MASTER THESIS

LEARNING THROUGH WORK: AN EXPLORATIVE STUDY INTO NURSES' ON-THE-JOB LEARNING BEHAVIOR

Freya Ernst
S1019104

FACULTY OF BEHAVIORAL SCIENCES
COMMUNICATION STUDIES
Master track: Corporate Communication

EXAMINATION COMMITTEE
Prof. dr. M.D.T. de Jong
P. Cornelissen, MSc.

Abstract

Lifelong learning is essential for nurses to provide quality patient care. Additionally, training and education is needed to be able to adjust to current societal changes, such as the cutbacks in health care and the ageing society. Learning on the job is thereby seen as a promising and more efficient alternative to formal training programs. Researchers are in agreement that the learning behavior of employees on their job, or in other words, their learning strategies, are influenced by both their individual learning styles as by the perceived learning situation (Berings et al., 2005; Honey & Mumford, 1986; Kolb, 1984). To support nurses, and integrate learning and work, a better understanding is needed how nurses learn on their job. The aim of this study was therefore to gain more insight into nurses' actual learning behavior at the job. To achieve this goal a mixed method approach was used to examine the interrelation between learning styles and the learning situation. As a result, this study is split into two parts. In the first study the effect of individual factors on nurses' learning styles was examined by means of a questionnaire. The second study used semi-structured interviews to reveal critical learning situations. Nurses from different hospitals in The Netherlands participated in the study, of which 234 nurses filled in the questionnaire and twenty took part in the interviews. The findings of the first study suggest that nurses' age, work experience and intrinsic motivation affect their personal learning styles. The in-depth interviews with nurses revealed four main on-the-job learning situations, namely 1. acute work situations, 2. new work situations, 3. recap work situations and 4. daily work situations. Furthermore, patterns in nurses' learning were found per situation, which provided a better understand how nurses learn in various situations at the workplace. In conclusion, these findings provided strong empirical results for the assumption that nurses' actual learning strategy is based upon both the perceived learning situation as well as on their learning style.

Preface

This report is my master thesis for the program Communication Studies at the University of Twente and forms the end of six years of college. Although writing my thesis was the most difficult and time consuming part of my studies, it is finally done! I am satisfied with the end product and can honestly say that I learned a lot from this process and also from my internship at Noordhoff Health. For the future, I hope to contribute to the learning of others and to also remain a 'student' myself as long as I will live. For now, there are a couple of people I would like to thank for their support.

First, I would like to thank my two supervisors for their feedback and guidance throughout this project. Thanks to Prof. Dr. M.D.T. de Jong, I got back on track and was able to clearly define my subject. In addition, I would like to thank my second supervisor, P. Cornelissen, who provided feedback when I really needed it and gave practical tips to improve my thesis.

Besides my supervisors, I would like to thank all of the awesome nurses who participated in my study and were able to find time in their busy schedule for me.

A special thanks goes out to Marijke Broekhuis for reading and revising my report and being critical when necessary. Also, thanks for the continuous support during my project, the long talks and endless wine sessions. Furthermore, I would like to thank Symen-Sjoerd Hofman for his love, friendship and his encouraging words and my family for their help, support and wisdom.

Last but not least, I'd like to thank all the people whom I met during my time at the university. Without you, my student life wouldn't have been so amazing.

Freya Ernst,
Enschede, 2015

Table of Content

1. Introduction

During the last ten years societal developments, such as the economic crisis and the ageing society, led to continual changes in the work environment of nurses (Van Woerkom & Poell, 2010). As a consequence of the economic crisis, the Dutch health care was obliged to make retrenchments, thereby making the health care profession more demanding. This resulted in a higher workload for nurses due to additional job tasks which were previously performed by physicians (Lambregts & Grotendorst, 2012). Mistiaen et al. (2011) examined the current and future demands and developments for the nursing profession in The Netherlands as well as internationally. Their results indicate that the main problem is the ageing society which will lead to a growing number of elderly, and therefore an increase of elderly with comorbidity and a more complex need for care in the future. At the same time the health care of The Netherlands and other European countries face a shortage of nurses and caretakers which will only incur in the next years. In their study of retention strategies in health care, Jelfs et al. (2014) describe the future shortage of health care professionals, which is also affirmed by the European Commission (European Commission, 2012). It is predicted that this shortage will lead up to almost 1 million in the EU in the year 2020 and will have tremendous effects on the quality of prospective health care.

