings were checked to see whether these could also be found in the interviews with the nurses in the first study.

All remarks made by the interviewees that explicated a relationship between the different categories of learning activities were highlighted in the summaries of the

interviews conducted in the second study and the findings were organized. The Atlas-ti query tool was used to check whether these findings could also be derived from the interviews with the nurses in the first study by selecting the text fragments in the transcripts containing words indicating the combinations of learning activities found in the first step of the analysis present within five lines of the transcripts. The fragments were then read carefully to check whether these fragments actually contained these combinations, and, consequently, provided evidence for a relationship between the various learning activities as reported by nurses. The findings are presented in the next section.

Findings of study 2

All interviewees recognised the original classification of learning contents and learning activities. Nevertheless, they also made many proposals for improvement. These were used to construct a classification with a similar structure but better defined items (see Tables 5.3 and 5.4). The interviewees also made many comments that indicate relationships between the learning activities distinguished and these were used to construct a framework to show these relationships. Many of the new learning activities that the interviewees mentioned can also be interpreted as working activities, since working and learning are intertwined (Eraut, 2000; Lave & Wenger, 1991). However, in this study, they are reported as learning activities, because they generate a learning outcome.

Learning Content. Table 5.3 shows the new classification of nurses' learning content. An important change from the classification conducted in the first study is that the category of personal coping has been split into two categories: psychological coping (social-emotional domain) and physical coping (technical-practical domain). The distinction in the socio-emotional domain between 'with respect to others' and 'with respect to oneself' was removed in order to obtain a more balanced classification, and 56 significant examples of learning contents were added. Two examples were removed. The first of these – 'writing brochures' – was removed because four interviewees mentioned that it is very rare that nurses write brochures themselves; the second – 'methodological acting', better referred to as 'methodological nursing approach' – was removed because the respondents explained that this concept includes too many different kinds of learning contents, namely all contents in the subcategories of 'nursing skills', 'knowledge of technical nursing', 'information transfer to patients', 'information transfer to colleagues', and 'task-management skills'. The category of 'information transfer to patients' was extended to 'information transfer to patients and family'. The terminology of the examples was changed in four instances and explanations were added in seven. Although attempts were made to avoid overlap in the classification, there is clearly still some overlap present. It was also difficult to separate the proactive attitude to work from the other categories, because they are very much interrelated, as shown by remarks made by the interviewees. Eight interviewees, for example, mentioned issues such as taking responsibility for, and taking initiatives in, learning in the developmental domain.

Table 5.3 Final classification of nurses' on-the-job learning content, additions to the first classification are printed in italics

Nurses' on-the-job learning contents		Examples
technical-practical domain	general skills	computer skills, administrative skills, *Dutch and English language skills, analytical thinking, logical thinking, punctuality, accuracy*
	nursing skills	following protocols, *restricted and risk-bearing nursing activities, nursing calculation, adjusting care to patients with particular problems, reporting incidents*
	knowledge of technical nursing	knowledge of pathology, knowledge of medication: *possible complications, effects and side-effects*
	information transfer to patients and family	information transfer, *directing patients to correct information sources,* answering questions, forwarding, *asking questions and follow-up questions, testing information that patients collected themselves*
	information transfer to colleagues	answering questions, *asking questions and follow-up questions,* teaching clinical classes, reporting *in patient files*, elaborating protocols
	physical coping	*ergonomic posture, dealing with devices*
socio-emotional domain	socio-emotional contact with patients and family	empathy, empathic treatment, patience, *active listening, encouraging dedication to therapy*, dealing with aggressive people, emotional support, *showing interest, taking patient diversity into account*
	socio-emotional contact with colleagues	emotional support, *showing interest, active listening*, collaborating, diplomacy, giving feedback*, reacting positively to feedback, taking colleague diversity into account*
	daring to communicate	*holding each other responsible for quality control*, assertiveness, honesty *about errors and near errors, sharing opinions,* indicating one's boundaries, *asking for help, honesty to patients about situation*
	appearance	*showing professionalism, confidence*, tranquillity*, sense of humour*, enthusiasm, timing (showing the right appearance at the right moments)
	psychological coping	putting things into perspective, work-family balance, self-confidence, drawing the line, *positioning oneself in the nursing team, handling emotions, assuring work pleasure, dealing with dirty work*
organiza-tional domain	task-management skills	planning, *prioritizing, keeping the overview,* elaborating nursing schemes, working in a structured way
	co-ordinating tasks	offering guidance *to nursing students*, structuring meetings, *choreographing 24-hour treatment, organizing doctor's consultation rounds, administration of materials, administration of waiting list, preparing duty rosters, and for supervising nurses:* leadership, performance assessment of team members
	role and environment skills	sensitivity to situation in direct work environment, understanding different roles in *and outside* the organization, *transferring patients to other carers,* critical reflection on the organization, and for supervising nurses: developing and implementing policies
develop-mental domain	learning and collecting information	collecting information, *evaluating reliability of information sources, interpreting information, looking up protocols*, asking questions, *asking for feedback*, formulating learning objectives, scanning for learning opportunities*, keeping up with specialist journals, obtaining resources (time, money, means, etc.)*
	self-knowledge	knowing one' s weaknesses and strengths, knowing one's boundaries, *self-reflection*
proactive attitude to work		working efficiently, decision making, helping colleagues, independent work attitude, *roster-technical* flexibility, *keeping up with innovations, thinking ahead, taking initiatives, taking responsibility, every-day quality control*

Learning Activity. The classification of learning activities was made more refined. An important difference between the new classification (see Table 5.4) and the classification conducted in the first study is that the subcategory 'exercising' in the main category 'doing one's regular job' was removed, since exercising is not encountered in other than educational settings. The subcategory 'learning by thinking about work experiences', is now called 'learning by reflection', and contains three, instead of two, subcategories, based on the moment of reflection (before, during or after action). The subcategories 'asking for feedback' and 'obtaining feedback' were merged into one category 'asking for and obtaining feedback', since these activities usually feature together. The broadly termed category of 'work experience' was narrowed down to 'taking care of patients', since broader aspects of work experience are covered by other subcategories. 'Asking questions to colleagues' was broadened to 'consulting colleagues'. The category of 'observing colleagues' was changed to 'watching colleagues', because the respondents indicated that this sounds less 'scary' in the original Dutch. The category 'taking courses' was broadened to 'education'. Many new examples (21) were also added to this classification in order to obtain a more complete overview. No examples were removed, since the experts confirmed that all examples in the classification can be relevant for most nurses. Finally, the terminology of examples was changed in ten instances and explanations were added in seven.

Despite the current culture of evidence-based working in the nursing profession in the Netherlands, with increased importance of academic knowledge at the expense of other forms of knowledge (Clarke & Wilcockson, 2002), it can be seen that many of the learning activities that the interviewees mentioned are based on so-called informal experiential and interactive sources (cf. Estabrooks et al., 2005). This could be explained by the idea that knowledge obtained by the use of media, education or information meetings often does not address the nurses' immediate or context-specific needs. Consulting colleagues, for instance, is less time consuming than searching the library or Internet. Visiting information meetings, such as symposia and conferences, is often expensive and time consuming. Therefore, the interviewees advised the authors to add 'obtaining resources', such as time, money and means, to the learning content of 'learning and collecting information'.

Although attempts were made to avoid overlap in the classification as much as possible, it must be recognized that there is clearly still some overlap present in this classification. 'Learning by social interaction with colleagues', for example, is also a part of 'taking care of patients', and 'learning together by reflection' is also a part of 'learning by social interaction with colleagues'. These relationships among learning activities were studied in order to answer the second research question.

Relations among different learning activities. Even though this was not explicitly asked in the interviews, the supervisors and educators in this study made many comments indicating that 'learning by social interaction' and 'learning by reflection' are related to the other main categories of 'learning by doing one's regular job', 'learning by applying something new in the job', 'learning by theory or supervision' and 'learning by life outside work'. For example, three of the interviewees mentioned explicitly that '*learning by doing one's regular job should be related to learning by reflection, since one mainly*

Table 5.4 Final classification of nurses' on-the-job learning activity, additions to the first classification are printed in italics

Nurses' on-the-job learning activities		Examples
learning by doing one's regular job	taking care of patients	learning by doing, *learning from success*, learning from mistakes
	contact with patients and family	empathy, observing, conversations with patients and family, *asking for feedback*
	watching colleagues*	imitating positive colleague behaviour, not adopting negative colleague behaviour
	helping others learn	preparing and giving presentations, answering colleagues'* questions, student supervision
learning by applying something new in the job	broadening tasks	doing other peoples' tasks, searching for new situations, *participating in special interest activities or workgroups*
	job rotation	working in different departments or institutions, temporarily doing someone else's job in one's own department
learning by social interaction with colleagues*	consulting colleagues	asking colleagues informative questions *or help*
	asking for and obtaining feedback	inter-collegial testing, openness to feedback, converting feedback into positive action
	exchanging knowledge and experience	brainstorming together, conferring, casuistry meetings, *(multidisciplinary)* patient meetings, team meetings, *day evaluations, transitional team communication, doctor's consultation rounds, workgroups*
learning by theory or supervision	checking media	books*, television*, specialist journals, the Internet, protocols
	visiting information meetings	*internal or external:* symposia, congresses, clinical classes*, lectures, conversations with patient associations*
	education	*internal or external:* retraining, courses, workshops, education
	direct supervision	*supervision and coaching:* exercising with supervision, work supervision, annual performance assessment interviews, *personal development plan interviews*
learning by reflection	planning	*prospective reflection*: reasoning, logical thinking, creating step-by-step plans, writing down: *at home or at work, deep or shallow, on knowledge, skills or attitude, alone or together with others*
	making intermediate adjustments	*concurrent reflection: deep or shallow, on knowledge, skills, or attitude, alone or together with others*
	looking back	*retrospective reflection: at home or at work, deep or shallow, on knowledge, skills or attitude, alone or together with others, self-reflection*
learning through life outside work		*going through all phases of life in and outside the hospital:* raising children, sickness and death in one's own circle, personal conversations, *volunteering in clubs or associations, television, patients' stories*

* Wherever colleagues are mentioned in this table, in addition to nurses in the own department, this also represents nursing students, colleagues of other departments, other institutions of healthcare, colleagues of other disciplines (doctors, physiotherapists, psychologists, etc.), or professionals in external healthcare.

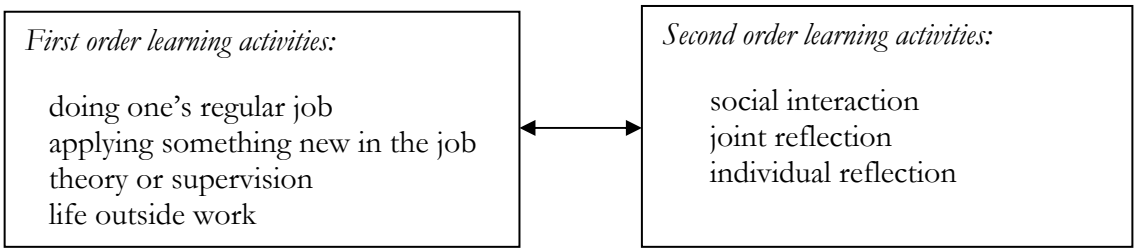


Figure 5.1. Framework of the relationship between different learning activities

learns by thinking over these regular work experiences'. It was also indicated many times that reflection often takes place in social interaction as 'joint reflection'. The content of social interaction, individual reflection and joint reflection lies in doing one's regular job, applying something new in the job, theory or supervision or life outside work. These last four activities can therefore be regarded as first order learning activities, which are often preceded or succeeded by the second order learning activities of social interaction, and individual and joint reflection, where a deepening of the first order learning experiences takes place (see Figure 5.1).

In order to validate the findings in the transcripts of the interviews with the nurses in the first study, 51 text fragments were selected from the transcripts that contained words indicating combinations of first order and second order learning activities distinguished in the first step of the analysis. After carefully reading these fragments together, 41 fragments were identified that indicated these combinations. A nurse who took the initiative to work at the emergency room for a couple of days, for example, told the interviewer how he and another nurse discussed how he had performed in trauma care: *'She asked me what was the reason that I had behaved the way I had and whether I thought that was the best way to handle such cases'*. In this example 'learning by applying something new in the job' is followed up by joint reflection. The other ten fragments did not explicitly indicate such a combination. The 41 fragments selected together represented all combinations of first order and second order learning activities and thus confirmed the analysis of the interviews of the supervisors and educators.

Discussion of study 2

The aim of this second study was to validate, and where necessary improve, the classification of learning contents and learning activities in the nursing profession developed earlier. In particular, the aim was to investigate possible amendments to the classification by obtaining systematic feedback from new informants who can be considered experts in the nursing profession. The valuable remarks and suggestions made by these experts did indeed result in several changes being made to the classification and in important improvements.

However, there are some relevant limitations to the research method and findings. First of all, the possible bias that may arise from the fact that both studies were conducted by the same researchers must be mentioned. To guard against bias the first author only collected all the data and performed the first analyses, while the

second and third authors acted as relatively objective judges. The choice made to have just one author carry out the first separation of interviewee remarks into one group of remarks that would, and one group of remarks that would not lead to an improvement of the classification also enabled a profound and structured discussion about the necessary changes. However, this procedure might have directed the discussion in a particular way and other outcomes would have been possible had a procedure been followed in which all three authors conducted this first separation of interviewee remarks.

Although attempts were made to avoid overlap in the classification as far as possible, there is still some obvious overlap. It should also be noticed that the domains, sub- domains and examples mentioned in the classification do not all have the same breadth. An example here is 'learning by doing' which is much broader than 'answering colleagues' questions'. However, the process has resulted in an improvement compared to the original classification on both these issues.

General conclusion and discussion

A content validation study, based on interviews with seventeen supervisors and eight educators in hospitals, was conducted based on a classification developed from interviews with 20 nurses, and the classification of nurses' on-the-job learning content and activities was further developed. A framework to show the relationship between the different learning activities nurses perform was also developed. The classification provides many insights into nurses' learning content and activity and shows many similarities with existing classifications of on-the-job learning but is more complete, more refined, and overcomes some overlap problems.

For example, concerning learning activity, the classification shows many similarities with a classification of Bolhuis (2001). She distinguishes learning by direct experience, learning by social interaction, learning by theory, and learning by reflection. Her first type, learning by direct experience, resembles the first two categories used here, namely learning by doing one's regular job and learning by applying something new in the job, which are also distinguished by Doornbos, et al. (2006) and Collin (2002). These categories also resemble Heikkila and Makinen's (2001) category learning by doing / learning in action, which they found in their study on nurses.

The third category, learning by social interaction with colleagues, is related to but more specific than Bolhuis' (2001) second type of learning, social interactions. In contrast to Bolhuis (2001) and Heikkila and Makinen (2001), social interaction with patients is regarded here as a subcategory of the first main category, learning by doing one's regular job. Therefore, the category of social interaction with colleagues is specified. This division resembles Collin (2002). The fourth category, learning by theory or supervision, is related to Bolhuis's (2001) category of learning by theory, but the term learning by supervision is added explicitly. Learning by theory includes checking media, attending information meetings and taking courses. The last two subcategories are particularly closely related to learning by supervision. In all situations

another person is explicitly helping with the learning process. Doornbos et al. (2006) combined learning by social interaction with colleagues and learning by theory or guidance into two other categories: information seeking and exchanging information, based on whether the information exchange was one-way or two-way. Collin (2002) distinguishes learning through formal education only and Heikkila and Makinen (2001) distinguished searching for information, organized training, and social interaction among their categories. The label of their first category overlaps the latter two and is therefore problematical. The fifth category, learning by reflection can also be found in Bolhuis' (2001) and Heikkila and Makinen's (2001) classifications and the subcategory retrospective reflection resembles Collin's (2002) learning through evaluating work experiences. The category reported in this study is more refined and distinguishes reflection before, during and after action. The sixth category found in this study, learning through life outside work, is similar to the category of life outside work that Eraut et al. (1998) distinguish and, to some extent, Collin's (2002) category of learning from contexts outside work, but the latter only includes subcategories that are still very much related to work contexts.

Concerning learning content, the categories cover all the learning content found by Den Boer and Hövels (2003) in their study of Dutch health care. However, the results of this study allowed the categories to be refined and additional categories were found. For example, the technical-practical subdomain physical coping and the socio-emotional sub domains daring to communicate, appearance, and psychological coping are not mentioned in the existing literature (e.g., den Boer & Hövels, 2003; Eraut et al., 1998; Onstenk, 1997). As well as aspects of organizational skills that are common in the literature such as task-management skills and co-ordinating tasks, an additional category, role and environment skills, was found which can be compared with a competence Mansfield (1991) found and described as understanding, working in and using the physical, organizational and cultural environment. Another additional category found was that of developmental skills. The first subcategory distinguished here, learning and collecting information, can be compared with the category knowledge resources and how to access these distinguished by Eraut et al. (1998) and with Onstenk's (1997) learning competences. The second subcategory found in the data, self-knowledge, however, is not mentioned in the literature. In on-the-job learning, nurses generally have to formulate their own learning objectives, and therefore self-knowledge is required. The final additional category of learning content found in this study, a proactive attitude to work, can partly be compared with cultural-normative competences that Onstenk (1997) distinguished as an element of broad professional skills.

We should mention the fact that on-the-job learning is a complicated process in which people are working, thinking, making decisions, innovating, and learning at the same time (Berings, Poell, & Simons, 2005), and therefore is difficult to explicate in a classification or framework. However, in this study, it has been possible to approach the existing multidimensionality of learning activity and learning content in a complete and refined manner by grounding the classification and framework in the data and by the use of multiple sources. The categories can be used to develop comprehensive and

structured intervention methods for the improvement of on-the-job learning which do justice to the complexity and diversity of on-the-job learning by nurses. They can be used for the development of questionnaires that measure the learning content and activity of individual nurses, for example. Using such an instrument, individual differences between nurses or differences between nurses from different kinds of departments or hospitals can be investigated. Additionally, such an instrument can be used by nurses to create an awareness of their on-the-job learning and therefore offer opportunities to improve this (Berings et al., 2005). The findings of this study can be used for the construction of profound personal development plans, going beyond the obvious learning contents and activities and the learning environment in hospitals could be adapted by providing opportunities for multiple forms of learning, instead of focusing only on education and training options.

This article provides a number of insights in on-the-job learning content and activity, but is based only on nurses in general hospitals in the Netherlands. However, other countries and other professions also need more knowledge about learning content and learning activity on the job. It can be expected that the main and sub domains found in this study can also be found in other countries and professions. Therefore, it would be interesting to use this classification for further research in other countries and professions in order to develop classifications fully applicable in those settings and to investigate whether it is possible to develop a general classification of employees' on-the-job learning activity and content. Additionally, it would be very interesting if future research could be devoted to the interrelation between learning content and learning activity. Such knowledge could be used by HRD practitioners for the development of intervention methods applicable to particular learning contents.

References

Akgün, A. E., Lynn, G. S., & Byrne, J. C. (2003). Organizational Learning: A Socio-Cognitive Framework. *Human Relations, 56*, 839-868.

Berings, M. G. M. C., & Doornbos, A. J. (2003). Exploring instruments mapping workplace learning processes. In *Proceedings book VI: Theme 8: Learning and learners at work. Work and lifelong learning in different contexts. Proceedings of the 3rd international conference of Researching Work and Learning* (pp. 48-58). Tampere, Finland: University of Tampere.

Berings, M. G. M. C., Gelissen, J. P. T. M., & Poell, R. F. (in press). What and how do nurses learn on the job? Similarities and differences among nurses in on-the-job learning. In S. Sambrook & J. Stewart (Eds.), *Human Resource Development in the public sector: The case of health and social care*. London, UK: Routledge.

Berings, M. G. M. C., Poell, R. F., & Simons, P. R. J. (2005). Conceptualizing on-the-job learning styles. *Human Resource Development Review, 4*, 373-400.

Bernstein, R. J. (1983). *Beyond objectivism and relativism*. Philadelphia, NJ: University of Pennsylvania Press.

Bolhuis, S. (2001). *Leren en veranderen bij volwassenen: Een nieuwe benadering [Learning and changing at adults: A new appraoch]* (2nd ed.). Bussum, The Netherlands: Coutinho.

Clark, J. (2001). *De lerende verpleegkundige [The learning nurse]*. May 8th 2001, Anna Reyvaan Lezing [Anna Reyvaan Lecture]. Amsterdam, The Netherlands: Academisch Medisch Centrum.

Clarke, C. L., & Wilcockson, J. (2002). Seeing need and developing care: Exploring knowledge for and from practice. *International Journal of Nursing Studies, 39*, 397-406.

Collin, K. (2002). Development engineers' conceptions of learning at work. *Studies in Continuing Education, 24*, 133-152.

den Boer, P., & Hövels, B. (2003). *Leer- en loopbaanmogelijkheden in de zorgsector [Learning and career possibilities in health care] (OSA Publicatie ZW41)*. Tilburg, The Netherlands: OSA.

Dik, M. M., & van Splunder, R. (2002). Employability leeft onvoldoende in Nederland. [Concern for employability in the Netherlands is low]. *Tijdschrift voor Arbeidsvraagstukken, 18*, 147-153.

Doornbos, A. J., Eekelen, I., & Koopmans, H. (2006). Learning in interactive work situations: It takes two to tango; why not invite both partners to dance? *Human Resource Development Quarterly, 17*, 135-158.

Eliens, A. M., & Strijbol, N. C. M. (2001). Naar een toekomst voor verpleegkundigen. [Towards a future for nurses]. In H. P. J. M. Habets (Ed.), *Inspiratie. Jaarboek verpleegkunde 2001*. Dwingelo, The Netherlands: Kavanah.

Eraut, M. (2000). Non-formal learning and tacit knowledge in professional work. *British Journal of Educational Psychology, 70*, 113-136.

Eraut, M., Alderton, J., Cole, G., & Senker, P. (1998). *Development of knowledge and skills in employment*. East Sussex, UK: University of Sussex.

Estabrooks, C. A., Rutakumwa, W., O'Leary, K. A., Profetto-McGrath, J., Milner, M., Levers, M. J., et al. (2005). Sources of practice knowledge among nurses. *Qualitative Health Research, 15*, 460-476.

Gerber, R. (1998). How do workers learn in their work. *The Learning Organization, 5*, 168-175.

Heikkila, K., & Makinen, L. (2001). Different ways of learning at work. In *Proceedings of the 2nd International Conference on Researching Work and Learning* (pp. 406-413). Calgary, Canada: University of Calgary.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripherical participation*. Cambridge, UK: Cambridge University Press.

Lincoln, Y., & Guba, E. G. (2000). Paradigmatic controversies, contradictions, and emerging confluences. In N. K. Denzin & Y. Lincoln (Eds.), *Handbook of qualitative research* (pp. 163-188). Thousand Oaks, CA: Sage Publications.

Mansfield, R. (1991). Deriving standards of competence. In E. Fennel (Ed.), *Development of assessable standards for national certification*. London, UK: Department for Education and Employment.

Maurer, T. J., Weiss, E. M., & Barbeite, F. G. (2003). A model of involvement in work-related learning and development activity: The effects of individual, situational, motivational, and age variables. *Journal of Applied Psychology, 88*, 707-724.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage Publications.

Mumford, A. (1995). *Effective learning*. London, UK: Institute of Personnel and Development.

Onstenk, J. (1997). *Lerend leren werken: Brede vakbekwaamheid en de integratie van leren, werken en innoveren. [Learning to work in a learning way: Broad occupational competence and the integration of learning, working and innovating]*. PhD Thesis, Katholieke Universiteit Nijmegen, Delft, The Netherlands: Eburon.