To be able to keep abreast of these changes, health care organizations need to develop and train internal human capital (Lammintakanen et al., 2008), in this specific case nurses. Lammintakanen et al. (2008) explains this by stating that health care organizations are one of the most knowledge-intensive sectors in society. Health care organizations can thus be referred to as a part of the knowledge economy, where the ability of companies to survive depends on continuously creating and employing new knowledge in order to adjust to changes in the environment (Harrison & Kessels, 2004).They emphasize this by stating that knowledge is temporary and expires fast in today's society. Consequently, it is from utmost importance that nurses' knowledge remains up-to-date and that they have the possibility to learn during their career (Dee & Reynolds, 2013). Continual professional development (CPD) is therefore essential for nurses to be able to maintain and develop their knowledge, skills and competences. According to Pool, Poell and ten Cate (2013b) CPD results in a greater sense of organizational commitment, job satisfaction and reduces stress. They state that when nurses perceive a deficiency of CPD, this may lead to leaving their jobs or choosing for early retirement. For this reason, CPD is seen as an important factor to retain nurses and minimize turnover (Jelfs et al., 2014). Hospitals already provide many learning opportunities in the form of internal or external training to ensure the professional development of their employees. A prevalent problem of these formal training programs however, is that they often have trouble conveying theoretical knowledge to the work environment. Also, these programs are costly and frequently lead to insufficient results (Van Woerkom & Poell, 2010). Moreover, several researchers state that employees primarily learn on the job (Gijbels & Raemdonk, 2010; Poell et al., 2004; Tannenbaum, 2002).

The workplace can provide many learning opportunities where employees spontaneously learn by cooperating with colleagues, executing tasks, dealing with problems or new situations faced within practice and receive opportunities for reflection (Tynjälä, 2008). On the job learning is therefore

seen as a promising alternative for organizations to educate their employees (Kessels, 2004). The quality of learning on the job depends on the employee as well as on the work environment (Billet, 2001). Because learning in health care is becoming increasingly self-directed, nurses can choose for themselves to participate in various learning opportunities during their work (Berings et al., 2007). But to encourage nurses to learn on the job, hospitals have to promote workplace learning by offering these learning opportunities and creating a strong learning environment (Billet, 2001). One of the major challenges for educational managers is to support nurses in employing more self-directed learning activities at work, while in the meantime taking the needs and predilections into account that exist between nurses (Pool et al., 2013a). Hence, to better support nurses, in their day to day learning at the workplace, more insight is needed in how nurses learn in their work environment.

Despite the vast amount of literature on workplace learning, little is known about the ways in which nurses actually learn on their jobs. Several researchers are in agreement that employees their personal learning preferences and capabilities, i.e. their learning styles, in combination with the perceived learning situation determine their actual learning behavior (Berings et al., 2005; Honey and Mumford, 1986; Kolb, 1984). Although there is already a small amount of research conducted about nurses and the way that they learn in the workplace, most of these studies did not explore the ways in which nurses differ in their on-the-job learning (Berings et al., 2005; Pool et al., 2013a). These individual learning styles are important to address the personal needs and preferences of nurses (Pool et al, 2013b). In addition, more insight into general characteristics of the individual that affect on-the-job learning behavior could be beneficial for educational coordinators in order to tailor instructional designs to individual learners. Besides individual learning styles, the perceived learning situation is also regarded as a central aspect which influences the learning behavior of employees (Berings et al., 2007). A large share of research about the learning environment is concentrated on situational factors that empower or inhibit learning on the job. Nevertheless, studies examining the role of the learning situation remain scarce, have been mostly conducted in one hospital and reveal ambiguous results (Berings et al., 2006; Poel et al., 2004).

From the studies and findings described above, six insights were attained, namely: (1) To ensure the quality of patient care and adjust to societal developments, hospitals need to sustain their personnel and also be an attractive employer to work for; (2) In order to do so the enablement of lifelong learning opportunities for nurses are crucial; (3) Employees primarily learn in the workplace; (4) To support nurses, and integrate learning and work, more insight is needed how and why nurses learn on their job; (5) Few studies have focused on individual differences in on-the-job learning; (6) The role of the learning situation, and therefore the interrelation between learning styles and learning situations, is indistinct. These insights show that more knowledge is necessary about the factors that affect on-the-job-learning behavior of nurses. For this reason, this study aims to contribute to a better understanding on the way that nurses learn on the job, thereby taken into account their personal needs, motivations and preferences concerning workplace learning.