Strauss, A. L., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Thousand Oaks, CA: Sage Publications.

Tannenbaum, S. I. (1997). Enhancing continuous learning: Diagnostic findings from multiple companies. *Human Resource Management, 36*, 437-452.

van Woerkom, M. (2003). *Critical reflection at work: Bridging individual and organisational learning*. PhD Thesis, Enschede, The Netherlands: Twente University.

Weston, C., Gandell, T., Beauchamp, J., McAlpine, L., Wiseman, C., & Beauchamp, C. (2001). Analyzing interview data: The development and evaluation of a coding system. *Qualitative Sociology, 24*, 381-400.

Chapter 6

Dimensions of On-the-Job Learning Styles*

Abstract

Awareness of their on-the-job learning style is important for employees to improve their on-the-job learning. Mental aspects of on-the-job learning styles receive hardly any attention in literature about on-the-job learning. Studies in educational psychology do focus on mental aspects of learning styles but mostly in educational settings. The aim of this study is to combine these two areas of literature and identify mental dimensions of on-the-job learning styles that can create awareness among employees and offer them opportunities for the improvement of their on-the-job learning. We conclude that employees need to be aware of four core dimensions of on-the-job learning styles: whether they are reproductive or developmental learners, whether they tend to learn alone, from others, or with others, whether they are holistic or analytical learners, and how they engage in reflection (e.g. the depth of reflection).

* This chapter has been submitted as: Berings, M. G. M. C., Poell, R. F., & Simons, P. R. J. (submitted). Dimensions of on-the-job learning styles.

Introduction

In addition to formal training and education, the most significant sources of learning for employees are the challenges of the work itself and interactions with other people in the workplace (e.g. Eraut, 2004; Eraut, Alderton, Cole, & Senker, 1998; Mumford, 1995; Poell, van Dam, & van den Berg, 2004). We regard on-the-job learning as all implicit or explicit mental and/or overt activities and processes, performed in the context of work, leading to relatively permanent changes in knowledge, attitudes or skills (compare Billett, 1993; Bolhuis & Simons, 1999; Levy, 1987). Little is known about methods that can be used to improve on-the-job learning. Learning style theory suggests that a useful way to improve employees' on-the-job learning could be to make them aware of their on-the-job learning styles (Berings, Poell, & Simons, 2005a; Desmedt, 2004; Kolb, 1974; Sadler-Smith, 2001). On-the-job learning styles can be defined as the tendency to use a particular combination of implicit and explicit learning activities that a person can and likes to perform on the job. As Figure 6.1 shows, the person adapts the combination of learning activities to each situation differently. The particular combination used is called the actualized learning strategy. Learning style theory suggests that knowledge about their own and other possible on-the-job learning styles can make people aware of their options and choices in learning behaviour and, therefore, provide opportunities for adaptations (Berings et al., 2005a; Coffield, Mosely, Hall, & Ecclestone, 2004). However, currently, there is a lack of knowledge of on-the-job learning styles in the literature.

Literature in the field of on-the-job learning (e.g., Eraut et al., 1998; Gerber, 1998) focuses mostly on overt aspects of on-the-job learning styles, such as having social interaction or searching for information, and hardly addresses mental aspects. In contrast, literature on learning in educational settings focuses predominantly on the mental, or covert, processes behind the overt learning activities, i.e. the activities that occur in someone's brain, such as holistic or analytical thinking (e.g., Allinson & Hayes, 1996; Riding & Cheema, 1991; Sternberg, 1997). Attention should, in our view, be paid to both overt and mental aspects when identifying employees' on-the-job learning

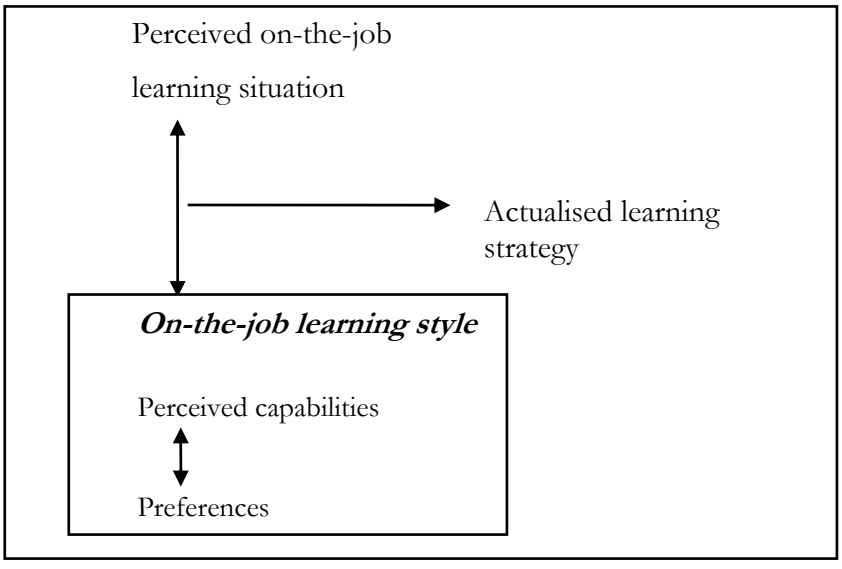


Figure 6.1. On-the-job learning styles (Berings et al., 2005a)

styles (Berings et al., 2005a). This study therefore focuses on mental aspects that provide a valuable complement to the overt aspects that are found in studies of on-the-job learning.

The aim of this study is to identify dimensions of on-the-job learning styles that may create awareness of learning styles among employees and offer them opportunities for the improvement of their on-the-job learning. The large amount of literature on learning styles in educational psychology will be used as a starting point. The differences between learning in educational contexts and on-the-job learning will be explored first and criteria for the identification of dimensions of on-the-job learning styles will be derived from this. The dimensions of learning styles in literature on educational psychology will then be explored and those learning style dimensions that fit the workplace context best will be selected. Literature about on-the-job learning will then be used to translate these dimensions to the on-the-job context. Finally, the insights derived from this study will be discussed in the perspective of future research and practice.

Differences between learning in educational contexts and learning in workplace contexts

In order to formulate criteria for mental aspects of learning styles that can be translated to on-the-job learning settings and create awareness among employees it is necessary to describe the differences between an educational perspective on learning, which usually describes the mental aspects of learning styles, and a workplace perspective on learning. Therefore, the differences between learning in educational contexts and learning in on-the-job contexts will be indicated and the implications for the dimensions of the on-the-job learning styles to be identified in this paper will be described.

Differences in learning process, learning outcome, and learning setting

The most important differences between learning in the two different contexts that are central to the purpose of this paper are in the area of the learning process. First of all, on-the-job learners have more opportunities of choosing their own learning activities whereas in educational contexts it is mostly the teacher who makes the choices. Focusing on actual learning activities rather than learning preferences or orientations† is, therefore, even more relevant in the workplace context than it is in educational contexts. Since participation in learning activities can be actively directed by learners themselves, this activity based approach offers most opportunities for the improvement of on-the-job learning (Berings et al., 2005a). Secondly, learning is mainly an individual activity in educational contexts, while it is often a collaborative or collegial activity in workplace contexts (Beckett & Hager, 2002). Interaction with others is the main source of learning for employees (Doornbos, Bolhuis, & Simons,

† Learning activities indicate what learning activities learners actually perform, whereas learning preferences indicate which circumstances learners prefer for learning and learning orientations refer to how people think about learning.

2004; Eraut et al., 1998; Gear, McIntosch, & Squires, 1994). Therefore, this aspect should, in our view, be respresented in a description of employees' on-the-job learning styles. Finally, learning is mostly an explicit process in educational contexts, while many learning processes that take place in on-the-job contexts remain implicit (cf. Bolhuis & Simons, 1999; Eraut, 2000). Therefore, the learning style dimensions identified should also be applicable to implicit learning.

The most significant difference with regard to the learning outcomes is that most learning outcomes are made visible in educational contexts while learning outcomes are mostly tacit or regarded as part of a person's general capability in on-the-job contexts (Eraut, 2000). The most important difference between the two contexts with regard to the learning setting is that learning is the first priority in educational contexts and work is the first priority in organizational contexts. Therefore, learning is usually intended in educational contexts and seen as a preparation for work, while learning is usually seen as a side effect of work or a way of innovating work in workplaces (Nieuwenhuis & van Woerkom, 2003, August). The dimensions of the learning styles that are identified should be applicable to all of these settings.

Summary of criteria for dimensions of learning styles suitable for on-the-job learning

The goal of this paper is to identify dimensions of on-the-job learning styles that can create awareness among employees and offer them opportunities for the improvement of their on-the-job learning. Summarizing from the previous sections, therefore, (1) the dimensions should concern learning *activities,* indicating actual learning *behaviour* that (2) can be *actively directed* by learners and they should (3) be *applicable to the workplace context*. This means that there should be dimensions included that (a) regard learning as part of the preparation of work, the execution of work, and as a way of innovating work, (b) are applicable to explicit and implicit learning processes, and (c) are applicable to social learning processes. Furthermore, we believe that in addition to the criteria mentioned in previous paragraphs (4) the dimensions should also be easily interpretable and therefore be *unidimensional*, i.e. not an amalgamation of many different aspects.

Suitability of dimensions of learning styles from educational psychology

Many different models of learning styles are described in the literature on educational psychology. Numerous overviews have been presented (e.g. Cassidy, 2004; Coffield et al., 2004; Rayner & Riding, 1997; Riding & Cheema, 1991; Sadler-Smith, 1997). The extensive and recent overview carried out by Coffield et al. (2004) is used as the starting point for this exploration. They found 71 models and selected thirteen of these models for further exploration‡. These are the models that are representative of the total range of models in literature, are widely quoted, have led to further research by other authors, and are widely used by practitioners in the field of education. They are all related to the field of post-16 learning (learners over sixteen years of age). Two of

‡ Coffield et al. were predominantly interested in the instruments that accompany the learning style models. This paper is concerned mainly with the theoretical models themselves.

the models selected by Coffield et al. – Apter's motivational styles (Apter, Mallows, & Williams, 1998) and Myers Briggs' personality types (1987) – are relevant for general motivational and personality characteristics and, in our opinion, cannot directly be translated to learning activities. The other eleven models do actually concern learning and will therefore be used as the starting point for the overview of learning style models in the literature. These are: Entwistle's deep and surface learning approaches (1981, 1988), Vermunt's learning styles (1992), Kolb's learning styles (1984), Honey and Mumford's learning cycle (1986), Jackson's learning styles (2002), Hermann's brain dominance (1989), Allinson and Hayes' intuition and analysis (1996), Dunn, Dunn and Price's model of learning preferences (Dunn, 2003; Dunn, Dunn, & Price, 1989), Gregorc's mind styles model (1982), Riding and Cheema's cognitive styles (1991), and Sternberg's thinking styles (1997). The learning cycle of Kolb, Honey and Mumford, and that of Jackson are discussed separately in the overview prepared by Coffield et al. but they contain so many similarities that they will be described and discussed together in this overview. Appendix 1 shows an overview of conceptual similarities with other models found in literature so as to provide an overview of the whole range of dimensions of learning styles found in the literature on educational psychology. These other models use different terminology, but do show great conceptual similarities. This overview also demonstrates the overlap between the eleven models that were taken as the starting-point.

In the next section, each model is described briefly and then the usefulness of the models in workplace contexts is discussed using the criteria mentioned in the previous section.

1. Deep and surface learning approaches (Entwistle, 1981, 1988)

Deep learners search for meaning, use previous experience, relate facts, and conclude. Surface learners search for facts, put most effort into memorizing, and are uneasy about the learning situation.

The actual learning activities within this dimension are multidimensional, since many different activities are included, and defined for achieving typically educational goals. They are hardly applicable to the workplace context. Therefore, this model does not meet the criteria used in this paper.

2. Vermunt's learning styles (1992)

Vermunt regards learning styles as a mixture of the following aspects: cognitive processing, learning orientation, mental model of learning, and regulation of learning. Using combinations of these aspects, he defines four learning styles: meaning-directed, application-directed, reproduction-directed and undirected. Meaning-directed learners relate key concepts to each other and application-directed learners relate them to every-day experiences. Reproduction-directed learners memorize the learning content, while undirected learners use ambivalent learning strategies.

Vermunt's model of learning styles contains many different aspects and is therefore multidimensional. For the purposes of this paper we could have chosen to focus only on the aspect cognitive processing since learning activities are being looked

for, however, from this perspective it can also be concluded that this model does not meet the criteria used in this paper. It is typically designed for educational goals, in the sense of the preparation of work, and not for learning situations in the execution of work or as a way of innovating work.

3. Kolb's (1984), Honey and Mumford's (1986), and Jackson's learning cycles (2002)

These three learning style models have great conceptual similarities. They all describe learning as a cyclical process, involving four distinct learning stages that learners follow in sequence. Each step in the learning cycle represents a different learning strategy. Preferences for certain strategies become habitual by repeating successful strategies, and as a result learning styles develop. A brief description of the comparable stages of the learning cycle is given in Table 6.1.

The models are constructed on classical theories from Dewey, Lewin, Piaget, Vygotsky, Guilford, Freire, Illlich, Pepper, Jung and others (Kolb, 1984). Honey and Mumford made a slight modification to Kolb's terminology in order to make it more suitable for managerial populations. Jackson claims that his model describes both functional and dysfunctional learning, whereas Kolb only describes learning in general.

The suitability of the different aspects in these comparable learning style models will be discussed using Kolb's terminology. The aspects concrete experience and active experimentation are multidimensional, because other mental learning activities take place while doing and trying in order to actually achieve learning results. The aspect of abstract conceptualization describes a sequence in performing different learning activities so that this aspect is also multidimensional. The sequence in which different learning activities are used can be important information, but the aim of this study is to select the dimensions that can be included in a model of on-the-job learning styles. If this aspect is looked at from a different viewpoint, namely whether a person forms abstract concepts, it can be viewed as a dimension that describes 'what' a person learns, rather than 'how' a person learns, so that this dimension is also unsuitable for the

Table 6.1. Comparison of the learning cycles of Kolb (1984), Honey and Mumford (1986) and Jackson (2002)

Kolb	*Honey and Mumford*	*Jackson*	*Description*
Concrete experience	Activist	Initiator	Doing and experiencing things and learning by trial and error.
Reflective observation	Reflector	Reasoner	Observing experiences from many different angles and trying to understand the logic underlying problems before making a move.
Abstract conceptualization	Theorist	Analyst	Reviewing information, analyzing, and forming abstract concepts and generalizations before acting.
Active experimentation	Pragmatist	Implementer	Trying out ideas, theories and techniques to see if these work in practice.

purpose of this paper. The aspect of reflective observation, finally, also describes a sequence in performing different learning activities. However, when this aspect is looked at from a different point of view, namely as a dimension of whether a person reflects on learning situations, this dimension could be very suitable in a description of employees' on-the-job learning styles. This dimension describes the activity of reflection, which can actively be directed by learners themselves.

4. Brain dominance (Herrmann, 1989)

Brain dominance can be by the left-hand or right-hand side of the brain and cerebral (top/front) or limbic (bottom/rear). Dominance by the left cortex means that an individual is rational: logical, analytical, fact-based and quantitative. Dominance by the left limbic means that someone is organized: sequential, planned and detailed. Dominance by the right limbic makes someone interpersonal: feeling-based, kinaesthetic and emotional. Finally, dominance by the right cortex means that someone is imaginative: holistic, intuitive, integrating and synthesizing. This distinction between different parts of the brain is now much debated (e.g., Sala, 1999).

This model is multidimensional since many different dimensions are put together as one. Further, the main characteristics of the different parts of the brain, which indicate whether someone is organized, interpersonal, or imaginative, can not directly be translated to learning activities. Therefore, this model does not meet the criteria used in this paper.

5. Intuition and analysis (Allinson & Hayes, 1996)

Intuition refers to "immediate judgement based on feeling and the adoption of a global perspective" and analysis refers to "judgement based on mental reasoning and a focus on detail" (p.122). The model was constructed on the distinction between the left and right hemispheres of the brain.

This model focuses on information processing activities, which learners can direct actively themselves. It is applicable in all possible contexts, including work contexts. Therefore it meets the criteria used in this paper and seems to be directly translatable to on-the-job learning settings.

6. Model of learning preferences (Dunn, 2003; Dunn et al., 1989)

This model describes the manner in which stimuli affect an individual's ability to perceive, interact with, and respond to the learning environment. This includes environmental, emotional, sociological, physical, and psychological stimuli.

This model does not concern learning activities but learning preferences. The model concerns variables that affect learning styles, rather than learning styles itself (Sternberg, 1997). Except for the sociological stimulus of learning alone or with peers and the psychological stimuli of reflectivity and impulsivity, the preferences described in this model cannot be translated to learning activities that can actively be directed by the learners themselves. Namely, it is not possible to translate, for instance, room temperature, sense of responsibility, or mobility, to actual learning activities. Therefore, only a translation of the sociological and psychological stimuli to activity-based

dimensions of learning styles meets the criteria used in this paper for on-the-job learning styles. Herewith, we include a social dimension of on-the-job learning styles. The psychological stimuli ally with the reflection dimension from Kolb's model.

7. Mind styles model: perception and ordering (Gregorc, 1982)

This model describes two forms of perception: concrete and abstract. Concrete learners register information directly through physical stimuli, tending to be oriented towards the pragmatics of a situation. They make hardly any relationships between ideas or concepts. Abstract learners ignore or dislike details, abstract relationships from objects of experience, and organize them in terms of their interrelatedness. Two forms of ordering are described also: sequential and random ordering. Sequential learners organize information in a linear manner, preferring to follow a previously developed plan rather than relying on impulse. Random learners organize information in their mind by chunks and in no particular order. They are impulsive rather than planned.

The two forms of information-perception cannot actively be directed or influenced by the learners themselves (Curry, 1983). The ordering dimension entails information processing activities, which can actively be directed by the learners themselves and are applicable in all possible contexts. This dimension, therefore, offers possibilities for on-the-job learning styles.

8. Cognitive styles (Riding & Cheema, 1991)

Riding and Cheema combined previous models of cognitive styles of other authors into two dimensions: the holistic-analytical dimension and the verbal-imagery dimension. The holistic-analytical dimension describes the fact that some individuals tend to process information in wholes (holists), whereas others process information in parts (analytics). The verbal-imagery dimension describes the tendency to process information in verbal or visual form.

This dimension is a combination of many different aspects. It is a compilation of different previous models and is therefore multidimensional. Moreover, many of the aspects involved cannot directly be translated to learning activities so that this model does not meet the criteria used in this paper.

9. Thinking styles (Sternberg, 1997)

Sternberg distinguishes thirteen thinking styles to delineate a cognitive profile of how people direct their intelligence. These include three *functions* of mental self-government: legislative (creating, imagining, and planning), executive (implementing and doing), and judicial self-government (judging, evaluating, and comparing). The four *forms* of mental self-government are oligarchic – which allows for multiple equally important goals, monarchic – focusing on one item or aspect of that item until it is completed, hierarchic – focusing on multiple goals with different priorities, and anarchic – mental self-government, with a great flexibility of approaches, motivated by a potpourri of needs and goals that are often difficult to sort out. The two *levels* of mental self-government are local – meaning engagement with specific, concrete details, and global – preferring general and abstract thinking. The *scope* of mental self-government can be

internal – which means working independently from others, or external – meaning working and interacting with others at different stages of progress. Finally, the *leaning* of mental self-government can be liberal – in the sense of going beyond existing rules and procedures, or conservative – concerning adherence to existing rules and procedures and seeking familiarity in life and work.

The functions of mental self-government are multidimensional, since they concern different learning activities, and the levels and forms of mental self-government concern learning objectives rather than learning activities. Therefore, these dimensions do not meet the criteria used in this paper. In contrast, the scope and leaning of mental self-government seem suitable dimensions of on-the-job learning styles. As shown in Appendix 6.1, they are similar to respectively learning alone or with peers (Dunn, 2003; Dunn et al., 1989), and random and sequential ordering (Gregorc, 1982).

Conclusions on suitability

The conclusions of the exploration above concerning the suitability of the dimensions distinguished for on-the-job learning contexts, i.e. dimensions that can create awareness among employees and offer them opportunities for the improvement of their on-the-job learning using the criteria earlier summarized in this chapter, are summarized in Table 6.2.

Table 6.2. Overview of learning style models in educational psychology literature and their suitability in on-the-job learning contexts

Model	*Suitability for on-the-job learning contexts*
1. Deep and surface learning approaches (Entwistle, 1981, 1988)	Not suitable
2. Vermunt's learning styles (1992)	Not suitable
3. Kolb's (1984), Honey and Mumford's (1986) and Jackson's learning cycles (2002)	A translation of the element of reflection can be suitable
4. Brain dominance (Herrmann, 1989)	Not suitable
5. Intuition and analysis (Allinson & Hayes, 1996)	The intuition-analysis dimension can be suitable
6. Model of learning preferences (Dunn, 2003; Dunn et al., 1989)	A translation of the sociological and psychological stimuli can be suitable
7. Mind styles model: ordering and perception (Gregorc, 1982)	The two forms of ordering, sequential and random ordering, can be suitable
8. Cognitive styles (Riding & Cheema, 1991)	Not suitable
9. Thinking styles (Sternberg, 1997)	The scope and leaning of mental self-government can be suitable

Four learning style dimensions that can be suitable for on-the-job learning are inferred from the above overview:

- Sequential and random ordering, derived from Gregorc (1982) and Sternberg (1997);
- Learning alone or with others, derived from Dunn et al. (1989) and Sternberg (1997);
- Intuitive and analytical learning, derived from Allinson and Hayes (1996); and
- Forms of reflection, derived from Kolb (1984), Honey and Mumford (1986), Jackson (2002), and Dunn (2003, 1989).

These dimensions indicate learning activities that can actively be directed by the learners themselves. They are applicable to the preparation of work, the execution of work, and the innovation of work. They are applicable to both explicit and implicit learning processes and a social learning dimension is included.

Translation to on-the-job learning

Literature about on-the-job learning has paid attention to theories that show great similarities with the learning style dimensions selected here but different terminology is often used. In the next section the learning style dimensions selected from the field of educational psychology are extended by adding terminology and theories from the field of on-the-job learning in order to connect these two areas of research.

Reproductive and developmental learning

The first learning style dimension distinguished is derived from sequential and random ordering (Gregorc, 1982) and similar dimensions, and shows great similarities with the distinction between reproductive and developmental learning as described by Ellström (2005). Reproductive learning is learning with a focus on a subject's adjustment to and mastery of certain given tasks or situations. This learning strategy can be very effective in the execution of work, focusing on performance and security. However, employees are currently also asked to contribute to the innovation of work (Nieuwenhuis & van Woerkom, 2003, August). There is a need to explore, question, reframe and transform a situation in this form of learning, rather than simply adapt to a predefined reality. Developmental learning is learning while transforming rather than reproducing a prevailing situation, hence developing new solutions (Ellström, 2005).

Ellström emphasizes that reproductive and developmental learning are complementary, but that one way of learning can be dominant. Intermediate forms of learning may also be possible, such as productive learning, as described by Engeström (1987), in which the given outcome is reached by experimentation. The distinction between reproductive learning and developmental learning is similar to Argyris and Schön's (1978) distinction in single-loop and double-loop learning. The terminology used by Ellström – reproductive and developmental learning – will be adopted to describe this dimension of learning styles.

Learning alone, learning from others, and learning with others

The second dimension distinguished is the social learning style dimension (i.e. learning alone or with others, Dunn, 2003; Dunn et al., 1989). This dimension should receive significant attention in workplace settings, since in these settings interaction with others is the main source of learning (Doornbos et al., 2004; Eraut et al., 1998; Gear et al., 1994). Other people are directly or indirectly involved in almost all learning activities. These can be interaction partners from within the working group, such as collaboration partners, mentors and coaches, and interaction partners from outside the working group, such as clients or suppliers, people elsewhere in the own or other organizations (Eraut et al., 1998). Several authors describe social dimensions of learning, but often not entirely in terms of learning activities (e.g. Dunn, 2003; Dunn et al., 1989; Eraut et al., 1998; Riechmann & Grasha, 1974; Salomon & Perkins, 1998). Doornbos, Eekelen and Koopmans (2006) describe five different forms of learning from social interaction in terms of activities that interaction partners perform: responding to the employees' work, being a role model, supporting learning, for instance by giving a lecture or course, providing information or reactions to the employee and exchanging information. In the first four forms the interaction partner supports the employee's learning in a one-way direction and in the fifth form both interaction partners learn from the interaction, in a two-way direction (D'abate, Eddy, & Tannenbaum, 2003).

A classification that indicates the mental activities of the learners themselves is needed in order to elaborate social forms of learning in the context of mental aspects of on-the-job learning styles. Simplifying the insights above then leads to three different types of learning activities from the learners themselves: learning alone, learning from others, and learning with others. Learning alone is learning where no direct social interaction resulting is involved. This type of learning activity involves learning from individual reflection and learning from indirect interaction, such as learning from media or other cultural artefacts, for example. Learning *from* others is learning through direct social interaction with other people. It contributes to the development of the learner but not necessarily to the development of others. Finally, learning *with* others occurs when both interaction partners learn from each other (cf. Doornbos et al., 2004). This involves both knowledge exchange and collaborative knowledge construction. Doornbos et al. (2004) suggest that the use of the different types of learning activity in this dimension of social learning style are complementary; in some situations it is more effective to learn alone, in other situations it is more effective to learn from or with others.

Holistic and analytical learning

The third learning style dimension distinguished, that of intuitive and analytical learning, which was derived from Allinson and Hayes (1996), in contrast to the other dimensions originates from and has been studied using samples with employees and managers (cf. Allinson & Hayes, 1996; Sadler-Smith, 1998; Sadler-Smith, Allinson, & Hayes, 2000). The terminology of Riding and Cheema (1991) who summarized a range of similar dimensions using the terms (w)holistic and analytical learning will be

followed. Analysts are individuals who prefer to pay attention to detail. They approach new information and experiences with a systematic method of investigation. Holists, on the other hand, are less concerned with detail. They have adopted a broad perspective on new information and experience and tend to integrate many inputs simultaneously.

Despite its origin from research on samples with employees and managers, the dimension of the holistic-analytical style has received much more attention in studies on educational psychology than in studies on workplace learning. This might be due to its cognitive basis, which is more common in the former literature, and to the complexity of workplace contexts, which makes it harder and perhaps less desirable to describe the learning process in such a structured way. However, some parallels can be drawn with the Dreyfus model in literature on expertise development (e.g. Benner, 1982; Dreyfus, Dreyfus, & Athanasiou, 1986). In this model, people who encounter situations from a context-free analytical perspective are regarded as novices, and people who encounter situations from a context-sensitive holistic perspective are regarded as experts on the job. Although this may be suggested by the comparison with novices and experts, the authors believe that one cannot indisputably conclude that holistic learners are more effective learners than analytical learners, or that, as Dreyfus et al. (1986) proposed, novices always learn best by using analytic strategies and experts always learn best by using holistic strategies. We believe that in some learning situations it is most effective for an individual to use holistic strategies and for the same individual, in other situations, it is most effective to use analytical strategies (cf. Benner, 1982; Sadler-Smith, 1998).

Reflection

There is a large amount of literature in the field of on-the-job learning and other fields of study that focuses on reflection, the fourth learning style dimension distinguished. Boyd and Fales (1983, p.100) offer a definition of reflection that is convenient for the context of on-the-job learning: "Reflective learning is the process of internally examining and exploring an issue of concern, triggered by an experience, which creates and clarifies meaning in terms of self, and which results in a changed conceptual perspective". Mezirow (1990, p.1) describes its result: "Reflection enables us to correct distortions in our beliefs and errors in problem solving". Many different aspects of reflection can be distinguished:

- the amount of reflection (Kagan, 1965; Kagan, Rosman, Day, Albert, & Philips, 1964; Petzold, 1985)
- the content of reflection, such as task or social reflection (Swift & West, 1998), reflection on single or multiple contents (Alvesson & Sköldberg, 2000), and reflection on events or problems, or reflection on the self of the learner (self-reflection or reflexivity, Mezirow, 1990)
- the depth of reflection, such as shallow, moderate, or deep reflection (Swift & West, 1998), reflection or critical reflection (Mezirow, 1985; van Woerkom, 2003; Walton, 1999), and single and double-loop learning (Argyris & Schön, 1978)

- the timing of reflection, such as reflection-in-action or reflection-on-action (Schön, 1987) and inductive or deductive learning (Felder & Silverman, 1988; Juch, 1983)
- the social dimension of reflection, such as reflecting alone or in social interaction (Swift & West, 1998; van Woerkom, 2003).

People use personal heuristics and short cuts for information-processing and decision-making during work activities. Many of their actions have become routines, which saves energy. This could be called habitual action (Kember & Leung, 2000), active processing (De Chiantis & Kirton, 1996; Felder & Silverman, 1988), or knowing-in-action (Schön, 1987). However, these routines sometimes do not function (van Woerkom, 2003) and lead to bias in decision-making (Kahneman & Tversky, 1996). Reflection is needed then to change the perspective. Thus, in some situations it is most effective to reflect and in other situations it is better to rely on routines, since too much reflection can lead to indecisiveness and inertia (Schippers, 2003).

Overlap and complementation among the four dimensions

Since on-the-job learning is a comprehensive activity that entails many different processes, such as working, thinking, making decisions and innovating (Berings et al., 2005a), it is not surprising that the dimensions distinguished contain some overlap. The difference between single-loop and double-loop learning (Argyris & Schön, 1978) for example, is related both to the distinction between reproductive and developmental learning and to reflection. Single-loop learning is the detection and correction of errors in relation to a given set of operating norms; double-loop learning is questioning the accepted norms in a learning situation. Riding and Cheema (1991) and Sadler-Smith (1998) found many similarities between the dimensions of styles referred to as developmental and reproductive learning and as holistic and analytical learning.

The dimensions do not just overlap but they complement each other as well. The different dimensions are needed to obtain a comprehensive view of the actual learning processes occurring in order to be able to give a profound description of the learning processes of individual employees. People can, for example, reflect alone or with others and they can use both holistic and analytical learning strategies in both reproductive and developmental learning.

Conclusion

Four core dimensions of on-the-job learning styles that can create awareness among employees and offer them opportunities for the improvement of their on-the-job learning were found in the literature on educational psychology. These are whether they are reproductive or developmental learners, whether they tend to learn alone, from others, or with others, whether they are holistic or analytical learners and how they engage in reflection (e.g. the depth of reflection).

Learning styles describe the tendency to use a particular combination of learning activities across different learning situations. Individuals use different learning strategies based on their personal learning style and the particular learning situation. All four core dimensions described above are complementary. The literature described

above suggests that different learning strategies will be most effective for different individuals in different learning situations. If they are aware of their learning style, employees can adapt their use of learning strategies to fit specific learning situations. This is called adaptive flexibility (Berings et al., 2005a).

Discussion

Literature on learning styles was explored in this study and four core dimensions of on-the-job learning styles selected. The dimensions mentioned in the literature review from Coffield et al. (2004) were used as a starting point for an overview of the literature in educational psychology on dimensions of learning styles. These authors claimed that their selection is representative for the total range of literature. The overview of dimensions of learning styles was completed by adding similar models found in the literature. Nevertheless, it is possible that other dimensions would have been found if another approach had been used.

The selection of the four core dimensions was driven by the aim that the selected dimensions should be able to create awareness among employees, offering them opportunities for the improvement of their on-the-job learning. More dimensions of on-the-job learning styles could be distinguished by the use of other selection criteria, for example, to establish purely theoretical individual differences in on-the-job learning.

The dimensions of on-the-job learning styles that have been distinguished can be elaborated differently and have different significance depending on the goals of the various researchers or practitioners and their specific professions. In another study (Berings, Poell, & Simons, 2005b), semi-structured interviews with supervisors and educators in hospitals in the Netherlands, who were considered experts on nurses' on-the-job learning, were used to explore the importance and face validity of these dimensions for the nursing profession. The results showed that it is useful for nurses to be aware of the different aspects of the reflection dimension, including the question whether they reflect alone or with others. The usefulness of awareness of the other dimensions, reproductive or developmental learning and holistic or analytical learning was judged differently by the various experts. These dimensions showed low face validity. But what does this imply? Does it mean that it is not useful to make nurses aware of these dimensions? Or does it mean that the awareness of these dimensions in the nursing profession is low, and that, based on theoretical grounds, it is useful to make nurses more precisely aware of these dimensions? This is an interesting question that could be answered in future research, as well as questions about the importance and face validity of the dimensions that might be distinguished in other professions.

This study has elucidated which dimensions of learning styles it is relevant to distinguish in workplace contexts in order to make employees aware of them. The findings provide many opportunities for researchers to develop instruments to identify these learning styles. Supervisors, mentors, coaches, and other HR professionals could use such instruments to make employees aware of their on-the-job learning styles. A coaching session for employees could be organized, for example, to reflect on their use of learning strategies in different learning situations. Different alternative learning

strategies can be discussed and new learning strategies in addition to their current personal preferences can be tried out and developed in the every-day working and learning process, leading to the improvement of the employees' on-the-job learning (Berings et al., 2005a). Such instruments can be used to improve the individual job fit, that is a good fit between learning style and the learning demands of a job, or to manage the composition of a team, in order to promote effective learning (Hayes & Allinson, 1998). The empirical effects of such interventions should be investigated. Does an awareness of on-the-job learning styles improve employees' on-the-job learning? Which learning demands fit which learning style best, and what is the best composition of a team in relation to optimal on-the-job learning?

Literature

Allinson, C. W., & Hayes, J. (1996). The Cognitive Style Index: A measure of intuition-analysis for organisational research. *Journal of Management Studies, 33*, 119-135.

Alvesson, M., & Sköldberg, K. (2000). *Reflexive methodology: New vista's for qualitative research*. London, UK: Sage Publications Inc.

Apter, M. J., Mallows, R., & Williams, S. (1998). The development of the motivational style profile. *Personality and Individual Differences, 24*, 7-18.

Argyris, C., & Schön, D. A. (1978). *Organisational learning: A theory of action perspective*. Reading, MA: Addison-Wesley.

Beckett, D., & Hager, P. (2002). *Life, work and learning: Practice in postmodernity*. London, UK: Routledge.

Benner, P. (1982). *From novice to expert: Excellence and power in clinical nursing practice*. San Francisco, CA: Addison-Wesley Publishing Company.

Berings, M. G. M. C., Poell, R. F., & Simons, P. R. J. (2005a). Conceptualizing on-the-job learning styles. *Human Resource Development Review, 4*, 373-400.

Berings, M. G. M. C., Poell, R. F., & Simons, P. R. J. (2005b). Dimensions of on-the-job learning styles in the nursing profession. In *Proceedings of the 4th international conference: International conference on Researching Work and Learning*. Sydney, Australia: University of Technology.

Biggs, J. B. (1985). The role of metalearning in study processes. *British Journal of Educational Psychology, 55*(3), 185-212.

Billett, S. R. (1993). Authenticity and a culture of practice. *Australian and New Zealand Journal of Vocational Education Research, 2*(1), 1-29.

Bolhuis, S., & Simons, P. R. J. (1999). *Leren en werken [Learning and working]*. Deventer, The Netherlands: Kluwer.

Boyd, E. M., & Fales, A. W. (1983). Reflective learning: Key to learning from experience. *Journal of Humanistic Psychology, 23*, 99-117.

Briggs Myers, I. (1962). *Introduction to type: A description of the theory and applications of the Myers-Briggs Type Indicator* (4 ed.). Palo Alto, CA: Consulting Psychologists Press, Inc.

Cassidy, S. (2004). Learning styles: An overview of theories, models and measures. *Educational Psychology, 24*, 419-444.

Coffield, F., Mosely, D., Hall, E., & Ecclestone, K. (2004). *Learning styles and pedagogy in*

post-16 learning. London, UK: Learning and Skills Research Centre.
Corno, L., & Mandinach, E. B. (1983). The role of cognitive engagement in classroom learning and motivation. *Educational Psychologist, 18*(2), 88-108.
Curry, L. (1983). An organization of learning style theory and constructs. In L. Curry (Ed.), *Learning style in continuing medical education* (pp. 115-131). Halifax, Canada: Dalhousie University.
D'abate, C., Eddy, E. R., & Tannenbaum, S. I. (2003). What's in a name? A literature based approach to understanding mentoring coaching, and other constructs that describe developmental interactions. *Human Resource Development Review, 2*, 360-384.
De Chiantis, S. M., & Kirton, M. J. (1996). A psychometric reexamination of Kolb's experiential learning cycle construct: A separation of level, style and process. *Educational and Psychological Measurement, 56*, 809-820.
Desmedt, E. (2004). *Research into the theoretical base of learning styles in view of educational applications in a university setting*. Doctoral dissertation, Ghendt, Belgium: Ghendt University.
Doornbos, A. J., Bolhuis, S., & Simons, P. R. J. (2004). Modeling work-related learning on the basis of intentionality and developmental relatedness: A non-educative perspective. *Human Resource Development Review, 3*, 250-274.
Doornbos, A. J., Eekelen, I., & Koopmans, H. (2006). Learning in interactive work situations: It takes two to tango; why not invite both partners to dance? *Human Resource Development Quarterly, 17*, 135-158.
Dreyfus, H. L., Dreyfus, S. E., & Athanasiou, T. (1986). *Mind over machine: The power of human intuition and expertise in the era of the computer*. New York: Free Press.
Dunn, R. (2003). The Dunn and Dunn learning style model and its theoretical cornerstone. In R. Dunn & S. Griggs (Eds.), *Synthesis of the Dunn and Dunn learning styles model research: who, what, when, where and so what - the Dunn and Dunn learning styles model and its theoretical cornerstone*. (pp. 1-6). New York: St John's University.
Dunn, R., Dunn, K., & Price, G. E. (1989). *Learning Styles Inventory*. Lawrence, KS: Price Systems.
Ellström, P. E. (2005). Two logics of learning. In E. Antonacopoulou, B. Elkjær & P. Jarvis (Eds.), *Learning, working and living: Mapping the terrain of working life learning*. London, UK: Palgrave Macmillan.
Engeström, Y. (1987). *Learning by expanding: An activity theoretical approach to development research*. Helsinki, Finland: Orienta Konsultit Oy.
Entwistle, N. J. (1981). *Styles of learning and teaching*. Chichester, UK: Wiley.
Entwistle, N. J. (1988). Motivational factors in student's approaches to learning. In R. R. Schmeck (Ed.), *Learning strategies and learning styles* (pp. 21-51). New York: Plenum Press.
Eraut, M. (2000). Non-formal learning, implicit learning and tacit knowledge in professional work. In F. Coffield (Ed.), *The necessity of informal learning* (pp. 12-31). Bristol, UK: The Policy Press.
Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education, 26*,

247-273.
Eraut, M., Alderton, J., Cole, G., & Senker, P. (1998). *Development of knowledge and skills in employment*. East Sussex, UK: University of Sussex.
Felder, R. M., & Silverman, L. K. (1988). Learning and teaching styles in engineering education. *Engineering Education, 78*, 674-681.
Gear, J., McIntosch, A., & Squires, G. (1994). *Informal learning in the professions*. Hull, UK: School of Education, The University of Hull.
Gerber, R. (1998). How do workers learn in their work. *The Learning Organization, 5*, 168-175.
Gregorc, A. R. (1982). *Style Delineator*. Maynard, MA: Gabriel Systems.
Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.
Hayes, J., & Allinson, C. W. (1998). Cognitive Style and the Theory and Practice of Individual and Collective Learning in Organizations. *Human Relations, 51*, 847-871.
Herrmann, N. (1989). *The creative brain*. North Carolina, NC: Brain Books, The Ned Hermann Group.
Holzman, P. S., & Klein, G. S. (1954). Cognitive system-principles of leveling and sharpening: Individual differences in assimilation effects in visual time-error. *Journal of Psychology, 37*, 105-122.
Honey, P., & Mumford, A. (1986). *Using your learning styles*. Maidenhead, UK: Peter Honey Publications.
Hudson, L. (1968). *Frames of mind*. Harmondsworth, UK: Penguin Books.
Jackson, C. J. (2002). *Learning styles and its measurement: An applied neuropsychological model of learning for business, education, training and clinical use*. Brisbane, Australia: Cymeon.
Juch, B. (1983). *Personal development: Theory and practice in management training*. Chichester, UK: Wiley.
Jung, C. G. (1923). *Psychological types*. London, UK: Kegan Paul.
Kagan, J. (1965). Individual differences in the resolution of response uncertainty. *Journal of Personality and Social Psychology, 2*, 154-160.
Kagan, J., Rosman, B. L., Day, D., Albert, J., & Philips, W. (1964). Information processing in the child: Significance of analytic and reflective attitudes. *Psychological Monographs, 78*, 1-37.
Kahneman, D., & Tversky, A. (1996). On the reality of cognitive illusions. *Psychological Review, 103*, 582-591.
Kaufmann, G. (1979). The explorer and the assimilator: A cognitive style distinction. *Scandanavian Journal of Educational Research, 23*, 101-108.
Kember, D., & Leung, D. Y. P. (2000). Development of a questionnaire to measure the level of reflective thinking. *Assesment & Evaluation in Higher Education, 25*, 381-395.
Kirton, M. J. (1976). Adaptors and innovators: A description and measure. *Journal of Applied Psychology, 61*, 622-629.
Kolb, D. A. (1974). On management and the learning process. In D. A. Kolb, I. M. Rubin & J. M. McIntyre (Eds.), *Organizational psychology: A book of readings* (pp. 27-42). Englewood Cliffs, NJ: Prentice-Hall.

Kolb, D. A. (1984). *Experiental learning. Experience as the source of learning and development*. Englewood-Cliffs, NJ: Prentice Hall.

Letteri, C. A. (1980). Cognitive profile: Basic determinant of academic achievement. *Journal of Educational Research, 73*(4), 195-199.

Levy, M. (1987). *The core skills project and work-based learning: An overview of the development of a new model for the design, delivery and accreditation of vocational education and training?* Sheffield, UK: Manpower Services Commission.

MacLean, P. (1978). A mind of three minds: Educating the triune brain. In J. S. Chall & A. F. Mirsky (Eds.), *Education and the brain* (pp. 308-342). Chicago, IL: The University of Chicago Press.

Marton, F. (1975). What does it take to learn? In N. J. Entwistle (Ed.), *Strategies for research and development in higher education* (pp. 32-43). Amsterdam, The Netherlands: Swets and Zeitlinger.

Mezirow, J. (1990). *Fostering critical reflection in adulthood: A guide to transformative and emancipatory learning*. San Francisco, CA: Jossey-Bass Publishers.

Mezirow, J. D. (1985). A critical theory of adult learning and education. In S. D. Brookfield (Ed.), *Self directed learning: from theory to practice* (pp. 17-30). San Fransisco, CA: Jossey-Bass.

Mumford, A. (1995). *Effective learning*. London, UK: Institute of Personnel and Development.

Myers Briggs, I. B. (1987). *Introduction to type: A description of the theory and applications of the Myers-Briggs Type Indicator*. Palo Alto, CA: Consulting Psychologists Press.

Nieuwenhuis, L. F., & van Woerkom, M. (2003, August). *Paradigms for work related learning*. Paper presented at the Earli 10th Biennal Conference, Padua, Italy.

Paivio, A. (1971). *Imagery and verbal processes*. New York: Holt, Rinehart and Winston, Inc.

Pask, G. (1972). A fresh look at cognition and the individual. *International Journal of Man-Machine Studies, 4*, 211-216.

Pettigrew, T. E. (1958). The measurement and correlates of category width as a cognitive variable. *Journal of Personality, 26*, 532-544.

Petzold, M. (1985). Kognitive stile: Definitionen, Klassifikationen und Relevanz eines psychologische Konstrukts aus wissenschaftshistorischer Sicht. [Cognitive styles: Definitions, classifications and the relevance of psychological contructs from a perspective of science history]. *Psychologie in Erziehung und Unterricht, 32*, 161-177.

Piaget, J. (1970). Extracts from Piaget's Theory. In P. H. Mussen (Ed.), *Manual of child psychology* (pp. 703-732). London, UK: John Wiley & Sons.

Poell, R. F., van Dam, K., & van den Berg, P. T. (2004). Organising learning in work contexts. *Applied Psychology: An International Review, 53*, 529-540.

Rayner, R., & Riding, R. (1997). Towards a categorisation of cognitive styles and learning styles. *Educational Psychology, 17*, 5-28.

Richardson, A. (1977). Verbalizer-visualizer: A cognitive style dimension. *Journal of Mental Imagery, 2*, 109-126.

Riding, R. (1997). On the nature of cognitive style. *Educational Psychology, 17*, 29-49.

Riding, R., & Cheema, I. (1991). Cognitive styles: An overview of integration. *Educational Psychology, 11*(1-2), 193-215.

Riding, R. J., & Taylor, E. M. (1976). Imagery performance and prose comprehension in 7 year old children. *Educational Studies, 2*, 21-27.

Riechmann, S. W., & Grasha, A. F. (1974). A rational approach to developing and assessing the validity of a student learning styles instrument. *Journal of Psychology, 87*(2), 213-223.

Sadler-Smith, E. (1997). 'Learning style': Frameworks and instruments. *Educational Psychology, 17*, 51-63.

Sadler-Smith, E. (1998). Cognitive style: Some human resource implications for managers. *The International Journal of Human Resource Management, 9*, 185-202.

Sadler-Smith, E. (2001). The relationship between learning style and cognitive style. *Personality and Individual Differences, 30*, 609-616.

Sadler-Smith, E., Allinson, C. W., & Hayes, J. (2000). Learning preferences and cognitive style: Some implications for continuing professional development. *Management Learning, 31*, 239-256.

Sala, S. D. (1999). *Mind myths: Exploring popular assumptions about the mind and brain*. New York: Wiley & Sons.

Salomon, G., & Perkins, D. N. (1998). Individual and social aspects of learning. *Review of Research in Education, 23*, 1-24.

Schippers, M. C. (2003). *Reflexivity in teams*. PhD-thesis, Amsterdam, The Netherlands: Vrije Universiteit van Amsterdam.

Schmeck, R. R. (1983). Learning styles of college students. In R. Dillon & R. R. Schmeck (Eds.), *Individual differences in cognition* (pp. 233-279). New York: Academic Press.

Schön, D. A. (1987). *Educating the reflective practitioner*. San Francisco, CA: Jossey-Bass.

Sperry, R. (1977). Bridging science and values: A unifying view of mind and brain. *American Psychologist, 32*, 237-245.

Sternberg, R. J. (1997). *Thinking styles*. Cambridge, UK: Cambridge University Press.