To be able to examine the on-the-job learning behavior of nurses, first of all, a short overview of the literature will be given regarding the main characteristics that define learning on the job. This theoretical overview comprises popular measurements, theories and models concerning workplace

learning, followed by individual and situational factors that are found to affect the learning behavior of employees. Although there are many individual and situational factors proposed to influence nurses' learning behavior, empirical research supporting the relationship between the learning situation and learning style is still very limited. A mixed method research is chosen to further expand the scope of learning styles to learning situations. As a result, this study is split into two parts. In the first study the individual differences in learning style preferences will be examined. This study uses a quantitative survey which employs existing learning activities in order to measure preferences in the participation in learning styles from different groups of nurses. The goal of the second study is to acquire more in-depth information about concrete situations in which nurses learn. On that account, Study 2 uses semi-structured interviews to reveal critical situations in which nurses perceive to learn and how they learn in these situations. The methodology, results, discussion and conclusion will be discussed per study. Finally, the general discussion presents the overall conclusion of both studies and will also include practical implications and suggestions for future research.

2. Theoretical Framework

2.1. Defining learning on the job

The nineties saw the advent of a rising attention in learning on the job from both practitioners as academics. Van Woerkom and Poell (2010) allocate this increase in interest partly to the growing costs in training of personnel which often led to disappointing results. During the last ten years interest in learning on the job further intensified, due to the emerging globalization, rapid technical innovations and earlier mentioned societal changes such as the economic crisis and the aging workforce (Van Woerkom & Poell, 2010). To be able to adjust to these changes, organizations saw learning on the job as the best solution to maintain and sustain their personnel (Kessels, 2004).

Because of the increasing attention towards this topic, many different disciplines (e.g. human resource development, psychology, sociology, organizational studies, management studies and so forth) studied learning on the job, leading to numerous variations in viewpoints and conceptualizations (Manuti et al., 2015). This is especially apparent when reviewing the abundance of terms which are used to describe learning that primarily takes place in a work context, including: workplace learning, on-the-job-learning, informal learning, non-formal learning and work-based learning (Berings, 2006). In general the term 'on the job learning' is used for many forms of learning that occur before, during or after work, thus learning that is embedded in the ongoing work process (Streumer, 2001). To be able to study employees' learning behavior on the job, the concept of learning styles was developed. The basic principle of learning styles supposes that all individuals have a distinct preferred or habitual way to receive and process information (Kolb, 1984). Hence, the manner in which individuals respond to the learning environment constitutes their specific learning style (James & Gardner, 1995).

Despite the many different perspectives on this topic, literature reveals two central characteristics of learning on the job. Discussions between disciplines about this topic mostly focus on the differentiation between formal and informal learning (Jacobs & Park, 2015) and the way that learning styles are perceived: as a state or trait (Riding & Cheema, 1991). In the following two paragraphs these defining features of learning on the job are further described. At the end of each paragraph the perspective on on-the-job-learning of this study is defined.

2.1.1. Formal versus informal learning

Streumer (2001) describes that the workplace creates differences in the type of learning employees participate in, distinguishing learning in a formal, informal or incidental way. The classification between formal, informal and incidental (Colley, Hodkinson & Malcolm, 2003; Elkjaer & Wahlgren, 2006; Sambrook, 2005; Watkins & Marsick, 1992) or planned/unplanned learning (Hodkinson & Hodkinson, 2004) is one of the most salient, but also one of the most discussed, components of on the job learning described in literature. It is therefore necessary to assess which kind of learning activity of situation can be regarded as formal and which as informal. The previous mentioned concepts are not merely used in research about on-the-job learning, but are also commonly applied terms in literature about continual professional development or adult learning. In these areas of study formal learning is

referred to as planned learning in an educational context, whereas informal or incidental learning is seen as learning that takes place in a workplace setting (Pool et al., 2013a).

The broad application of these concepts thus is cause for confusion. In general, learning at the workplace can offer both formal and informal learning activities. Jacobs and Park (2015) designed a framework of on the job learning based on the concept of formal and informal learning. In their review of the literature they summarize formal learning as planned, explicit learning activities that are designed to help employees gain knowledge and/or skills. These activities are provided by the organization, which could encompass training programs, workshops, symposia or lessons at the workplace or outside of the workplace. Informal learning occurs in situations that are not designed for learning, or were learning is not the main goal and can be for example learning from asking colleagues questions or solving a difficult problem they came across in their daily work. Therefore informal learning is often unintended and employees are not always aware that they learn in these situations (Jacobs & Park, 2015). In the nursing profession, there are a lot of opportunities for learning organized by hospitals which do not necessarily take place outside the workplace (e.g. clinical lessons, workshops or temporary evaluation programs). For that reason, all learning activities that are relevant for the daily work process are included in this study, which encompass both informal as formal learning activities that happen in or outside the workplace. This broad definition is also applied in the study of Berings, Poell and Simons (2005). They define learning on the job as: *''all explicit or implicit mental and/or overt processes and activities, performed in the context of work, resulting in a fairly fixed alteration in knowledge, attitudes or skills''*. This study will also use the definition of Berings et al. (2005, p. 14) in order to include all work-related learning opportunities, activities and processes for nurses within the health care profession.