Swift, T. A., & West, M. A. (1998). *Reflexivity and group processes*. Sheffield, UK: ESRC Centre for Organization and Innovation.

van Woerkom, M. (2003). *Critical reflection at work: Bridging individual and organisational learning*. PhD Thesis, Enschede, The Netherlands: Twente University.

Vermunt, J. D. H. M. (1992). *Leerstijlen en sturen van leerprocessen in het hoger onderwijs: Naar procesgerichte instructie in zelfstandig denken [Learning styles and directing learning processes in higher education: Towards proces-oriented instruction in self-directed thinking]*. Lisse, The Netherlands: Swets & Zeitlinger.

Wallach, M. A., & Kogan, N. (1965). *Modes of thinking in young children*. New York: Holt, Rinehart & Winston.

Walton, J. (1999). *Strategic human resource development*. Harlow, UK: Pearson Education.

Witkin, H. A. (1962). *Psychological differentiation: Studies of development*. New York: Wiley.

Witkin, H. A. (1976). Cognitive style in academic performance and in teacher-student relations. In S. Messick (Ed.), *Individuality in learning: Implications of cognitive style and creativity for human development* (pp. 38-72). San Francisco, CA: Jossey-Bass.

Appendix 6.1

Conceptual similarities of the dimensions described in this paper with other dimensions found in literature. Similarities indicated by one of the original authors are shown by *, additional similarities indicated by Coffield et al. are shown by %, and further additional similarities indicated by the authors of the present paper are shown by #.

1. Deep and surface learning approaches (Entwistle, 1981, 1988)

- Deep and surface learning achievements (Biggs, 1985)*
- Elaborative and reiterative processing (Schmeck, 1983)*
- Deep and surface-level processing (Marton, 1975)*
- Meaning-directed and replication-directed learning (Vermunt, 1992)*

2. Vermunt's learning styles (1992)

a. Meaning-directed and reproduction-directed approach:

- Deep and surface learning approach (Entwistle, 1981, 1988)* and similar constructs

b. Regulation of learning:

- Self-regulation and passive learning (Corno & Mandinach, 1983)%

3. Kolb's (1984), Honey and Mumford's (1986), and Jackson's learning cycles (2002)

a. Complete model:

- Sensing, thinking, addressing, and doing (Juch, 1983)*

b. Concrete experience and abstract conceptualization:

- Theories about the left and right hemisphere of the brain*

c. Reflective observation and active experimentation:

- Active and reflective processing (De Chiantis & Kirton, 1996; Felder & Silverman, 1988)*
- Reflectivity and impulsivity (Dunn, 2003; Kagan, 1965)*
- The functions of mental self-government (Sternberg, 1997)#

4. Brain dominance (Herrmann, 1989)

Herrmann's model is constructed on other brain-based models, such as the left and right hemisphere (Sperry, 1977)[*] and the reptilian brain, limbic system and neo-cortex (MacLean, 1978)[*]. Conceptual relationships exist with many other theories, since each quadrant in the model contains many different characteristics.

5. Intuition and analysis (Allinson & Hayes, 1996)

- Holistic and analytical learning (Riding, 1997)[*]
- Global and analytical learning (Letteri, 1980)[*]
- Intuition and sensing (Briggs Myers, 1962; Felder & Silverman, 1988; Jung, 1923)[#]
- Activists and theorists (Honey & Mumford, 1986)[*]
- Broad and narrow category width (Pettigrew, 1958)[#]
- Field independence and field dependence (Witkin, 1962, 1976)[#]

6. Model of learning preferences (Dunn, 2003; Dunn et al., 1989)

a. Physical stimuli:

- Visual and auditory learning (Paivio, 1971)[#]
- Verbal-imagery dimension (Riding & Cheema, 1991)[#]
- Visual and verbal organization (Felder & Silverman, 1988)[*]

b. Sociological stimulus (learning alone or with peers):

- Interaction dimensions (Riechmann & Grasha, 1974)[#]
- Scope of mental self-government (Sternberg, 1997)[#]

c. Psychological stimuli of global and analytical learning:

- Intuition and analysis (Allinson & Hayes, 1996)[#]

d. Stimuli of impulsive and reflective behaviour:

- Reflective observation and active experimentation (Kolb, 1984)[#] and related constructs[#]

7. Mind styles model: perception and ordering (Gregorc, 1982)

a. Concrete and abstract perception:

- Concrete and abstract learning (Kolb, 1984)[%]
- Activists and theorists (Honey & Mumford, 1986)[#]
- Initiators and analysts (Jackson, 2002)[#]
- Levels of mental self-government (Sternberg, 1997)[#]

b. Sequential and random ordering:

- Assimilation and accommodation (Piaget, 1970)[%]
- Assimilation and exploring (Kaufmann, 1979)[#]
- Convergent and divergent thinking (Guilford, 1967)[%] (Hudson, 1968)[#] (Wallach & Kogan, 1965)[#]
- Inductive and deductive learning (Felder & Silverman, 1988)[#]
- Adaptation and innovation (Kirton, 1976)[%]
- Leaning of mental self-government (Sternberg, 1997)[#]

8. Cognitive styles (Riding & Cheema, 1991)

a. Holistic-analytical dimension:

- Field dependence and field independence (Witkin, 1962)[*]
- Levelling and sharpening (Holzman & Klein, 1954)[*]
- Impulsivity and reflectivity (Kagan et al., 1964)[*]
- Holists and serialists (Pask, 1972)[*]
- Broad and narrow category width (Pettigrew, 1958)[#]
- Intuition and analysis (Allinson & Hayes, 1996)[*]

b. Verbal-imagery dimension:

- Verbal-imagery dimension (Riding & Taylor, 1976)[*]
- Verbalizer and visualiser (Richardson, 1977)[*]
- Visual and auditory learning (Dunn et al., 1989[#]; Felder & Silverman, 1988[#]; Paivio, 1971[*])

9. Thinking styles (Sternberg, 1997)

a. Levels of mental self-government:

- Abstract and concrete perception (Gregorc, 1982)[#] and related dimensions

b. Functions of mental self-government:

- Reflective observation and active experimentation (Kolb, 1984) and related models

c. Scope of mental self-government:

- Sociological learning preferences (Dunn et al., 1989)[#]
- Interaction dimensions (Riechmann & Grasha, 1974)[#]

d. Leaning of mental self-government:

- Random and sequential ordering (Gregorc, 1982)[#] and related dimensions

Chapter 7

The Development and Validation of the On-the-job Learning Styles Questionnaire for the Nursing Profession*

Abstract

Aim. This paper reports the development and validation of the On-the-job Learning Styles Questionnaire for the Nursing profession (OLSQN). With this instrument we aim to contribute to knowledge on nurses' on-the-job learning in general and on-the-job learning styles in particular. Furthermore, we provide a tool for nurses to develop self-awareness of their on-the-job learning methods.

Background. Although numerous questionnaires measuring learning styles have been developed, none of them are suitable for working environments. Existing instruments do not meet the requirements for use in workplace settings and tend to ignore the influence of different learning situations.

Method. The questionnaire was constructed using a situation-response design, measuring learning activities in different on-the-job learning situations. Content validity was ensured by basing the questionnaire on interview studies. The questionnaire was distributed to 912 registered nurses working in different departments of 13 general hospitals in the Netherlands.

Results. The response rate was 41% (372 questionnaires). The internal factor structure of the questionnaire was partly based on the learning activities nurses participate in and partly on the learning situation in which they are performed. The internal consistency was good. The situation-response design of the questionnaire demonstrated its added value. Construct validity was confirmed by appropriate intercorrelations between the scales, and the criterion validity of the questionnaire was confirmed based on the relationships of the scales with perceived professional competence.

Conclusion. The OLSQN is well suited to measure nurses' learning styles in on-the-job settings and has satisfactory psychometric properties.

* This chapter has been submitted as: Berings, M. G. M. C., Poell, R. F., Simons, P. R. J., & van Veldhoven, M. J. P. M. (submitted). The development and validation of the On-the-job Learning Styles Questionnaire for the Nursing profession.

Summary

What is already known about this topic

- Nurses need to develop learning skills to meet their responsibilities for their continuous professional development
- Awareness of their on-the-job learning styles can help nurses improve their on-the-job learning
- There are many learning style instruments relevant for measuring learning styles in educational settings but none of them are adequate in on-the-job settings

What this paper adds

- The On-the-job Learning Styles Questionnaire for the Nursing profession (OLSQN) is useful for measuring nurses' learning styles in on-the-job settings
- The OLSQN is a psychometrically sound instrument that can be used to investigate the relationship between nurses' on-the-job learning and job characteristics and several outcome variables
- Measuring learning styles using a situation-response design has added value over measuring learning styles using traditional response designs
- The OLSQN can be used by nurses, their supervisors and HR professionals in hospitals as a tool to make nurses aware of their on-the-job learning styles and improve their on-the-job learning and work performance

Introduction

The professional environment of nurses is continuously changing owing to, for instance, the development of new technologies in nursing equipment, changing disease patterns and treatment and knowledge about them, changing task perceptions (Clark, 2001) and changing task divisions (Allen, 2001). The training nurses initially receive is insufficient to be able to adapt to these new work situations and they thus need to keep on learning during their careers (Lawton & Wimpenny, 2003). Although hospitals can provide teaching and training to enable individual learning, these opportunities are not always financially possible and it often seems difficult to transfer what has been learned to the daily work environment (van Woerkom, 2003). On-the-job learning is a promising alternative (Powell, 1989). The challenges of the work itself and the interactions with other people in the workplace involve many learning opportunities (Eraut, 2004; Poell, van Dam, & van den Berg, 2004) but receive hardly any attention in literature on nurses' continuing learning.

It is increasingly expected from nurses that they bear responsibility for their own professional development (Furze & Pearcey, 1999). Therefore, they need to develop learning skills (O'Shea, 2003). To be able to actively direct their own learning, people should first know *that* they learn and *how* they learn (Barrie & Pace, 1998). They should be aware of their on-the-job learning styles. An on-the-job learning style can be defined as "the tendency to use a particular combination of implicit and explicit learning activities that a person can and likes to perform on the job" (Berings, Poell, & Simons,

2005a, p. 380). Knowledge about their own and other possible on-the-job learning styles can make nurses aware of their options and choices in learning behaviour and therefore offer opportunities for adaptation. It offers them a lexicon that enables verbal expression of individual differences in their learning behaviour (Coffield, Mosely, Hall, & Ecclestone, 2004; Desmedt & Valcke, 2003). Further, it can improve communication and collaboration between team members and offer opportunities to tailor guidance by human resource professionals or managers. However, people are usually not aware of their learning styles (Boekaerts, 1996). To help nurses improve their learning skills it is necessary to raise their awareness of their on-the-job learning styles. The purpose of this paper is to provide a tool that can help raise this awareness.

Background

The current instruments measuring on-the-job learning styles are inadequate for our purpose for three main reasons. First, though the numerous existing questionnaires that have been developed to measure learning styles may be adequate for application in educational settings, they do not fulfil the requirements for use in the workplace (Berings & Poell, 2005). Second, the influence of different learning situations generally seems to be ignored in measurement (Rayner & Riding, 1997). Third, most instruments reveal serious psychometrical weaknesses (Coffield et al., 2004; Snyder, 1998). All these reasons will be explained below.

Adequacy in workplace settings

In literature on on-the-job learning, instruments are often simply transferred from research in educational settings to workplace settings, despite the great differences between these contexts. The first point of criticism against using these instruments in the workplace is their lack of attention to the social learning dimension. In learning style instruments the social dimension of learning hardly receives any attention, even though interaction with others is the main source of learning in the workplace (Doornbos, Bolhuis, & Simons, 2004; Eraut, Alderton, Cole, & Senker, 1998; Gear, McIntosh, & Squires, 1994).

Second, existing learning style instruments focus on the ways in which learners process information offered by teachers and textbooks. In educational contexts, learning opportunities are mostly chosen by the teacher. In on-the-job contexts, however, employees have opportunities for explicitly or implicitly choosing their own learning activities. It can thus offer more opportunities for the improvement of on-the-job learning to focus a learning style instrument on the variety of learning activities workers choose, instead of on the way they process the information they are offered in courses (Berings et al., 2005a).

Third, most existing learning style instruments use the word 'learning' in most items. This may cause respondents to merely think about courses they attended, the books they read, the coaching they received and so on, while we are also interested in learning activities that are more integrated into the work process, such as learning from work experience and learning from social interaction with colleagues. Therefore, in our

view, nurses should be asked about concrete changes in competences, work processes or outcomes. They could also be asked about their 'development' or 'improvement' (Doornbos & Simons, 2001, April).

Influence of the learning situation: the interactional approach

Learning situations can differ in many respects, such as in their content, the information environment, the social work environment, and the learning climate (Berings et al., 2005a). Learning style instruments generally ignore the influence of these differences by measuring learning activities in 'general situations' and regarding these 'general activities' as learning styles. We believe that the neglect of the existence of various learning situations is related to the unresolved 'state-or-trait' debate in the learning style literature (Cassidy, 2004; Coffield et al., 2004; Loo, 1997). Literature is still unclear on whether learning styles should be regarded as stable across situations – as traits – or as changing with each learning situation – as states. We assume that people adapt their preferred combination of learning activities to different situations in a consistent way, depending on their learning style. In other words, we assume that learning behaviour is neither situation specific – a state – nor cross-situationally consistent – a trait – but that on-the-job learning behaviour should be regarded from an interactional perspective, as is shown in the interaction model in Figure 7.1 (Berings et al., 2005a).

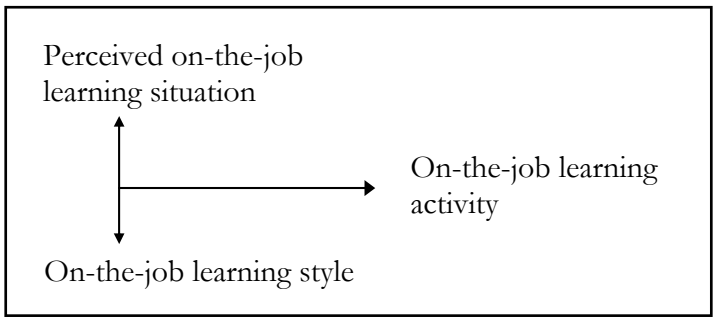


Figure 7.1. Interaction model of on-the-job learning styles (adapted from Berings et al., 2005a, p.380)

This assumption is shared by many learning style theorists (e.g., Allinson & Hayes, 1996; Kolb, 1984; Vermunt, 1992), though almost all learning style instruments still attempt to measure learning styles with one general questionnaire intended to cover all learning situations. This reduces the reliability and predictive validity, since respondents usually adopt a variety of frames of reference to compensate for the lack of specificity in general questionnaires (Spielberger, 1971; van Schoyck & Grasha, 1981).

Only Boyatzis and Kolb (1993) have developed an instrument that measures people's learning strategies in different learning situations. This instrument has not been used extensively so far. This could be due to the poor psychometric values in several subscales; for example, Cronbach alpha's ranged from .47 to .78. Another reason could be that the only measure calculated that incorporated the situational

factor ('adaptive flexibility') did not show criterion validity (Mainemelis, Boyatzis, & Kolb, 2002).

In this paper we will take into account different learning situations when measuring learning styles.

Weaknesses in psychometric quality

Only a few psychometrically validated learning style instruments are available. Most of the existing instruments are not statistically validated or they are known to be invalid and unreliable (Snyder, 1998). Coffield *et al.* (2004) examined 13 of the best known and most used learning style instruments in detail and concluded that they lack psychometric quality. Only one instrument, Allinson and Hayes' Cognitive Style Index (Allinson & Hayes, 1996), reported proper internal consistency, proper construct validity, and proper criterion validity. Coffield *et al.* therefore advise that use of the other instruments in research and practice should be discontinued. Adequate psychometric instrument properties are essential. If instruments are not valid or reliable, they cannot be used to perform sound scientific research. However, many underlying models appear to be valuable nonetheless because they provide participants with a framework for understanding difference and vocabulary to discuss their learning issues.

The study

Aims

In this study our aim is to develop a questionnaire measuring nurses' learning styles. This questionnaire, the On-the-job Learning Style Questionnaire for the Nursing Profession (OLSQN), can serve as a tool for nurses to create self-awareness about their methods of learning on the job.

In reporting our study we will focus on the following research questions:

1. How can we develop a questionnaire measuring nurses' on-the-job learning styles?
2. What is the reliability of this questionnaire?
3. What is the added value of a situation-response design in such a questionnaire?
4. What is the validity of this questionnaire?

The questionnaire will be developed in two stages. The first stage deals with the construction of our scales, using the findings of an earlier study conducted from an interpretative approach. In this stage we will answer the first research question. In the second stage we will answer the other research questions, examining the psychometric properties of the questionnaire. The approach we use is related to the empirical-analytical paradigm. In this study we thus combine the interpretative and empirical-analytical research paradigm to build the best possible questionnaire.

I. Scale construction

The instrument we developed measures the use of learning strategies in the various on-the-job learning situations that nurses are confronted by. The scale was deductively constructed following a situation-response design to provide data on the same behavioural scale for a number of diverse situations (Endler & Hunt, 1966). We based the items on empirical data gathered in interviews with nurses, their supervisors, and educators in the nursing profession (Berings, Gelissen, & Poell, submitted) to guard the content validity of the scale. First, six different learning situations were operationalized as six different learning contents. Then, analogous items were formulated as responses for each learning content that included the learning activities nurses use. Finally, the final mapping sentence was formulated as explained below.

Learning contents

The learning situations were operationalized as six different learning contents. In the abovementioned interviews, nurses provided many examples of on-the-job learning content. Using inductive analysis, these examples were organized into five categories: the 'technical-practical domain' (e.g., technical nursing skills), the 'socio-emotional domain', the 'organizational domain' (e.g., planning the care of patients), the 'developmental domain' (e.g., finding reliable information sources), and a 'pro-active attitude to work' (e.g., taking initiatives at work). The large socio-emotional domain could be split into a socio-emotional domain towards others (e.g., supporting patients and family) and towards oneself (e.g., putting emotionally difficult situations into perspective). To guarantee the independence and exclusivity of the learning content in the items, each content should be a significant example from one of these domains. We used the examples mentioned to formulate the contents and, to ensure the exclusivity, significance, and recognizability of the examples, we evaluated them with five nurses in the field. After a few changes in expression the contents fulfilled all requirements.

Learning activities

In the interview studies the respondents also mentioned many examples of the learning activities nurses employ. They were organized into six domains of responses in the questionnaire: 'learning by doing one's regular job', 'learning by applying something new in the job', 'learning by social interaction with colleagues', 'learning by theory or supervision', 'learning by reflection', and 'learning through life outside work'. The last domain was left out since most examples mentioned in that category cannot be influenced by the nurses themselves, such as sickness and death in one's own circle and raising children. The category 'learning by theory and supervision' was split into 'learning by theory' and 'learning by supervision', since the source of knowledge used is different for these situations (Estabrooks et al., 2005), and it is therefore plausible that they are used for different learning content. Except for the 'learning by reflection' mental domain, all domains found in the interviews represented overt activities. To obtain a valuable distinction within this single mental domain, the 'learning by reflection' category was split up into two categories: 'reflecting by oneself' and

'reflecting with others', (Berings, Poell, & Simons, 2005b).

Pilot and final mapping sentence

The learning contents and learning activities are represented in a so-called mapping sentence, resulting in the formulation of the items shown in Figure 7.2 (Oosterveld, 1996). The scale consists of seven items containing learning activities measured for six different learning contents (42 in total). The 6-point response scale ranged from 1, 'never' to 6, 'always'. In a pilot version we used a 4-point response scale. Nine nurses filled in this pilot questionnaire using a thinking aloud procedure that one researcher attended. The nurses recognized the contents and activities and could easily fill out the questionnaire. However, the variation in responses was very low. Therefore, the response scale was increased from a 4-point to a 6-point scale.

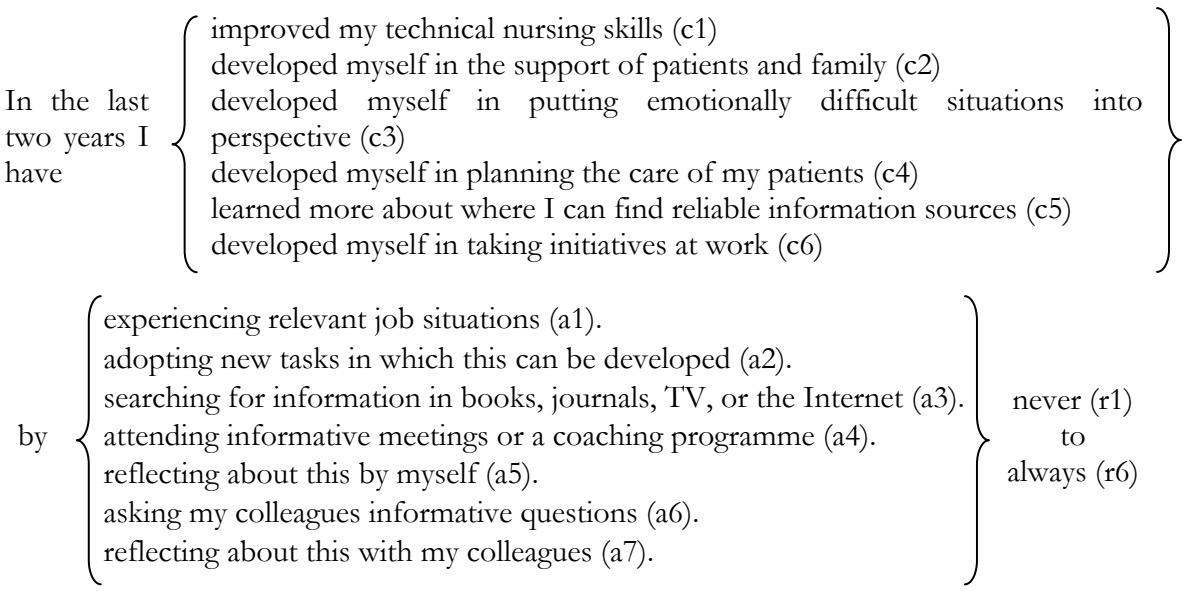


Figure 7.2. Mapping sentence of the OLSQN. The questionnaire consists of seven learning activities questioned for six learning contents (42 items in total) and was conducted in Dutch (c=learning content; a=learning activity)

II. Psychometric properties of the questionnaire

In this section we will describe the psychometric properties of the questionnaire. We will describe a study of the factor structure, the internal consistency, the added value of the situational response design, the construct validity, and criterion validity of the scales.

Methodology

Participants and procedure. To distribute the questionnaires, we contacted nursing supervisors and human resource professionals working in hospitals in the Netherlands who had attended a conference about on-the-job learning in the healthcare sector that we had organized a year earlier. We asked them to distribute our study scales as part of

a larger questionnaire to the nurses working at their departments. Using the snowball method, more supervisors were approached. This way, the questionnaire was distributed to 912 registered nurses working in different departments of 13 general academic, teaching, and peripheral hospitals in the Netherlands at the end of 2005. The respondents received their own learning style profile by email in return for their contribution. Four hundred and thirty-six of the questionnaires were returned, an initial response rate of 48%. The dataset contained a relatively large amount of missing data, which was probably due to the questionnaire's length. Therefore, we imputed the missing data for all cases in which less than 10% of the variables of the OLSQN scale were missing. Data imputation improves the efficiency of estimates and the 'power' of statistical tests (de Leeuw, 2001). We used 'two-way imputation for separate scales', because this method has proven to produce almost no bias in Cronbach's alpha in simulation research (van Ginkel, van der Ark, & Sijtsma, in press). All other cases were deleted listwise. This left 372 cases, which amounts to a final response rate of 41%.

Perceived professional competence. Drawing on previous research, we expected that nurses' on-the-job learning positively influences their perceived professional competence (see below). In this study we used two measures to indicate this competence: self-efficacy and perceived development. Self-efficacy refers to the belief in one's capabilities to achieve a desired result. It is influenced by judgements of personal capabilities and can therefore be influenced by a person's investment in learning activities (Bandura, 1977; Kraiger, Ford, & Salas, 1993; Parker & Wall, 1998). Diverse studies reveal the impact of nursing students' learning experiences on their self-efficacy (e.g., Shellman, in press; e.g., Williamson, Stecchi, Allen, & Coppens, 1996). Self-efficacy was measured by means of six items from a scale developed by Rigotti, Schyns, and Mohr (submitted) ($M = 4.92$, $SD = .55$, $\alpha = .81$). The six-point response scale ranged from 1, 'totally disagree', to 6, 'totally agree'. An example is '*I can usually handle whatever comes my way in my job'*.

The other indicator of perceived professional competence, perceived development, refers to how a nurse reports about his or her own professional development after graduation. Van der Heijden (2002) found a positive relationship between participation in learning activities and how employees' perceive their own professional development. Perceived development was measured by a single item asking '*How do you assess your own development as a nurse since your graduation?*' ($M = 4.74$, $SD = .70$). The six-point response scale ranged from 1, 'very bad', to 6, 'very good'.

Data analysis. The data were analysed using SPSS version 12.0.1 for Windows. We conducted exploratory factor analysis in order to find the most adequate factor structure of the OLSQN and calculated the internal consistency for each scale. To investigate the added value of the situation-response design of the questionnaire, we used univariate analysis of variance with random effects for the person factor and fixed effects for the factors learning content and type of learning activity to measure explained variances of these factors in the item scores. To test the construct validity, we calculated the internal correlations between the scales. To test the criterion validity

of the questionnaire we conducted linear regression analyses with the external variables, controlling for effects of gender, nursing education level, employment, and nursing experience. To avoid multicollinearity with nursing experience, the effect of age was not captured in the model. We inspected main effects and the interaction effects for centred variables. A probability level of $p < .05$ was used for all analyses.

Results

The sample contained 372 nurses, 16.58% of which were male and 83.42% were female. The average age was 36.90 years old (SD = 11.08). The nurses worked 29.13 hours per week on average (SD = 6.87) and they had an average of 12.51 years of nursing experience since graduating (SD = 10.24). The sample was not completely representative for the population of all nurses working in general hospitals in the Netherlands (data from 2004, obtained from the NVZ, Dutch Association of Hospitals). A nonparametric Chi-square test revealed that males were overrepresented ($\chi^2 = 7.30$, $p = .007$). One sample t-tests showed that the nurses in the sample were a bit younger ($t = -4.42$, $p < .001$) and have a longer working week ($t = 17.21$, $p < .001$) than the nurses in the population.

Factor structure and internal consistency

Principal component analysis indicated that ten factors could be distinguished with an eigenvalue greater than one. We conducted different exploratory analyses in order to find the most adequate factor structure. Two separate analyses of all 32 items concerning work experience, adding something new, searching for information, visiting information meetings or coaching, and reflecting by oneself and on all 12 items concerning asking colleagues questions and reflecting together revealed the most clearly interpretable results. Kaiser's measure for sampling adequacy was .89 for the first solution and .80 for the second solution, indicating good factorability (Kaiser, 1974). The first factor solution yielded five factors representing the five learning activities for different learning contents. We excluded 11 items in order to decrease the ambiguity and to increase the reliability of the scales. This solution explained 68.61% of the total variance. The second factor solution also yielded five factors, representing learning by talking with colleagues about five learning contents: technical nursing skills, putting things in perspective, organizing patient care, finding information, and taking initiatives. The sixth learning content that was originally put into the design (support of patients and family) was not found in the factor solution. These two items were therefore deleted. This factor solution explained 82.92% of the total variance. Cronbach alphas of all scales ranged from .67 to .87. The varimax rotated factor matrices, mean scores, standard deviations, and reliabilities of the factors are presented in Tables 7.1 and 7.2.

Table 7.1. Varimax rotated factor matrix, mean scores, standard deviations, and reliability coefficients for five learning activities (N=372). Factor loadings lower than .32 are not displayed.

Item	Component: Learning by…				
	information meetings / coaching	reflecting by oneself	adding something new	work experience	searching for information
c2*a1				.79	
c3*a1				.69	
c4*a1			.38	.75	
c4*a2			.67	.39	
c5*a2	.33		.66		
c6*a2			.73		
c1*a3					.77
c2*a3	.33				.79
c3*a3	.43				.71
c2*a4	.72				
c3*a4	.74				
c4*a4	.79				
c5*a4	.74				
c6*a4	.75				
c1*a5		.78			
c2*a5		.71			
c3*a5		.68		.39	
c5*a5		.65	.43		
c6*a5		.55	.43		
Mean	3.00	4.22	3.60	4.17	3.37
SD	1.02	.86	1.11	1.04	1.03
N° items	5	5	3	3	3
Cronbach's alpha	.87	.81	.79	.79	.80

Learning from work experience and learning from reflecting by oneself were reported most frequently, while learning from attending information meetings or coaching were reported the least. Nurses learned most from talking with their colleagues when discussing technical matters and how to put things into perspective and least when discussing finding information and taking initiatives. There is considerable variance between the nurses on each scale. Analysis of variance revealed no significant differencesbetween nurses from different types of hospitals (academic, teaching, or peripheral hospitals) or different types of wards (nursing wards, emergency rooms, outpatient departments, and intensive care units).

Table 7.2. Varimax rotated factor matrix, mean scores, standard deviations, and reliability coefficients for five learning contents about which nurses learn about by talking with each other (N=372). Factor loadings lower than .32 are not displayed.

Item	Component: Learning by talking together about…				
	finding information	organizing patient care	putting things into perspective	taking initiatives	technical nursing skills
c1*a6					.86
c1 *a7					.78
c3*a6			.85		
c3 *a7			.83		
c4*a6		.86			
c4*a7		.80			
c5*a6	.82				
c5*a7	.89				
c6*a6				.87	
c6 *a7				.78	
Mean	3.73	3.84	3.95	3.73	4.01
SD	1.11	1.10	1.09	1.08	.90
N° items	2	2	2	2	2
Cronbach's alpha	.85	.83	.77	.80	.67

The added value of the situation-response design

Table 7.3 shows the explained variance proportions in the frequency of learning activities by types of learning activities, learning content, and person. All contributions are significant.

Table 7.3. Proportions of explained variance of the item scores (frequency) by person, learning content, type of learning activity, and two-way interactions (N=372)

	R^2	p
Person	.44	.000
Learning content	.11	.000
Type of learning activity	.36	.000
Person * learning content	.39	.000
Person * type of learning activity	.43	.000
Learning content * type of learning activity	.07	.000

Validity

To study the construct validity of the final OLSQN scales, we calculated their intercorrelations. These ranged from .31 to .63, with an average of .46.

To examine the criterion validity of the questionnaire, we examined relationships with perceived professional competence. Table 7.4 presents β's, beta values, and R^2s of

linear multiple regression analyses. We controlled for effects of gender, nursing education level, employment, and nursing experience.

Higher levels of adding something new to one's task are related to higher levels of perceived development (beta = .29, p < .001). Often visiting information meetings or receiving coaching is related to high self-efficacy (beta = .21, p = .003). Higher levels of reflecting by oneself are related to higher levels of self-efficacy (beta = .19, p = .011). Learning by talking about putting things into perspective is positively related to self-efficacy (beta = .14, p = .036) and learning by talking about organizing patient care is negatively related to perceived development (beta = -.18, p = .021).

Table 7.4. Linear multiple regressions of nurses' on-the-job learning on their professional competence (N=372)

	Self-efficacy		Perceived development	
	β	*beta*	*β*	*beta*
Gender (1 = female; 0 = male)	-.24	-.17**	-.06	-.03
Nursing education level				
- Dummy (1 = higher nursing education; 0 = others†)	-.07	-.04	.14	.06
- Dummy (1= postgraduate education; 0 = others†)	.08	.07	.08	.06
Employment hours	.00	-.02	.01	.10
Years of nursing experience	.01	.26***	.00	.05
Learning by…				
Work experience	-.01	-.02	-.02	-.03
Adding something new	.03	.07	.18	.29***
Searching for information	-.03	-.06	.02	.03
Information meetings/coaching	.11	.21**	.02	.03
Reflecting by oneself	.12	.19*	.10	.12
Learning by talking together about…				
Technical nursing skills	-.03	-.05	.04	.05
Putting things into perspective	.07	.14*	.05	.08
Organizing patient care	-.07	-.14	-.11	-.18*
Finding information	.00	.01	-.01	-.02
Taking initiatives	.05	.09	.00	.01
Adjusted R^2	.16			.12
R^2 *Change*‡	.14			.12

* p ≤ .05 ** p ≤ .01 *** p ≤ .001

† Three levels of nursing education were distinguished: vocational education (level 4), higher nursing education (level 5) and postgraduate education.

‡ Tested against a model only including background characteristics: gender, nursing education level, employment, and nursing experience.

Conclusion and discussion

The aim of this study was to develop and validate a questionnaire able to measure the individual use of on-the-job learning activities by nurses. In this study we developed the OLSQN, which satisfied these conceptual and psychometrical requirements. In this section, we examine the findings in more detail and discuss their limitations and implications for future research and practice.

Factor structure and internal consistency

The factor solution that best matched the data yielded ten factors and structured the separate items on two different theoretical grounds. Five factors represented five learning activities for different learning contents and the five other factors represented five learning contents about which nurses learn by talking with their colleagues. The classification of 42 items into 10 factors and the deletion of 13 items resulted in small factors containing only a few items. This can negatively affect the robustness of the factors. However, the factor solutions were very clear for interpretation and the reliability of the factors was satisfactory. Only one factor (learning by talking together about technical nursing skills, $\alpha = .67$) did not exceed the generally accepted .70 criterion (Nunnally, 1978). For valid inferences about groups of persons, alphas from .60 are sufficient (Sijtsma & Molenaar, 2002). For diagnostic purposes, however, higher reliability values should be realized. All other Cronbach alphas exceeded .77 and are therefore satisfactory.

The added value of the situation-response design

Firstly, the fact that some of the items in the questionnaire organized themselves into factors representing learning content is an indication for the importance of the situational aspect in the questionnaire. Secondly, the explained variance proportion of the learning content, the situational part of the design, and its interactions with the person and learning activity are significant. The contribution of the learning activity type, measured in most learning style questionnaires, and the contribution of the person are greater, but the contribution of the learning content is substantial and unquestionably has added value for the design.

Probably one of the reasons that the 'state-or-trait' debate in learning style literature has still not been solved is that learning behaviour, like other aspects of human behaviour, is highly complex. Our data show that all the factors we put in the model have an important impact. It is best to calculate not only the main sources of variance and two-way interactions, but also the three-way interaction effect (person * learning content * learning activity). Learning is a function of all these factors in combination (cf. Endler & Hunt, 1966). It would thus also be possible to empirically test whether our assumption, that on-the-job learning behaviour should be regarded from an interactional approach, is plausible. In the current study, however, only one item for each learning activity per subject is available for each learning content, which makes it impossible to analyze the three-way interaction effect. If the learning activity were scored repeatedly within each learning content, respondents would become irritated by the repetition or would merely repeat their first response from memory

(Endler & Hunt, 1966). Therefore, it would be difficult to develop such a questionnaire and empirically test the interaction assumption and all factors in combination.

Validity

For sound construct validity, the final OLSQN subscales should correlate since they should all measure on-the-job learning activities (convergent validity), but the intercorrelations should not be too high as all scales should all measure different kinds of on-the job learning activities (divergent validity). The intercorrelations we found are considerable, but this is unsurprising since it is to be expected that if nurses have invested effort in one way of learning, they will also invest effort in other ways of learning. The intercorrelations are not too high, which means that they are considerably lower than the scales' reliability estimates, which indicates that the scales truly indicate separate scales. Therefore, the final OLSQN scales satisfy the norms for construct validity.

As expected, we found positive relationships between different nurses' on-the-job learning activities and perceived professional competence. This confirms the criterion validity of the questionnaire. One relationship we found was negative: the relationship between learning by talking about organizing patient care and perceived development. This is contrary to our expectations. We have no clear explanation for this. It could mean that nurses who discuss how to better plan care for their patients more frequently have lower esteem about their development as nurses. It could also mean that questions regarding organizing patient care were misinterpreted by the nurses. They may have thought this was the job of their supervisor. For now, this scale should be interpreted with care. We did not find all the relationships for all kinds of on-the-job learning. This strengthens the evidence for the criterion validity of the questionnaire, since it proves the relevance of the distinction between the different learning activities we made. This is further supported by the fact that some learning activities show significant relationships with self-efficacy and other activities with perceived development. We must note, however, that the beta values we found are not very high. This is probably due to the fact that perceived professional competence is influenced by many other factors, such as job satisfaction and commitment (Rigotti et al., submitted). Furthermore, we should note that although it is theoretically plausible that self-efficacy and perceived development are influenced by on-the-job learning activities, it is conceivable that there is a mutual relationship. With the empirical data gathered in this study the direction of the causality cannot be determined, however.

Limitations

A weakness in our study is that all variables were measured using a self-report questionnaire. Because individuals strive to achieve consistency in their self-reported response pattern, it is probable that this explains relationships between the variables we found. For example, nurses who claim to use many learning activities frequently might want to be consistent and provide positive answers to questions about their perceived competence (Kasl, 1978; Perry, 1995). We have tried to avoid such deviant results by placing other items between these scales on the questionnaire.

The results are limited by the fact that the sample in this study was not completely representative of the entire population of nurses working in general hospitals in the Netherlands. It is possible that this bias is caused by the fact that nurses who are more interested in continuous learning were more readily inclined to fill out the questionnaire and receive their profiles. Therefore, our sample might represent a group of nurses with 'above average' interest in learning on the job. We expect only negligible influences on the results of this study. It is easily conceivable that the mean scores on the on-the-job learning activities in the population are lower, but since the standard deviances of the item scores are of reasonable magnitude we do not expect that this has significantly influenced the formation of factors. While analyzing the questionnaire's criterion validity we used the nurses' background characteristics as control variables and therefore this bias in the sample cannot have strongly influenced our conclusions.

The content of the questionnaire, the learning activities and learning contents, were based on an empirical study of nurses working in general hospitals in the Netherlands. However, comparisons with other studies in other professions and in other countries suggest broader applicability (Berings et al., submitted).

Feedback

In addition to contributing to scientific knowledge on nurses' on-the-job learning and learning styles in general, with the development of the OLSQN we wanted to facilitate nurses in creating self-awareness about their way of learning on the job. Therefore, we provided the nurses who filled in the questionnaire with feedback on their on-the-job learning styles by means of their score on each scale of the OLSQN. In existing learning style instruments, learning style characteristics are usually described in bipolar or multipolar dimensions. The feedback people receive usually consists of a single label describing their general way of learning. In our opinion, on-the-job learning styles should not be defined as bipolar dimensions that exclude one another but as singular dimensions of which people possess few or many characteristics (cf. Riding & Cheema, 1991; Vermunt, 1992). The latter type of feedback is more detailed, delivers better personal adjustment and therefore offers better opportunities for improvement of their learning.

Implications for future research and practice

The OLSQN can be used in future research to investigate the implications of nurses' on-the-job learning on several other output variables. For example, do the different learning activities affect their work effectiveness or patient satisfaction? This questionnaire should also be used to investigate which factors affect which on-the-job learning activities, such as job autonomy, social support of colleagues and supervisors, etc. In addition, it could also be applied to determine which nurses, with which background characteristics, conduct which learning activities. With this information supervisors, human resource professionals, and continuing nursing educators, as well as the nurses themselves, can implement well tailored intervention strategies adapted to each individual nursing professional.

The questionnaire can be self-administered by nurses or can be used by supervisors, mentors, coaches, and HR professionals to make nurses aware of their on-the-job learning styles. They can, for example, organize coaching sessions for nurses to reflect on their use of learning strategies in different learning situations. Alternative learning strategies can be discussed and new learning strategies besides their current personal preferences can be tried out and developed in the everyday working and learning process, leading to the improvement of the nurses' on-the-job learning and work performance (Berings et al., 2005a). Furthermore, our instrument can be used to improve person-job fits, i.e. finding a good fit between learning style and the learning demands of a job in order to promote effective learning (Hayes & Allinson, 1998).

References

Allen, D. (2001). *The changing shape of nursing practice: The role of nurses in the hospital division of labour*. London, UK: Routledge.

Allinson, C. W., & Hayes, J. (1996). The Cognitive Style Index: A measure of intuition-analysis for organisational research. *Journal of Management Studies, 33*, 119-135.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215.

Barrie, J., & Pace, R. W. (1998). Learning for organisational effectiveness: Philosophy of education and human resource development. *Human Resource Development Quarterly, 9*, 39-54.

Berings, M. G. M. C., Gelissen, J. P. T. M., & Poell, R. F. (submitted). The development of a classification of on-the-job learning behaviour: Learning contents and learning activities in the nursing profession.

Berings, M. G. M. C., & Poell, R. F. (2005). Measuring on-the-job learning styles: A critique of three widely used questionnaires. *British Journal of Occupational Learning, 3*, 3-12.

Berings, M. G. M. C., Poell, R. F., & Simons, P. R. J. (2005a). Conceptualizing on-the-job learning styles. *Human Resource Development Review, 4*, 373-400.

Berings, M. G. M. C., Poell, R. F., & Simons, P. R. J. (2005b). Dimensions of on-the-job learning styles in the nursing profession. In *Proceedings of the 4th international conference: International conference on Researching Work and Learning*. Sydney, Australia: University of Technology.

Boekaerts, M. (1996). Personality and the psychology of learning. *European Journal of Personality, 10*, 377-404.

Boyatzis, R. E., & Kolb, D. A. (1993). *Adaptive Style Inventory: Self scored inventory and interpretation booklet*. Boston, MA: Hay/McBer, Training Resources Group.

Cassidy, S. (2004). Learning styles: An overview of theories, models and measures. *Educational Psychology, 24*, 419-444.

Clark, J. (2001). *De lerende verpleegkundige [The learning nurse]*. May 8th 2001, Anna Reyvaan Lezing [Anna Reyvaan Lecture]. Amsterdam, The Netherlands: Academisch Medisch Centrum.

Coffield, F., Mosely, D., Hall, E., & Ecclestone, K. (2004). *Learning styles and pedagogy in post-16 learning*. London, UK: Learning and Skills Research Centre.

de Leeuw, E. D. (2001). Reducing missing data in surveys: An overview of methods. *Quality and Quantity, 35*, 147-160.

Desmedt, E., & Valcke, M. (2003). Learning style awareness: Why would it work? In S. Armstrong, M. Graff, C. Lashley, E. Peterson, S. Raynor, E. Sadler-Smith, M. Schiering & D. Spicer (Eds.), *Bridging theory and practice. Proceedings of the 8th annual ELSIN conference 2003* (pp. 139-150). Hull, UK: University of Hull.

Doornbos, A. J., Bolhuis, S., & Simons, P. R. J. (2004). Modeling work-related learning on the basis of intentionality and developmental relatedness: A non-educative perspective. *Human Resource Development Review, 3*, 250-274.

Doornbos, A. J., & Simons, P. R. J. (2001, April). *Three ways of learning in the workplace.* Paper presented at the 82nd Annual Meeting of the American Educational Research Association, Seattle, WA.

Endler, N. S., & Hunt, J. M. (1966). Sources of behavioral variance as measured by the s-r inventory of anxiousness. *Psychological Bulletin, 65*, 336-346.

Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education, 26*, 247-273.

Eraut, M., Alderton, J., Cole, G., & Senker, P. (1998). *Development of knowledge and skills in employment*. East Sussex, UK: University of Sussex.

Estabrooks, C. A., Rutakumwa, W., O'Leary, K. A., Profetto-McGrath, J., Milner, M., Levers, M. J., et al. (2005). Sources of practice knowledge among nurses. *Qualitative Health Research, 15*, 460-476.

Furze, G., & Pearcey, P. (1999). Continuing education in nursing: A review of the literature. *Journal of Advanced Nursing, 29*, 355-363.

Gear, J., McIntosch, A., & Squires, G. (1994). *Informal learning in the professions*. Hull, UK: School of Education, The University of Hull.

Hayes, J., & Allinson, C. W. (1998). Cognitive Style and the Theory and Practice of Individual and Collective Learning in Organizations. *Human Relations, 51*, 847-871.

Kaiser, H. (1974). An index of factorial simplicity. *Psychometrika, 39*, 31-36.

Kasl, S. V. (1978). Epidemiological contributions to the study of work stress. In C. L. Cooper & R. Payne (Eds.), *Stress at Work* (pp. 3-48). Chichester, UK: John Wiley & Sons.

Kolb, D. A. (1984). *Experiental learning. Experience as the source of learning and development*. Englewood-Cliffs, NJ: Prentice Hall.

Kraiger, K., Ford, K., & Salas, E. (1993). Application of cognitive, skill-based, and affective theories of learning outcomes to new methods of training evaluation. *Journal of Applied Psychology, 78*, 311-328.

Lawton, S., & Wimpenny, P. (2003). Continuing professional development: A review. *Nursing Standard, 17*(24), 41-44.

Loo, R. (1997). Evaluating change and stability in learning styles: A methodological concern. *Educational Psychology, 17*, 95-100.

Mainemelis, C., Boyatzis, R. E., & Kolb, D. A. (2002). Learning styles and adaptive flexibility: Testing experiential learning theory. *Management Learning, 33*, 5-33.

Nunnally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill.

O'Shea, E. (2003). Self-directed learning in nurse education: A review of the literature. *Journal of Advanced Nursing, 43*, 62-70.

Oosterveld, P. (1996). *Questionnaire design methods*. Nijmegen, The Netherlands: Berkhout Nijmegen BV.

Parker, S., & Wall, T. (1998). *Job and work design: Organizing work to promote well-being and effectiveness*. London, UK: Sage Publications.

Perry, L. (1995). Continuing professional education: Luxury or necessity? *Journal of Advanced Nursing, 21*, 766-721.

Poell, R. F., van Dam, K., & van den Berg, P. T. (2004). Organising learning in work contexts. *Applied Psychology: An International Review, 53*, 529-540.

Powell, J. H. (1989). The reflective practitioner in nursing. *Journal of Advanced Nursing, 14*, 824-832.

Rayner, R., & Riding, R. (1997). Towards a categorisation of cognitive styles and learning styles. *Educational Psychology, 17*, 5-28.

Riding, R., & Cheema, I. (1991). Cognitive styles: An overview of integration. *Educational Psychology, 11*(1-2), 193-215.

Rigotti, T., Schyns, B., & Mohr, G. (submitted). A short version of the Occupational self-efficacy scale: Structural and construct validity across five countries.

Shellman, J. (in press). The effects of a reminiscence education program on Baccalaureate Nursing students' cultural self-efficacy in caring for elders. *Nurse Education Today*.

Sijtsma, K., & Molenaar, I. W. (2002). *Introduction to nonparametric item response theory*. Thousand Oaks, CA: Sage Publications.

Snyder, R. P. (1998). *An assessment of the reliability and validity of scores obtained by six learning styles instruments*. Unpublished doctoral dissertation, Utah State University, Logan, UT.

Spielberger, C. D. (1971). Trait-state anxiety and motor behavior. *Journal of Motor Behavior, 3*, 265-279.

van Ginkel, J. R., van der Ark, A., & Sijtsma, K. (in press). Multiple imputation of item scores when test data are factorially complex. *British Journal of Mathematical and Statistical Psychology*.

van Schoyck, S. R., & Grasha, A. F. (1981). Attentional style variations and athletic ability: The advantage of a sport-specific test. *Journal of Sport Psychology, 3*, 149-165.

van Woerkom, M. (2003). *Critical reflection at work: Bridging individual and organisational learning*. PhD Thesis, Enschede, The Netherlands: Twente University.

Vermunt, J. D. H. M. (1992). *Leerstijlen en sturen van leerprocessen in het hoger onderwijs: Naar procesgerichte instructie in zelfstandig denken [Learning styles and directing learning processes in higher education: Towards proces-oriented instruction in self-directed thinking]*. Lisse, The Netherlands: Swets & Zeitlinger.

Williamson, E., Stecchi, J. M., Allen, B. B., & Coppens, N. M. (1996). Multiethnic experiences enhance nursing students' learning. *Journal of Community Health Nursing, 13*(2), 74-81.

Chapter 8

Discussion

The purpose of this PhD research was to develop a better understanding of individual on-the-job learning processes in general and particularly for the nursing profession. We aimed to develop and validate an instrument to measure nurses' on-the-job learning styles in such a way that the instrument (1) contributes to scientific knowledge on nurses' on-the-job learning and (2) offers opportunities for nurses to improve their on-the-job learning in practice.

In this chapter we will first formulate conclusions in relation to the research questions of the study, and then we will discuss the dilemmas that we encountered during the research process. We will reflect on the decisions that we made and their implications for this study on the conceptual, methodological, empirical, and practical levels. We will also discuss challenges for future research.

Conclusions

The *first research question concerned the conceptualization of on-the-job learning styles*. On-the-job learning style is defined as the tendency to use a particular combination of implicit and explicit learning activities that a person can and likes to perform on the job. The person adapts the combination of learning activities to each situation differently. This particular combination is called the actualized learning strategy. On-the-job learning styles should be operationalized to include both mental and overt learning styles and both interpersonal and intrapersonal learning styles (see chapter two).

We used both literature study and empirical research to investigate the dimensions of on-the-job learning styles. It was noticeable that most learning activities that we found are also work activities. In addition to work goals, the nurses sometimes also have learning goals in mind while performing these activities, and sometimes they have not. In the latter case, implicit learning took place. The interview studies described in chapter five mostly revealed overt dimensions of learning styles: learning by doing one's regular job, learning by applying something new in the job, learning by social interaction with colleagues, learning by theory or supervision, and learning through life outside work. Also, one mental dimension was distinguished in these studies: learning by reflection. The literature study in chapter six focused on the mental dimensions of on-the-job learning styles. The dimensions derived from the latter study were proposed to experts in the nursing profession in an interview study. This interview study revealed clearly that reflection is one dimension of on-the-job learning styles that is very useful to distinguish, for example, whether the nurses reflect alone or with others. The usefulness of the other seemingly relevant mental dimensions that we found in the literature, namely whether the nurses are reproductive or developmental

learners, or whether they are holistic or analytical learners, was judged differently by the various experts in the interview study.

The *second research question concerned the development and validation of an instrument* that can raise awareness among nurses about their on-the-job learning style, and offer them opportunities for the improvement of their on-the-job learning. In chapter three, we concluded that existing instruments are not adequate to measure learning styles in on-the-job situations. Chapter four suggests that a mixture of data collection techniques should be used for research into on-the-job learning. Measurement should take into account the nature of the task itself, the cultural and social relations that characterize the workplace, and the experiences and social world of the participants (Billett, 2002; Illeris, 2002). Researchers should report carefully on the measurement techniques that are used in their studies.

In interview studies about on-the-job learning processes, researchers should not ask questions about learning activities in a direct manner but rather use triggers (e.g. from diaries or observations) and build up the conversation from questions about the job content, to the learning content, to the learning activities. This is the interview approach we used in chapter five.

For the development of our questionnaire, taking the practical goals into account, the scales of the questionnaire should contain items that:

a. concern learning activities, indicating actual learning behaviour that can be actively directed by learners
b. include a social learning dimension
c. cover different learning situations.

Further, the questionnaire should be valid and reliable and use alternatives for the word 'learning' where possible.

Based on these criteria and the empirical findings in the interview studies we developed a questionnaire: the On-the-job Learning Styles Questionnaire for the Nursing profession (OLSQN). This questionnaire is described in chapter seven and consists of seven items measuring seven different learning activities for six different learning contents on a 6-point scale, therefore 42 items in total. The scales of the questionnaire represent five on-the-job learning activities separately: work experience, adding something new to one's job, searching for information, visiting information meetings or receiving coaching, and reflecting by oneself. Five other factors represent learning by talking with colleagues about five learning contents: technical nursing skills, putting things in perspective, organizing patient care, finding information, and taking initiatives. The internal consistency of the scales is good. We provided validity evidence based on the intercorrelations between the scales and on relations with measures of perceived professional competence, using data from a sample of nurses working in thirteen general hospitals in the Netherlands. The situation-response design of the questionnaire demonstrated its added value.

Main concepts used in this study

In this section we discuss the main concepts that we used in this thesis. We reflect on the terminology we have used, the way in which we have operationalized the concepts and how this may have influenced the results of this study.

On-the-job learning

As described in chapter one, in this thesis we studied on-the-job learning from a broad perspective. It included all implicit or explicit mental and/or overt activities and processes performed in the context of work, leading to relatively permanent changes in knowledge, attitudes or skills. We were not only interested in learning embedded in work processes, but were interested in all the ways in which employees continue their professional development. This not only includes learning embedded in work processes, but also learning in formally designed programmes.

One might argue that it would be better to use another term to describe such a broad concept, since the term 'on-the-job learning' might suggest that it only concerns learning that is situated on the job, which is what we first set out to study (see introduction chapter). We therefore considered changing our terminology into 'workplace learning', 'work-based learning' or 'work-related learning'. We did not choose these options, however, for two reasons in particular: First, these terms are also often used for the practical part of vocational education, such as apprenticeships (cf. Heikkila & Makinen, 2001), which is not the object of this study. In vocational education the learners are students, while in our study the learners are employees; they already have jobs and are continuing their development in their job. The word 'job' in 'on-the-job learning' emphasizes this position of our subjects. Second, the terms 'work-based learning' and 'work-related learning' are often *not* associated with learning *embedded in* work processes, but just with formal education *about* work processes, although several studies suggest that most employee learning is particularly situated in natural work processes (e.g., this thesis: Doornbos, 2006; Eraut, Alderton, Cole, & Senker, 1998). The term 'on-the-job learning' emphasizes the latter highly significant learning processes. Our attention to these natural learning processes is the most important characteristic that distinguishes this thesis from other literature on learning styles. For these reasons, we decided to maintain the term we started this research project with: 'on-the-job learning'.

Our definition of on-the-job learning incorporates both explicit and implicit learning. But have we managed to bring all nurses' implicit learning activities to the surface? Probably not. Implicit learning is unintentional and the resulting knowledge is difficult to express (Reber, 1993). This makes it difficult to examine. Workers are not aware of these learning processes. During the interviews and while filling out our questionnaires, the nurses were challenged to make information about their on-the-job learning explicit. We studied their activities retrospectively, by asking them to look back from learning outcomes they had realized to the activities that must have taken place, unconsciously, and contributed to the learning outcome. This has probably made parts of their implicit learning explicit, but it is perfectly possible that other parts have remained implicit. We think that it is impossible to reveal all implicit learning outcomes

and activities, and therefore also impossible to gain a perfectly comprehensive insight into employees' on-the-job learning and learning styles. Nevertheless, with the interview and questionnaire approach we used, using triggers and synonyms for learning, we hope to have revealed as much of nurses' implicit learning as possible. In future, it could be interesting to use case studies for a more in-depth study of respondents' on-the-job learning, to investigate whether a larger part of their implicit learning can be revealed using more triggers and longer and repeated interview sessions.

Learning style, learning strategy, and learning activity

What is the difference between the concepts learning style, learning strategy, and learning activity; which of these concepts did we intend to measure; and which of these concepts did we actually measure?

Learning activities are the separate activities that people perform in order to learn, or with learning as a side effect. Learning strategies are combinations of these learning activities that together contribute to certain explicit or implicit learning goals. Learning styles are people's personal tendencies in their use of learning strategies. These are influenced by the learning situation, and therefore people perform different learning strategies (and thus activities) in different learning situations.

In this thesis, we intended to measure nurses' on-the-job learning styles. However, this latent construct is very difficult to measure. The perceptible part of someone's learning behaviour is their use of learning strategies (and thus activities) in different learning situations. We can therefore gain insight into people's learning styles by measuring their use of learning activities in different learning situations, as we did in this thesis. This is how our measurements of on-the-job learning styles should be explained. In other learning style literature, where authors propose a more direct way of measurement ('How do you usually learn?'), respondents obtain a label: 'Jonathan has learning style X'; in our study it takes more words to explain someone's learning style: 'Sandra uses X and Y activities for many learning contents, and Z activities for some learning contents'.

We measured on-the-job learning styles in terms of nurses' use of learning *activities*. However, different authors in learning style literature have made other decisions in their ways of describing people's learning styles. They describe learning styles, for example, in terms of learning orientations (e.g., Gregorc, 1982), learning preferences (e.g., Dunn, Dunn, & Price, 1989), learning motivations (e.g., Apter, 2001), learning approaches (Allinson & Hayes, 1996), or mixtures of these tendencies (e.g., Kolb, 1984; Vermunt, 1992). In future, these aspects of learning could also be interesting for investigation in an on-the-job setting. In this PhD, interviews with experts in the nursing profession indicated a higher face validity and usefulness for the activity-based reflection dimension than for the other dimensions (reproductive/developmental learning and holistic/analytical learning). These latter dimensions can better be characterized as approaches to learning activities. Regarding nurses' awareness of their on-the-job learning styles, a focus on their use of learning activities is most useful because these can actively be directed by themselves. Further, describing on-the-job

learning processes in terms of on-the-job learning activities also makes it possible to include work processes with learning as a side effect, which represents a large part of on-the-job learning processes.

Learning situation and learning content

In this thesis, in line with many authors, we claim that the on-the-job learning situation is an important determinant of the actualized learning strategy (e.g., Allinson & Hayes, 1996; Kolb, 1984; Vermunt, 1992). However, only few attempts have been made in learning style research to investigate the significant factors in the on-the-job learning situation (Wierstra, 2000). In this thesis, we operationalized the learning situation in terms of the learning content, which is only a small part of the learning situation. Apart from the content, on-the-job learning situations can differ in very many aspects, such as the information environment, the social work environment (Onstenk, 1997), the learning climate (Baars-van Moorsel, 2003), and coincidental factors (Meijman & Mulder, 1998). We described these factors in more detail in chapter two. They are all assumed to have an impact on employees' learning behaviour, but it has never been investigated which of these factors contribute most to employees' learning activities. For the development of our questionnaire, however, a reduction of the concept of learning situation was needed because otherwise it would have been too broad to be operationalized.

We chose to restrict our operationalization to the learning content because this is an aspect of the learning situation that varies for each nurse (Berings, Gelissen, & Poell, in press). Further, the impact of learning content on the use of learning strategies has been shown in previous research (Eley, 1992; Vermetten, Lodewijks, & Vermunt, 1999), and learning content is very operationalizable. If we had chosen to operationalize the learning situation in terms of one of the other aspects, our questionnaire would have been different. This would most probably have influenced our findings on the value of the situation-response design in chapter seven. If, for example, differences in the information environment had been used to operationalize the learning situation, the influence of the situation would have been estimated as larger, since this aspect directly influences the availability of learning opportunities.

Adaptive flexibility

As described in detail in chapter one, the literature suggests that learners are good learners if they are able to adapt their learning strategies to different learning situations, or in other words have a high degree of adaptive flexibility (cf. Grasha, 1983; Kirby, 1988; Mainemelis, Boyatzis, & Kolb, 2002). If employees have a broad repertoire of learning strategies and if they are flexible in using these strategies, then they are more self-directed, more able to adapt their attitude and behaviour to different learning situations, and thus become better learners (Kolb, 1984). Therefore, we suggested that a method to improve nurses' on-the-job learning should focus not only on the dominant on-the-job learning strategies that people use, it should also emphasize the breadth of their learning repertoire and their flexibility in using different on-the-job learning strategies. However, as yet there is no empirical evidence for the above

assumptions. Unfortunately, within the timeframe of this PhD project, we were not able to look for solid evidence to verify (or falsify) these assumptions either. We encountered conceptual and methodological difficulties, which we will explicate below with possible solutions.

The first problem we encountered was on the conceptual level. In this study we wanted to measure nurses' on-the-job learning styles – the consistency in their use of learning activities – and simultaneously we wanted to measure adaptive flexibility – a strategic inconsistency in their use of learning activities. People with a high adaptive flexibility have no consistency in their use of learning activities. So, do these people have no learning style? Or perhaps an ambivalent or undirected learning style (cf. Vermunt, 1992)? But the concept of adaptive flexibility includes a strategic adaptation of their learning activities to different learning situations. This does not entail ambivalence or undirectedness, but coherent and predictable changes from situation to situation.

Although the conceptual problem is rather difficult to grasp, it is definitely solvable. Adaptive flexibility can be integrated into our definition of on-the-job learning styles, which was formulated from an interactional approach. An on-the-job learning style is the tendency to use a particular combination of implicit and explicit learning activities that a person can and likes to perform. The person adapts the combination of learning activities to each situation differently. This particular combination is called the actualized learning strategy (Berings, Poell, & Simons, 2005, p. 380). The extent of adaptation to each learning situation is someone's adaptive flexibility. But how do we, as researchers, know whether someone's 'adaptation' is strategic or arbitrary?

With that question, we come to the methodological issues we encountered. With the questionnaire we used it is possible to measure someone's variability in using learning activities, but it is not possible to measure whether each individual has a pattern in this variability; in other words, whether this variability is strategic. For each person, only one item for each learning activity is available for each learning content, which makes it impossible to find an adaptation pattern. This would be possible if each learning activity was questioned repeatedly within each learning content, but then respondents may become irritated by the repetition or they may merely repeat their first response from memory (Endler & Hunt, 1966). Therefore, it would be difficult to develop such a questionnaire and empirically measure adaptive flexibility.

We wondered whether a 'variability score' would provide insight into nurses' adaptive flexibility and therefore calculated these scores. This would be the case if all (or most) variability in nurses' on-the-job learning activities is strategic. To calculate this variability score we counted a rank score for the frequency of learning activities on each learning content, compared with the other learning content for the same learning activity. The variability scores indicated standard deviations of these rank scores for each learning activity. We assumed that nurses with high adaptive flexibility are effective learners. Therefore, their perceived professional competence would probably be high. However, not very surprisingly, the variability scores did not show significant relationships with perceived professional competence. This means that either the

above-mentioned assumptions on the positive effects of adaptive flexibility on professional competence are not adequate, or that our variability score was not an adequate indicator, since it can also indicate arbitrary variability in the use of learning activities. For the reasons explained above, we believe that the latter explanation is the better one. Further research into these flexibility issues is needed.

Methodological practices used in this study

In this PhD research, we engaged in literature research, we conducted interviews and developed a questionnaire. In this section we reflect on the way in which we attempted to maintain quality during the process of this research, and the way in which we determined this quality.

Multi-paradigmatic research approach

The research approach we used in this study was multi-paradigmatic. The first empirical part of our study can be characterized as an interpretative study in which we used qualitative research methods, and the second part can be characterized as a classic study using quantitative research techniques (Denzin & Lincoln, 2000). Combining these different approaches, we attempted to gain a profound understanding of nurses' on-the-job learning styles.

Prior to the construction of the OLSQN, we conducted literature research and two interview studies to gain a better understanding of the concepts of this study. Piece by piece we built up the knowledge. We started with an exploration of the concept of on-the-job learning styles in literature and gained knowledge about nurses' actual on-the-job learning activities by observing them and by interviewing them in the field. We interpreted this information and revisited the classification we derived from this by checking it with other people involved in the field and adjusted our meanings accordingly. Further, during the interviews we noticed a discrepancy with the literature study and therefore decided that additional literature study was needed. Also, the findings of this additional literature study were reanalyzed in the interviews before overall conclusions were drawn. These overall conclusions were used to formulate the items in the questionnaire, which provided adequate content validity. The OLSQN provided sound and generalizable data and can more easily be deployed in future research and assessments with larger groups of respondents than the interview scheme.

Subjectivity

A point of concern in interpretative studies is the inherent subjectivity of the researcher. In interpretative studies the researcher strives for trustworthy findings, but acknowledges that multiple individual realities exist and therefore formulates working hypotheses that offer best fit to the studied phenomenon (Guba, 1981). One of the techniques that can be used to achieve such working hypotheses is to arrange for intersubjectivity in the study (Schwandt, 2000). If many perspectives are considered and integrated, the elements of consensus and dissensus can be better explained and pinpointed, leading to a more articulated level of shared intersubjectivity.

In this study, we used two techniques to arrange intersubjectivity: data sources triangulation and investigator triangulation (Denzin, 1978). Data sources triangulation means that researchers, observing a particular object of research, use as many different data sources as possible to get a more integral insight into the phenomenon studied. In the interview study in chapter five, we collected data from nurses, supervisors, and educators in the nursing profession. Investigator triangulation means that several researchers are engaged in the observation of a research problem, studying the same data, comparing and completing their findings. The different researchers have a different role in the research process (Kimchi, Polivka, & Stevenson, 1991). In the interview study in chapter five, the first author only collected all the data and performed the first analyses, while the second and third authors acted as relatively objective judges in further analyses.

In this PhD we also used different research methods to gather empirical data, namely interviews and questionnaires, but this cannot be typified as method triangulation since both instruments were used with a different goal. In the interviews we described all different on-the-job learning contents and activities in the nursing profession and with the questionnaires we attempted to describe nurses' individual learning profiles.

Self-report measures

Different data sources were used in our interview studies. This was useful to gain insight from multiple perspectives into the variety of nurses' learning contents and activities in general. The questionnaire, however, was solely a self-report measure. Therefore we did not obtain an objective evaluation of nurses' individual learning behaviour. Because individuals strive to achieve consistency in their self-reported response pattern, there is a probability that this explains some of the relationships between variables. For example, nurses who claim they use many learning activities a lot might want to be consistent and provide positive answers to the question about their perceived competence (Kasl, 1978; Perry, 1995). For future research and assessment, it should be possible to achieve a more complete picture by adding the perceptions of the nurses' supervisors and/or colleagues.

Stimulated recall

The respondents in the study were asked to recall learning contents and activities from the past. It is conceivable that the respondents did not remember the best examples of learning content and activities. They might not have remembered those that hardly ever occur or the ones that occur so often that they have become self-evident. As described earlier in this chapter, this could mean that some implicit ways of learning have remained implicit and that we have not been able to bring these to the surface.

Some proof of this was found through our observations in the first part of the empirical study. An interesting example was the following. After observation of her shift, we interviewed a nurse and asked her to give a summary of her work that day. We also asked her whether she had learned any new things that day, or if any particular incidents had happened that would stimulate her development as a nurse. She could

not remember anything along these lines. But during that day we had observed that she had noticed that her student made the patients' beds differently than she herself was used to doing. She liked this new way, tried it herself, and told us that this was an easier way than her own way and that she had decided to do it like this from now on. We recalled this incident to her and she smiled and concluded that she had actually learned something new that day. She just had not indicated it as such.

Rigour

In chapter four we pointed out seven guidelines for research into workplace learning. In this section we will describe to what extent we followed these guidelines in this thesis.

Guideline 1 concerns attention to informal workplace learning in terms of the nature of the task itself, the cultural and social relations that characterize the workplace, and the experiences and social world of the participants. To be able to pay attention to these matters, we decided to locate the research in a particular context, the nursing profession. We started with observations, which were very useful for gaining insight into the daily work practices and social work environment of our participants. We have not explicitly reported on the observations, although they really helped us to speak and understand the 'language' of our research subjects.

Guideline 2 concerns being explicit about the relationships between the underlying paradigm and all aspects of the methodological practice used. These aspects include operationalization of research concepts, research goals, researcher roles, and how to maintain rigour and quality. In our view, we have been clear about the research concepts and how they developed throughout the different studies. Also, although the research goals have been carefully described in each chapter, we have not used the terminology that was explicated in chapter four. If we were to use the general terms mentioned in this chapter, we could say that the studies in chapters two and five are descriptive and the studies in chapters three, four, and six explorative. The study in chapter seven is descriptive and predictive and aims for action. Explicitness about the researcher's role is addressed in guideline 5 and rigour and quality in guideline 6.

Guideline 3 concerns triangulation by using different kinds of data collection methods. In this study we used different data collection methods, interviews and questionnaires, but they served different goals and this procedure therefore cannot be typified as triangulation. We used other kinds of triangulation instead: data sources triangulation and investigator triangulation.

Guideline 4 concerns the use of other instruments besides interviews and questionnaires. In the first period of data collection for this PhD research, we observed 20 nurses throughout their work shifts. However, it was hard to report on this since it was difficult to discern whether their work activities could be indicated as learning activities. In this period we also experimented with diaries and concept maps. But it appeared that only explicit ways of learning could be discerned with these methods. To uncover implicit ways of learning, they should be complemented by interviews. For the purpose of this PhD research, we decided not to use these methods for systematic reporting but to value these experiences for the insight they provided us into the tasks

and social and cultural environment of the nursing profession, as mentioned in guideline 1. The observations were also very useful as triggers in the interviews that followed.

Guideline 5 concerns being explicit about the role the researchers play themselves in the research. We have not been explicit about our role. We found it difficult to label ourselves as researchers with just one of the roles. During the research project our role was blended. We have been reflexivists in our critical approach to existing learning style theories. In the largest part of the research we are better described as informants since we usually simply informed the users of research about nurses' on-the-job learning. On the other hand, we recognize our own influence and were involved with the participants, guarding the practical goals of the research, which could characterize us as passionate participants. These practical goals did not only concern the results of the research, but also the research process, since we intended to raise awareness of the on-the-job learning styles of the participants. Therefore, to a lesser extent we have also displayed the characteristics of activists.

Guideline 6a concerns the description of how to maintain rigour and quality before, during, and after data gathering for questionnaires. All measures taken before and after data gathering are described in chapter seven. During data gathering no particular measures were taken, since the supervisors of the departments served as ambassadors for our research. Guideline 6b concerns the description of how to maintain rigour and quality before, during, and after data gathering for interviews. In chapter five, we described the interview questions we used, but we did not describe in detail that they were used flexibly depending on the answers received or how. Further, we did not describe the pre-testing of the questions we did with fellow researchers and nurses from our inner circle. We did describe how the interview data were analysed and what and how selections of interview data were made. We also described the measures we took to increase and determine content validity, interpretative validity, theoretical validity, and generalizability. We can conclude that we were not explicit on all measures we took to maintain rigour and quality in our interview study. This was due to the limited space available in the journal we planned that particular article for (Berings, Gelissen, & Poell, submitted).

Guideline 7 concerns the proposal to use the opinions of subjects to evaluate the questionnaires and interviews. We tested our instruments on potential respondents and asked them for feedback afterwards. However, in chapter five we did not report on this. In chapter seven we did.

To summarize, even though we were fully aware of the importance of all the guidelines mentioned, we were not complete in reporting mostly due to limited space in articles. Further, we did not use the variety of methods that we suggested in chapter four due to limitations in these methods. It should be further investigated how they can be used effectively for research into on-the-job learning. Nevertheless, we experienced these guidelines as very useful. They helped us to explicate the decision-making throughout the research process.

Empirical results of this study

In the empirical part of this study, we gained insight into nurses' on-the-job learning content and activity and their on-the-job learning styles, as summarized in the conclusion section of this chapter. In this section, we will reflect on these empirical results by discussing their generalizibility and their expected lifespan.

Generalizability

The interviews we conducted with nurses were all conducted with nurses from ten different departments of one general academic hospital in the Netherlands. The interviews with the supervisors and educators were conducted with staff from seven different general academic, teaching, and peripheral hospitals. The questionnaires were answered by nurses from thirteen different general academic, teaching, and peripheral hospitals. The ratios between these different kinds of hospital were not representative for the population. However, we did not find any differences between nurses' on-the-job learning activities among nurses from different kinds of hospitals (all p-values were greater than .15). Also, on other aspects (gender, age, and working hours) the samples used in the questionnaire study were not completely representative for the full population of nurses working in general hospitals in the Netherlands, but probably for a group with 'more than average' interest in learning on the job. We expect that this bias in the sample has not strongly influenced our conclusions since there was still sufficient variance in the sample and these characteristics were used as control variables in the regression analyses.

Although the study was based on nurses working in general academic, teaching, and peripheral hospitals in the Netherlands, comparisons with other studies in other professions and in other countries suggest broader applicability. We think that in other professions and in other countries comparable learning activities will be present, but that other activities will probably be dominant.

Lifespan of the results

In the introduction chapter of this thesis we wrote that the context of health care is constantly changing. But if this is the case, are the learning contents and learning activities of nurses also changing all the time? In other words, what is the lifespan of the results of this study? The learning contents and activities in the questionnaire are all formulated in a very broad manner. In the classification in chapter five we were more specific, and it is perfectly possible that some new elements can be added in future years, and that the importance of some elements will increase of decrease. Therefore, it would be very interesting to conduct similar studies in years to come to see how dynamic learning contents and activities are. Based on the importance of the (new) elements in the classification, new decisions would probably be made about the content of the questionnaire.

Practical implications of this study

The theoretical and empirical results of this study have led to insight into nurses' on-the-job learning and to a tool to measure their on-the-job learning styles. In this section, we will reflect on the extent to which they offer opportunities for nurses to gain awareness about their on-the-job learning style and to improve their on-the-job learning in practice.

Tools for learning

We believe that continuing professional development of nurses, which can be achieved by on-the-job learning, is the joint responsibility of nursing professional associations, hospitals with their HR departments, supervisors, and the nurses themselves. Nurses need to be able to direct their own learning (O'Shea, 2003), but supervisors and nurse educators have a role in aiding nurses to acquire these skills (Lunyk-Child et al., 2001). The OLSQN, as presented in chapter seven, and the classification of nurses' on-the-job learning content and activity, as presented in chapter five, can serve as tools in this development process. They can help nurses to make the steps in their self-directed learning process more concrete. Self-directed learning is, as most commonly defined by Knowles (1975, p. 18), 'a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes'.

The OLSQN can be self-administered by nurses, or used by supervisors, mentors, coaches, and HR professionals to make nurses aware of their on-the-job learning styles. They can, for example, organize a coaching session for nurses, to reflect on their use of learning strategies in different learning situations. With the help of the classification in chapter five, alternative learning strategies can be discussed and new learning activities in addition to their current personal preferences can be tried out and developed in the everyday working and learning process, leading to an improvement in nurses' on-the-job learning.

Both tools provided in this thesis offer a vocabulary that enables nurses to make explicit how and what they learn. This creates opportunities for adaptations in their learning behaviour and for the creation of learning situations on the ward. Further, it can offer opportunities for the assessment and accreditation of experiential learning on-the-job.

Awareness: consequential validity

Another important issue is the effect of the application of our instruments in the practical nursing setting. Did the implementation of our instruments lead to an awareness of the participants' on-the-job learning styles and did this lead to an improvement in their on-the-job learning? Currently, research into the effects of learning style awareness is still scarce. Theoretically, the expectations are promising, as indicated in chapter 2, but empirical research to test this does not prove the expected effects (e.g., Desmedt, 2004). This may be due to the fact that existing instruments are not specifically designed for raising awareness. We believe that the tool we provide

offers better possibilities to achieve this. The OLSQN is contextualized and offers concrete dimensions that can be actively directed by the nurses themselves. Further, it could be used in combination with the classification in chapter five, which does justice to the complexity of on-the-job learning and increases respondent validity (Silverman, 1993).

Unfortunately, we were not able to investigate awareness of the participants' on-the-job learning styles and the improvement of their on-the-job learning in the timeframe of this PhD project. However, we did gain some insight into the consequential validity of our instruments by means of conversations we had with nurses after the interviews and emails with feedback on the questionnaire solicited from the nurses. Consequential validity refers to the effect of the test or other form of assessment on learning (Messick, 1989).

The feedback on the interviews was generally positive. Most nurses enjoyed spending time with the researcher to explicate their own on-the-job learning process. It provided them with insight into the activities and resources they used and it made them feel proud. This motivated them to continue their learning on-the-job. The feedback on the questionnaire was varied. Many nurses liked the fact that the process of filling in the questionnaire made them think about their on-the-job learning. Some nurses were disappointed if they received a profile in which they recognized themselves, as if they expected something more spectacular. Other nurses had difficulties with the interpretation of their profile and would have preferred a simpler label describing their general way of learning instead of separate scores on each scale. Part of the latter form of feedback on the learning style profile might be due to the fact that the nurses also received their variability scores as described in the adaptive flexibility section. These were very difficult to interpret indeed (see our discussion above).

The above suggests that for many nurses it is advisable to offer them guidance in the process of determining their on-the-job learning style and in making a 'plan' to improve their on-the-job learning. With the help of our instrument such a plan can escape from the natural tendency to think in terms of off-the-job training and explicit prestructured, preorganized, and preplanned learning. Instead, nurses could participate in learning programmes where the different forms of explicit and implicit learning are sequenced and related to contents and tasks to be executed. Different studies show that nurses differ in their readiness for self-directed learning and that nurses who are less 'ready' need more structure and guidance (Russell, 1990; Wiley, 1983). Guglielmino (1977) developed a scale to diagnose this self-directed learning readiness, and Fisher, King, and Tague (2001) developed one in collaboration with a panel of 11 nurse educators. These instruments might be useful for supervisors or educators to determine whether it is best to let the nurses in their departments use our on-the-job learning tools on their own, or whether they had better offer them guidance.

Similarities and differences between nurses

Most studies of on-the-job learning focus on similarities in employees' learning, while studies on learning styles, derived from literature on educational psychology, focus on

differences between learners. This PhD research has provided insight into both the similarities and the differences in nurses' on-the-job learning activities. Since we study learning styles, our focus is on the individual differences. We think that an awareness of nurses' *individual* learning styles can help to improve their on-the-job learning.

Since most learning activities are also work activities, stimulating workplace learning in organizations does not concern the implementation of new structures but rather implies making better use of learning opportunities in existing structures. These opportunities should be adapted to the individual nurses. However, when we visit or lecture at conferences, provide workshops, or have personal conversations with people working in the field, we experience that people find it easier to focus on similarities between nurses. In our experiences with several attempts in organizations to implement adaptations to create more learning opportunities in existing structures, we noticed that people find it difficult to take into account the individual differences among nurses. Usually attempts are made to enhance everyone's competences to the minimum level required and to provide learning opportunities to everybody accordingly. We would advise tailoring the learning opportunities to the individual nurses, depending on their learning style. This might be difficult, because individual differences are abstract and need to be made explicit to be able to deal with them. The OLSQN and the classifications in chapter five can be used to make a plan for this with each nurse. Hopefully, with these tools supervisors and educators will find it easier to tailor learning opportunities to individual nurses and nurses will have a tool to self-direct their own learning.

Agenda for future research

The implications and challenges for future research, derived from this study, have been discussed in the previous sections. For the convenience of the reader they are summarized and enumerated below.

- In future research, attention should be paid to the development of research methods that reveal as large a part of respondents' implicit learning as possible. One could think of the use of case studies for an in-depth study into respondents' on-the-job learning, using many triggers and long and repeated interview sessions. It should also be investigated how alternative research methods such as concept maps, observations, and diaries could be implemented in this perspective.
- The relative influence of the different aspects of the learning situation, such as the learning content, information environment, social work environment, learning climate, and coincidental factors on nurses' use of learning activities, should be investigated.
- The usefulness for nurses of an awareness of the reproductive and developmental learning style dimension and the holistic and analytical learning style dimension has remained unclear in this research project. This should be further investigated.

- Apart from learning activities, other aspects of nurses' on-the-job learning styles could also be investigated, such as their learning orientations, learning preferences, or motivations.
- For future research and assessment, it would be an enhancement to add the perception of the nurses' supervisors or colleagues in the measurement of their on-the-job learning styles. This may increase the reliability of the findings and could provoke discussion on their learning activities, which may increase the effect of the self-awareness that is raised.
- It would be very interesting to find a solution for the methodological difficulties described in this chapter and empirically investigate whether our assumptions concerning adaptive flexibility are valid. This solution would probably involve repeated questioning concerning learning activities in diverse learning situations or formulating direct questions on adaptive flexibility.
- The consequential validity of our tools should be investigated. Do they help in raising awareness and does this help in the improvement of nurses' on-the-job learning?
- It would be interesting to conduct similar explorative studies concerning nurses' on-the-job learning styles about ten years from now, to see what has changed due to the changing context of health care.
- We think that in other professions and in other countries comparable learning activities will be present, but that other activities will probably be dominant. Therefore, with modest adaptations, it would probably be possible to adapt the OLSQN to other settings as well. It would be useful to investigate which adaptations are needed and to apply the new questionnaire in other professions and/or countries.

Furthermore, the OLSQN can be used in future research to investigate the implications of nurses' on-the-job learning for several other output variables. For example, do the different learning activities affect their work effectiveness or patient satisfaction? Using this questionnaire, it should also be investigated which factors affect which on-the-job learning activities, such as job autonomy, social support of colleagues and supervisors, etc. With this information supervisors, HR professionals and continuing nursing educators or developers, as well as nurses themselves, could implement well suited intervention strategies, tailored to the individual nursing professional.

Literature

Allinson, C. W., & Hayes, J. (1996). The Cognitive Style Index: A measure of intuition-analysis for organisational research. *Journal of Management Studies, 33*, 119-135.

Apter, M. J. (2001). *Motivational styles in everyday life: A guide to reversal theory*. Washington, DC: American Psychological Association.

Baars-van Moorsel, M. (2003). *Leerklimaat: De culturele dimensie van leren in organisaties. [Learning climate: The cultural dimension of learning in organisations]*. PhD-Thesis, Tilburg University, Delft, The Netherlands: Eburon.

Berings, M. G. M. C., Gelissen, J. P. T. M., & Poell, R. F. (in press). What and how do nurses learn on the job? Similarities and differences among nurses in on-the-job learning. In S. Sambrook & J. Stewart (Eds.), *Human Resource Development in the public sector: The case of health and social care*. London, UK: Routledge.

Berings, M. G. M. C., Gelissen, J. P. T. M., & Poell, R. F. (submitted). The development of a classification of on-the-job learning behaviour: Learning contents and learning activities in the nursing profession.

Berings, M. G. M. C., Poell, R. F., & Simons, P. R. J. (2005). Conceptualizing on-the-job learning styles. *Human Resource Development Review, 4*, 373-400.

Billett, S. (2002). Workplace pedagogic practices: Co-participation and learning. *British Journal of Educational Studies, 50*(4), 457-481.

Denzin, N. K. (1978). *The Research act: A theoretical introduction to sociological methods*. New York: McGraw-Hill Book Company.

Denzin, N. K., & Lincoln, Y. (2000). The discipline and practice of qualitative research. In N. K. Denzin & Y. Lincoln (Eds.), *Handbook of qualitative research* (pp. 1-28). Thousand Oaks, CA: Sage Publications.

Desmedt, E. (2004). *Research into the theoretical base of learning styles in view of educational applications in a university setting*. Doctoral dissertation, Ghendt, Belgium: Ghendt University.

Doornbos, A. J. (2006). *Work-related learning at the Dutch police force*. PhD-thesis, Apeldoorn, The Netherlands: Police Academy of the Netherlands.

Dunn, R., Dunn, K., & Price, G. E. (1989). *Learning Styles Inventory*. Lawrence, KS: Price Systems.

Eley, M. G. (1992). Differential adoption of study approaches within individual students. *Higher Education, 23*, 231-254.

Endler, N. S., & Hunt, J. M. (1966). Sources of behavioral variance as measured by the s-r inventory of anxiousness. *Psychological Bulletin, 65*, 336-346.

Eraut, M., Alderton, J., Cole, G., & Senker, P. (1998). *Development of knowledge and skills in employment*. East Sussex, UK: University of Sussex.

Fisher, M., King, J., & Tague, G. (2001). Development of a self-directed learning readiness scale for nursing education. *Nurse Education Today, 21*, 516-525.

Grasha, A. F. (1983). Learning style: The journey from Greenwich Observatory (1796) to Dalhousie University (1981). *Improving College & University Teaching, 32*(1), 46-53.

Gregorc, A. R. (1982). *Style Delineator*. Maynard, MA: Gabriel Systems.

Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *Educational Communication and Technology Journal, 29*, 75-91.

Guglielmino, L. (1977). Development of the Self-Directed Learning Readiness Scale (Doctoral Dissertation, University of Georgia). *Dissertation Abstracts International, 38*, 64-64A.

Heikkila, K., & Makinen, L. (2001). Different ways of learning at work. In *Proceedings of the 2nd International Conference on Researching Work and Learning* (pp. 406-413). Calgary, Canada: University of Calgary.

Illeris, K. (2002). *The three dimensions of learning. Contemporary learning theory in the tension field between the cognitive, the emotional and the social.* Frederiksberg, Denmark: Roskilde University Press.

Kasl, S. V. (1978). Epidemiological contributions to the study of work stress. In C. L. Cooper & R. Payne (Eds.), *Stress at Work* (pp. 3-48). Chichester, UK: John Wiley & Sons.

Kimchi, J., Polivka, B., & Stevenson, J. S. (1991). Triangulation: operational defenitions. *Nursing Research, 40*, 364-366.

Kirby, J. R. (1988). Style, strategy, and skill in reading. In R. R. Schmeck (Ed.), *Learning strategies and learning styles* (pp. 229-274). New York: Plenum Press.

Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers*. Chicago, IL: Follett Publishing.

Kolb, D. A. (1984). *Experiental learning. Experience as the source of learning and development*. Englewood-Cliffs, NJ: Prentice Hall.

Lunyk-Child, O. L., Crooks, D., Ellis, P. J., Ofosu, C., O'Mara, L., & Rideout, E. (2001). Self-directed learning: Faculty and student perceptions. *Journal of Nursing Education, 40*, 116-123.

Mainemelis, C., Boyatzis, R. E., & Kolb, D. A. (2002). Learning styles and adaptive flexibility: Testing experiential learning theory. *Management Learning, 33*, 5-33.

Meijman, T. F., & Mulder, G. (1998). Psychological aspects of workload. In P. J. D. Drenth, H. Thierry & C. J. Wolff (Eds.), *Handbook of work and organizational psychology* (2nd ed., Vol. 2, pp. 5-33). Hove, UK: Psychology Press.

Messick, S. (1989). Validity. In R. L. Linn (Ed.), *Educational Measurement* (3rd ed., pp. 13-104). New York: Macmillan.

O'Shea, E. (2003). Self-directed learning in nurse education: A review of the literature. *Journal of Advanced Nursing, 43*, 62-70.

Onstenk, J. (1997). *Lerend leren werken: Brede vakbekwaamheid en de integratie van leren, werken en innoveren. [Learning to work in a learning way: Broad occupational competence and the integration of learning, working and innovating]*. PhD Thesis, Katholieke Universiteit Nijmegen, Delft, The Netherlands: Eburon.

Perry, L. (1995). Continuing professional education: Luxury or necessity? *Journal of Advanced Nursing, 21*, 766-721.

Reber, A. S. (1993). *Implicit learning and tacit knowledge: An essay on the cognitive unconscious*. New York: Oxford University Press.

Russell, J. M. (1990). Relationships among preference for educational structure, self-directed learning, instructional methods and achievement. *Journal of Professional Nursing, 6*, 86-93.

Schwandt, T. A. (2000). Three epistemological stances for qualitative inquiry: Interpretivism, hermeneutics, and social constructivism. In N. K. Denzin & Y. Lincoln (Eds.), *Handbook of qualitative research* (pp. 189-213). Thousand Oaks, CA: Sage Publications.

Silverman, D. (1993). *Interpreting qualitative data. Methods for analysing talk, text and interaction*. London, UK: Sage.

Vermetten, Y. J., Lodewijks, H. G., & Vermunt, J. D. (1999). Consistency and variability of learning strategies in different university courses. *Higher Education, 37*, 1-22.

Vermunt, J. D. H. M. (1992). *Leerstijlen en sturen van leerprocessen in het hoger onderwijs: Naar procesgerichte instructie in zelfstandig denken [Learning styles and directing learning processes in higher education: Towards proces-oriented instruction in self-directed thinking]*. Lisse, The Netherlands: Swets & Zeitlinger.

Wierstra, R. F. A. (2000). Leeromgeving, leerstrategie en leerdeskundigheid: Een nieuw paradigma in het onderzoek naar leerstijlen [Learning environment, learning strategy, and learning expertise]. In K. Stokking, G. Erkens, B. Versloot & L. Van Wessum (Eds.), *Van onderwijs naar leren. Tussen het aanbieden van kennis en het faciliteren van leerprocessen.* (pp. 157-170). Leuven, Belgium: Garant.

Wiley, K. (1983). Effects of a self-directed learning project and preference for structure on self-directed learning readiness. *Nursing Reserach, 32*, 181-185.

Samenvatting

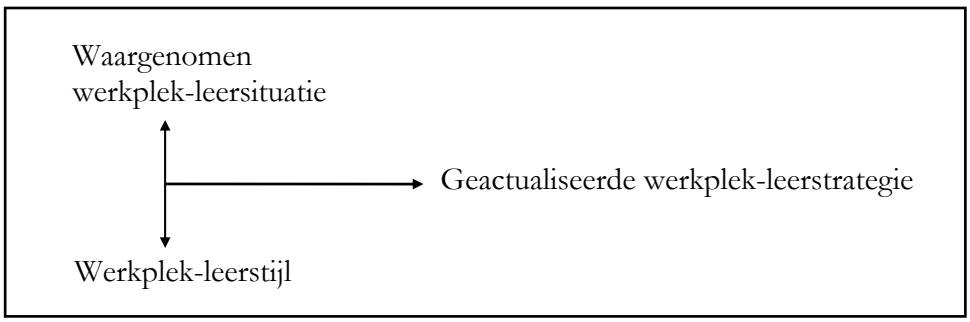
Dit proefschrift gaat over werkplek-leerstijlen van verpleegkundigen. Al het leren van gediplomeerde verpleegkundigen staat centraal. Dit leren vindt voornamelijk plaats tijdens het verrichten van het alledaagse werk.

Er zijn veel veranderingen gaande in de Nederlandse gezondheidszorg waardoor (gediplomeerde) verpleegkundigen zich moeten aanpassen aan allerlei nieuwe werksituaties. Er worden bijvoorbeeld steeds nieuwe technologieën ontwikkeld en kennis over ziektepatronen en zorgopvattingen verandert voortdurend. Het is voor verpleegkundigen van groot belang dat ze continu leren om hun werk goed uit te kunnen blijven voeren. Bovendien vinden ze het vaak ook erg prettig om zichzelf te ontwikkelen en vergroot het hun kansen op de arbeidsmarkt. Meer inzicht in de eigen werkplek-leerstijl en andere mogelijke werkplek-leerstijlen kan verpleegkundigen helpen hun leren op de werkplek te optimaliseren. Er bestaan echter geen geschikte instrumenten die leerstijlen in werkplek situaties kunnen meten. In dit onderzoek staat daarom de volgende vraag centraal: "Hoe kunnen werkplek-leerstijlen van verpleegkundigen worden geconceptualiseerd en gemeten?".

In *hoofdstuk 1* wordt het onderzoeksdoel van deze studie beschreven en wordt de hoofdvraag verder uitgewerkt. Het doel van deze studie is om individuele werkplek-leerprocessen beter te begrijpen, in het bijzonder voor verpleegkundigen. Ons doel was om een instrument te ontwikkelen en valideren dat de werkplek-leerstijlen van verpleegkundigen meet, op zo'n manier dat het instrument bijdraagt aan de wetenschappelijke kennis van werkplek-leerstijlen van verpleegkundigen en tevens mogelijkheden biedt voor verpleegkundigen om hun leren op de werkplek in de praktijk te verbeteren. De hoofdvraag is hiervoor opgesplitst in de volgende twee subvragen:

1. Hoe kunnen leerstijlen worden geconceptualiseerd in de context van de werkplek?
2. Hoe kunnen we een betrouwbaar en valide vragenlijst ontwikkelen om de werkplek-leerstijlen van verpleegkundigen te meten?

In *hoofdstuk 2* wordt het begrip leerstijlen geconceptualiseerd in de context van de werkplek en wordt beschreven hoe kennis hierover kan worden ingezet om het leren van werknemers te optimaliseren. Een werkplek-leerstijl wordt gedefinieerd als de neiging om een bepaalde combinatie van impliciete en expliciete leeractiviteiten te gebruiken, die een persoon kan en wil ondernemen op de werkplek. De persoon past deze combinatie van leeractiviteiten aan elke verschillende werkplek-leersituatie aan. Dit wordt de geactualiseerde leersstrategie genoemd (zie Figuur 1).



Figuur 1. Model van werkplek-leerstijlen

We concluderen dat een operationalisering van het concept werkplek-leerstijlen zowel mentale als zichtbare leerstijlen en zowel inter- als intrapersoonlijke leerstijlen behoort te omvatten. Daarnaast kunnen werknemers profiteren van een bewustzijn van werkplek-leerstijlen door adaptieve flexibiliteit te ontwikkelen in het gebruik van werkplek leerstrategieën.

In *hoofdstuk 3* worden drie leerstijl vragenlijsten die het meest zijn gebruikt in eerdere studies naar het leren op de werkplek nader onderzocht: Kolb's Learning Style Inventory (1976, 1985), Honey en Mumford's Learning Style Questionnaire (1986, 1989) en Allinson en Hayes' Cognitive Style Index (1996). De conclusie is dat bestaande vragenlijsten die werkplek-leerstijlen behoren te meten niet goed voor dit doel zijn uitgerust. Er is een duidelijke behoefte aan een nieuw goed gevalideerd instrument dat werkplek-leerstijlen meet. Een dergelijk nieuw instrument moet in elk geval (ook) een sociale leerdimensie meten. Deze dimensie ontbreekt veelal in bestaande instrumenten. Verder moet de term 'leren' met zorg gebruikt of zelfs vermeden worden, omdat deze term mensen niet zozeer aan het leren in het alledaagse werk doet denken, maar alleen aan het leren in opleidingen en cursussen. Tenslotte moet zo'n instrument niet alleen de dominante karakteristieken van iemands leerstijl meten, maar ook de breedte van iemands repertoire aan leerstrategieën en de adaptieve flexibiliteit in het gebruik hiervan in verschillende leersituaties.

Hoofdstuk 4 gaat over andere instrumenten die worden gebruikt in het hedendaagse onderzoek naar werkplek-leerprocessen (leerstijlen, leerstrategieën, leeractiviteiten, leertactieken, leergedragingen, leeroriëntaties en leeraanpakken). In het hoofdstuk worden de verschillende methodologische praktijken vergeleken en bediscussieerd. De term 'methodologische praktijken' verwijst naar de beslissingen die onderzoekers in hun onderzoeksprojecten nemen, hoe ze hun onderzoek uitvoeren en hoe ze hierover rapporteren. We besteden hierbij aandacht aan de onderzoeksinstrumenten, perspectieven op werkplek leren, onderzoeksparadigma's, onderzoeksdoelen, de rol van de onderzoeker en overwegingen van kwaliteit en nauwgezetheid. Uit een review van de literatuur blijkt dat de variëteit in het gebruik van onderzoeksinstrumenten in het huidige onderzoek naar leren op de werkplek erg klein is: er worden alleen vragenlijsten en interviews gebruikt. Waarschijnlijk komt dit doordat veel werkplek-leerprocessen impliciet van aard zijn. We suggereren dat een combinatie van deze instrumenten met andere instrumenten als concept maps, dagboeken en observaties, die tevens als 'trigger' gebruikt kunnen worden, vruchtbare

mogelijkheden biedt voor een goed begrip van werkplek-leerprocessen. Het hoofdstuk sluit af met een aantal voorlopige richtlijnen waaraan volgens ons goed onderzoek naar werkplek-leerprocessen zou moeten voldoen.

Het doel van *hoofdstuk 5* is om een classificatie van de werkplek-leeractiviteiten en werkplek-leerinhouden van verpleegkundigen te ontwikkelen en valideren. De leeractiviteiten geven inzicht in mogelijke dimensies van werkplek-leerstrategieën van verpleegkundigen en de leerinhouden geven informatie over een mogelijke operationalisering van leersituaties. Hiertoe worden in dit hoofdstuk twee opeenvolgende interviewstudies beschreven. In de eerste studie hebben we twintig verpleegkundigen van verschillende afdelingen in een Nederlands academisch ziekenhuis tijdens verschillende diensten geobserveerd en aansluitend geïnterviewd over het leren na hun diplomering. De observaties zijn gebruikt als 'trigger' om in de interviews het expliciteren van leerprocessen te vergemakkelijken. Daarnaast zijn de observaties gebruikt om de verpleegkundigen te kunnen bevragen naar authentieke werk- en leersituaties en om de interpretatie van de interviewdata te faciliteren. De interviews zijn geanalyseerd door middel van een gefundeerde theorie benadering (grounded theory). De classificatie van leeractiviteiten en leerinhouden die hieruit is ontstaan is gevalideerd in een tweede interviewstudie. In deze studie zijn zeventien afdelingshoofden en acht opleiders van verschillende algemene Nederlandse ziekenhuizen geïnterviewd. Op basis van deze tweede studie is de classificatie verbeterd. In Tabel 1 en 2 hieronder vindt u de verschillende hoofdcategorieën die we uiteindelijk hebben onderscheiden in de interviews, samen met een indeling in subcategorieën en een aantal voorbeelden.

Tabel 1. Werkplek-leeractiviteiten van verpleegkundigen

Werkplek-leeractiviteiten van Verpleegkundigen		*Voorbeelden*
leren door reguliere taakuitvoering	zorgen voor patiënten	leren door doen, leren van succes, leren van fouten
	contact met patiënten en familie	inleven, observeren, praten met patiënten en familie, feedback vragen
	afkijken van collega's*	positief gedrag van collega's imiteren, negatief gedrag van collega's niet overnemen
	anderen helpen met leren	presentaties geven en voorbereiden, vragen van collega's* beantwoorden, leerlingbegeleiding
leren door iets nieuws aan eigen taak toe te voegen	taakverbreding	taken van anderen op je nemen, nieuwe situaties opzoeken, participeren in aandachtsvelden en werkgroepen
	jobrotatie	op verschillende afdelingen / instellingen werken, functie van iemand anders op eigen afdeling tijdelijk overnemen
leren door sociale interactie met collega's*	consulteren van collega's	informatieve vragen stellen of hulp in uitvoering vragen aan collega's
	feedback vragen en krijgen	intercollegiale toetsing, open staan voor feedback, feedback omzetten in positieve actie
	uitwisselen van kennis en ervaring	samen brainstormen en overleggen bv. casuïstiekbespreking, (multidisciplinaire) patiëntenbespreking, teamoverleg, dagevaluatie, teamoverdracht, artsenvisites, werkgroepen
leren door theorie / begeleiding	media raadplegen	boeken, tv, vaktijdschriften, Internet, protocollenboek
	informatiebijeenkomst bezoeken	intern of extern: symposium, congres, klinische les, refereeravonden, gesprekken met patiëntenvereniging
	scholing volgen	intern of extern: bij- en nascholing, cursus, workshop, opleiding
	directe begeleiding	supervisie en coaching: oefenen onder begeleiding, werkbegeleiding, jaargesprek, POP-gesprek
leren door reflectie	plan maken	prospectieve reflectie: beredeneren, logisch nadenken, stappenplan maken, opschrijven: thuis of op het werk, diep of oppervlakkig, op kennis, vaardigheden of houding, alleen of samen
	bijsturen	actuele reflectie: diep of oppervlakkig, op kennis, vaardigheden of houding, alleen of samen
	terugkijken	retrospectieve reflectie: thuis of op het werk, diep of oppervlakkig, op kennis, vaardigheden of houding, alleen of samen, zelfreflectie
leren door het leven buiten het werk		het doorlopen van alle levensfasen binnen en buiten de instelling; kinderen krijgen en opvoeden, ziekten en sterfgevallen in eigen kring, gesprekken met bekenden, werken in het verenigingsleven, televisie, verhalen van patiënten

* Waar collega's worden genoemd worden naast verpleegkundige collega's van de eigen afdeling ook leerlingen, collega's van andere disciplines (artsen, fysiotherapeuten, psychologen, etc.), andere afdelingen, andere zorginstellingen en professionals in de mantelzorg bedoeld.

Tabel 2. Werkplek-leerinhouden van verpleegkundigen

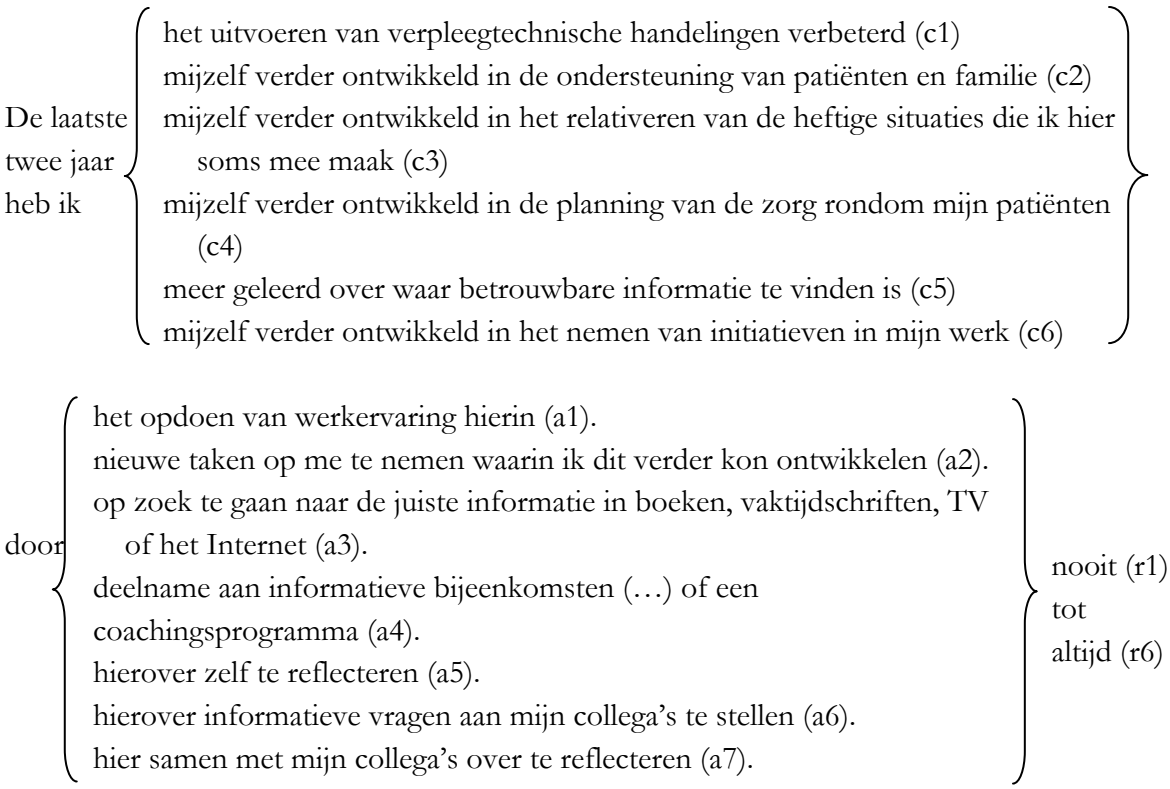
Werkplek-leerinhouden van Verpleegkundigen		*Voorbeelden*
technisch-praktisch domein	algemene vaardigheden	computervaardigheden, administratieve vaardigheden, nederlandse en engelse taalvaardigheid, analytisch denken, logisch denken, punctualiteit, zorgvuldigheid
	verpleegtechnische vaardigheden	protocollen volgen, voorbehouden en risicovolle handelingen, verpleegkundig rekenen, zorgafstemming op de patiënt, melding doen van incidenten
	verpleegkundige kennis	kennis van ziektebeelden en kennis van medicatie: contra-indicaties, mogelijke complicaties, werkingen en bijwerkingen van medicijnen kennen
	informatieoverdracht naar patiënten en familie	voorlichting geven, patiënt naar juiste informatiebronnen verwijzen, vragen beantwoorden, doorverwijzen, vragen en doorvragen, toetsen van informatie die patiënt zelf heeft gevonden
	informatieoverdracht naar collega's	vragen beantwoorden, vragen en doorvragen, klinische les geven, rapporteren in patiëntendossier, protocollen uitwerken
	fysieke coping	ergonomische werkhouding, omgaan met hulpmiddelen
sociaal-emotioneel domein	sociaal-emotionele omgang met patiënten en familie	bejegening, geduldig zijn, actief luisteren, omgaan met agressieve mensen, therapietrouw stimuleren, emotionele ondersteuning, inlevingsvermogen, interesse tonen, rekening houden met individuele verschillen tussen patiënten
	sociaal-emotionele omgang met collega's	actief luisteren, interesse tonen, emotioneel steunen, samenwerken, diplomatie, feedback geven, positief reageren op feedback, rekening houden met individuele verschillen tussen collega's
	durven communiceren	elkaar aanspreken t.b.v. kwaliteitsbewaking, assertiviteit, eerlijk zijn over (bijna) fouten, je mening geven, grenzen aangeven, hulp vragen, eerlijk zijn over situatie patiënten
	uitstraling	professionaliteit, zekerheid, humor, rust en enthousiasme uitstralen, timing (op het juiste moment de juiste uitstraling)
	psychische coping	relativeringsvermogen, goede werkprivé balans, zelfvertrouwen, grenzen stellen, je plek in het team vinden, emoties een plekje geven, zorgen dat je je werk leuk blijft vinden, omgaan met vies werk
organisatorisch domein	taakmanagement vaardigheden	plannen, prioriteiten stellen, overzicht houden, verpleegplan opzetten, gestructureerd werken
	coördinerende taken	leiding geven aan leerlingen, overleg structureren, regisseren van 24-uursbehandeling, organiseren van artsenvisite, materiaalbeheer, wachtlijstbeheer, rooster maken; en voor leidinggevende verpleegkundigen: leiding geven aan team en functioneren teamleden beoordelen
	rol en omgevings-vaardigheden	gevoeligheid voor situatie in directe werkomgeving, inzicht in rollen in en buiten de eigen instelling, overdracht van patienten aan andere zorgverleners, kritische blik naar de organisatie; en voor leidinggevende verpleegkundigen: beleid maken en uitvoeren

ontwikkelings-domein	leren en informatie verzamelen	informatie verzamelen, betrouwbaarheid van bronnen inschatten, interpreteren van de informatie, protocollen opzoeken, vragen stellen, feedback vragen, leerdoelen opstellen, leermogelijkheden onderzoeken, vaktijdschriften bijhouden, randvoorwaarden bewerkstelligen (tijd, geld, middelen, etc.)
	zelfkennis	grenzen kennen, je eigen zwaktes en sterktes kennen, zelfreflectie
pro-actieve werkhouding		efficiënt werken, beslissingen nemen, collega's meehelpen, zelfstandig kunnen werken, roostertechnische flexibiliteit, meegaan met vernieuwingen, vooruit denken, initiatief nemen, verantwoordelijkheid nemen, alledaagse kwaliteitszorg

Onze categorisatie vertoont gelijkenissen met, maar is completer en verfijnder en voorkomt een aantal overlapproblemen met bestaande categorisaties.

Hoofdstuk 6 beschrijft een literatuurstudie naar de mentale dimensies van werkplek-leerstijlen. Uit de interviewstudies in hoofdstuk vijf waren voornamelijk zichtbare dimensies naar voren gekomen, terwijl bestaande leerstijl-literatuur zich juist vooral op mentale dimensies richt. In dit hoofdstuk hebben we de verschillende (mentale) dimensies van leerstijlen in de onderwijspsychologische literatuur gereviewd en geanalyseerd welke van deze dimensies mogelijkheden bieden voor gebruik in werkplek-leersituaties. We wilden dimensies selecteren welke een bruikbaar bewustzijn voor werknemers kunnen opleveren en welke hen mogelijkheden kunnen bieden voor de optimalisering van hun leren op de werkplek. Vier dimensies waren hiervoor geschikt: of de werknemers reproductieve of ontwikkelingsgerichte lerenden zijn, of ze de neiging hebben om alleen te leren, van anderen of met anderen, of ze holistische of analytische lerenden zijn en op welke manier ze reflecteren (bijvoorbeeld de diepte van reflectie). Tijdens interviews hebben we een aantal afdelingshoofden en opleiders in algemene ziekenhuizen gevraagd naar de bruikbaarheid (het belang en de herkenbaarheid) van deze vier dimensies voor verpleegkundigen. Hieruit kwam naar voren dat deze experts van mening zijn dat het bewustzijn van de reflectiedimensie voor verpleegkundigen in elk geval erg nuttig is. De bruikbaarheid van de andere dimensies bleef onduidelijk.

In *hoofdstuk 7* is met behulp van alle informatie die verzameld is in de studies in de eerdere hoofdstukken een vragenlijst ontwikkeld en gevalideerd. Deze vragenlijst, de Vragenlijst Werkplek-Leerstijlen van Verpleegkundigen (VWLV), is geconstrueerd volgens een situatie-respons design en meet het gebruik van verschillende leeractiviteiten in verschillende leersituaties, geoperationaliseerd als leerinhouden. De leeractiviteiten en leerinhouden die we hebben gebruikt in de items zijn gebaseerd op de interview- en literatuurstudies. In Figuur 2 staat een overzicht van de itemstructuur van de VWLV. De vragenlijst bestaat uit zeven leeractiviteiten (a), die bevraagd worden voor zes verschillende leerinhouden (c). In totaal bestaat de vragenlijst dus uit 42 items.



Figuur 2. Itemstructuur van de VWLV

De vragenlijst is uitgezet bij 912 gediplomeerde verpleegkundigen die werken op verschillende afdelingen van 13 algemene ziekenhuizen in Nederland. Van deze vragenlijsten is 41% (372 vragenlijsten) terug ontvangen en geanalyseerd. De factor structuur van de items was gedeeltelijk gebaseerd op de leeractiviteiten die verpleegkundigen ondernemen en gedeeltelijk op de leerinhoud (zie Figuur 3).

Leren door ...	Leren door samen te praten over …
- werkervaring	- verpleegtechnische handelingen
- iets nieuws aan de eigen taak toevoegen	- relativeren
- informatie op te zoeken	- planning van patiëntenzorg
- informatie bijeenkomsten / coaching	- betrouwbare informatie vinden
- zelf te reflecteren	- initiatieven nemen

Figuur 3. De tien schalen van de VWLV

De betrouwbaarheid van de schalen was redelijk tot goed. De meerwaarde van het situatie-respons design is empirisch aannemelijk gemaakt, doordat de situatie component, de leerinhoud, veel variantie verklaarde. De construct validiteit is aannemelijk gemaakt doordat de correlaties tussen de schalen niet te hoog en niet te laag zijn (divergente en convergente validiteit). Criterium validiteit is aannemelijk gemaakt met behulp van relaties tussen de schalen van de vragenlijst en waargenomen professionele competentie (vertrouwen in eigen vakbekwaamheid en waargenomen ontwikkeling). Uiteindelijk kon geconcludeerd worden dat de VWLV geschikt is om de

leerstijlen van verpleegkundigen op de werkplek te meten en dat de psychometrische kenmerken voldoende tot goed zijn.

In *hoofdstuk 8* worden de conclusies met betrekking tot de onderzoeksvragen van dit proefschrift beschreven en worden de dilemma's bediscussieerd waar we tijdens het onderzoeksproces tegen aan zijn gelopen. De conclusies zijn reeds behandeld in de samenvattingen van de voorgaande hoofdstukken.

Na de conclusies wordt eerst gereflecteerd op de concepten die we in dit proefschrift hebben gebruikt, zoals onze keuze voor de term 'on-the-job learning' en het onderscheid tussen leerstijlen, leerstrategieën en leeractiviteiten. Ook wordt beargumenteerd waarom we leerstijlen op activiteitenniveau hebben benaderd en waarom we de leerinhoud hebben gebruikt om leersituaties te operationaliseren. Verder wordt uitgelegd waarom het ons niet is gelukt om in dit proefschrift de adaptieve flexibiliteit in het gebruik van leerstrategieën te meten en hoe dit in de toekomst wellicht anders aangepakt zou kunnen worden.

Vervolgens komen de methodologische praktijken van dit proefschrift aan bod. De onderzoeksaanpak die we hebben gebruikt was multi-paradigmatisch. Het eerste empirische gedeelte kan als een interpretatieve studie gekarakteriseerd worden en het tweede empirische gedeelte was meer klassiek van aard. We beschrijven de verschillende methoden die we hebben gebruikt om de kwaliteit en nauwkeurigheid van het onderzoek te waarborgen. Dit doen we onder andere door alle richtlijnen waarmee we hoofdstuk 4 hadden afgesloten na te gaan. We concluderen dat we ons, ook al waren we ons volledig bewust van het belang van deze richtlijnen, toch niet volledig aan alle richtlijnen hebben gehouden, voornamelijk in verband met ruimtegebrek in artikelen.

Vervolgens wordt gereflecteerd op de empirische resultaten van dit onderzoek. De steekproeven die in het onderzoek zijn gebruikt zijn niet geheel representatief voor de gehele populatie van verpleegkundigen werkzaam in algemene ziekenhuizen in Nederland. Toch denken we dat de instrumenten voor alle verpleegkundigen in algemene ziekenhuizen in Nederland en met enige aanpassing ook in andere landen en ten behoeve van andere beroepen gebruikt kunnen worden. Doordat er zoveel veranderingen gaande zijn in de gezondheidszorg, lijkt het ons wel een goed idee dit onderzoek over een aantal jaar te herhalen, omdat er dan wellicht nieuwe leerinhouden en leeractiviteiten zijn en de nadrukken dan wellicht anders liggen.

De theoretische en empirische resultaten van deze studie hebben ons veel inzicht gegeven in het leren op de werkplek van verpleegkundigen en een vragenlijst opgeleverd om hun werkplek-leerstijlen te meten. De vragenlijst uit hoofdstuk 7 kan worden gebruikt door verpleegkundigen, afdelingshoofden, coaches en HR professionals in de gezondheidszorg om de verpleegkundigen bewust te maken van hun werkplek-leerstijl en de andere mogelijke manieren om te leren op de werkplek. Met behulp van de classificaties uit hoofdstuk 5 kunnen voor elke individuele verpleegkundige alternatieve leerstrategieën worden bediscussieerd en uitgeprobeerd in de praktijk, wat kan leiden tot een verbetering in het leren op de werkplek. We hebben de resultaten hiervan nog niet onderzocht, maar door feedback van verpleegkundigen hebben we wel een eerste indruk gekregen van de bruikbaarheid van de instrumenten.

Uit de reacties van sommige verpleegkundigen blijkt dat zij baat zouden kunnen hebben bij begeleiding bij het gebruik van deze instrumenten.

Het hoofdstuk sluit af met een agenda voor toekomstig onderzoek. Naast de genoemde punten pleit deze agenda onder andere voor de ontwikkeling van goede methoden om het impliciete leren op de werkplek en adaptieve flexibiliteit in het gebruik van leerstrategieën te meten. Het zou interessant zijn te onderzoeken of het gebruik van onze instrumenten ook daadwerkelijk de gewenste bewustwording en verbetering van het leerproces van verpleegkundigen oplevert. Daarnaast is het interessant de relaties tussen de verschillende manieren van het leren op de werkplek te onderzoeken met verschillende uitkomst variabelen, zoals werkeffectiviteit en patiënt tevredenheid. Met die informatie kunnen afdelingshoofden en HR professionals in de gezondheidszorg goede interventiestrategieën implementeren om het leren op de werkplek te optimaliseren, aangepast aan de individuele verpleegkundige.

Literatuur

Allinson, C. W., & Hayes, J. (1996). The Cognitive Style Index: A measure of intuition-analysis for organisational research. *Journal of Management Studies, 33*, 119-135.

Honey, P., & Mumford, A. (1986). *Using your learning styles*. Maidenhead, UK: Peter Honey Publications.

Honey, P., & Mumford, A. (1989). *The manual of learning opportunities*. Maidenhead, UK: Peter Honey Publications.

Kolb, D. A. (1976). *Learning Style Inventory, self-scoring test and interpretation booklet*. Boston, MA: McBer and Company.

Kolb, D. A. (1985). *Learning Style Inventory: Self-scoring inventory and interpretation booklet*. Boston, MA: McBer and Company.

Curriculum Vitae

Marjolein Berings was born on 31 December 1976, in Sint Oedenrode, the Netherlands. She graduated in 1995 from Skinle college in Schijndel (now Elde college). In 1996 she did voluntary work at several schools in Benguela, Angola. In 2000 she received her Master's degree in Educational Sciences from the University of Nijmegen (now Radboud University). In 2001, Marjolein began her PhD research at the University of Nijmegen and switched to the Department of Human Resource Studies at Tilburg University in 2002. Her PhD project involved nurses' on-the-job learning. She combined research with thesis supervision and various teaching activities for statistics and methodology courses at Radboud University, Tilburg University, and the Dutch Police Academy in Apeldoorn. From October 2006, Marjolein will work as a junior technical advisor at the monitoring, evaluation, and research unit of the Christian Health Association of Malawi (CHAM) in Lilongwe, Malawi. For more information see www.marjoleinberings.nl.