2.1.2. Learning styles: state or trait?

To be able to measure the various learning approaches, and thus make the ways in which employees learn more tangible, the concept 'learning styles' became popular in the 1970's. Learning styles strive to clarify differences in employees' learning behavior (James & Gardner, 1995). Learning styles can contribute to employees' learning in two ways. First learning styles can make employees aware of how they learn, resulting in an increased insight into their personal strengths and weaknesses so that they can better select effective modes of instruction or education that fit their personal learning style. Second, educational coordinators have the opportunity to analyze the learning styles of their employees to better tailor educational means. (Hamada et al., 2011). Most theories about learning styles have their roots in the field of educational science or educational psychology and view learning styles as a determining factor of the learning process which facilitates learning for employees by providing them their personal optimal form of instruction (Hamada et al. 2011). An important component in learning style theories is the way that learning styles are perceived. Riding and Cheema (1991) state that learning styles can be viewed upon in three different ways, namely as a structure, as a process or as a combination of both. Learning as a structure could be compared to seeing learning strategies as a trait. As such, the learning style is perceived as steady and permanent. Learning styles as a process are viewed as dynamic and changeable from nature. Lastly, learning styles can be seen as a combination of structure and process, which means that a learning style is relatively stable, but

can change due to new events or environments which affect the learning style. Berings et al. (2008) share this last named notion and clarify this view in their interaction model (Figure 1). They argue that the learning individual with its own capabilities and preferences share a reciprocal relationship of action with the learning situation. Learning is hereby affected by both individual characteristics as well as by the perceived learning situation.

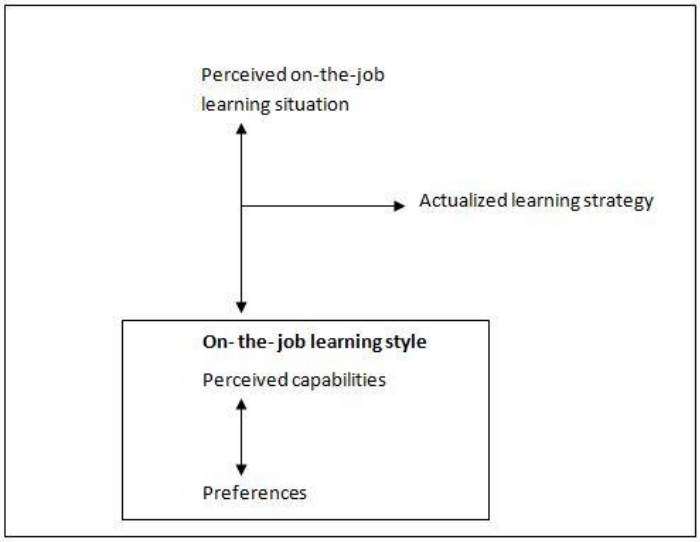

Figure 1: On-the-job learning styles model (Berings et al., 2005)

In this model learning styles are characterized as learning activities and learning strategies. Where learning activities are actual activities that nurses execute to learn. Learning strategies are a combination of learning activities that mutually contribute to implicit or explicit learning goals (Berings et al., 2005). The on-the job learning style of nurses is influenced by the perceived situation, causing nurses to perform different learning strategies (e.g. mix of activities) in different learning situations. To summarize, learning styles are viewed as relatively fixed traits based upon personal preferences for learning activities and perceived capabilities. Learning strategies can be seen as a state, varying with every situation. Berings et al. (2005, p.18) conceptualized learning styles in the following definition*: ''a tendency to employ a specific combination of implicit and explicit learning activities that an individual likes, and is able to, execute. Individuals adjust the combination of learning activities to each situation. This specific combination is referred to as the actualized learning strategy''* .In this study the last named definition is adhered, where the situation is expected to have an influential role on nurses their learning styles, assuming that nurses have a preference for certain learning activities which is stable, but perform them differently or maintain a distinct order per situation.

2.2. Operationalizing learning on the job: learning style theories

The majority of research in the nursing profession views learning styles as a combination of structure and process and utilizes Kolb's experiential learning theory and complementary Learning Style Inventory (LSI) to explain and measure learning styles (Kolb, 1984). This theory is regarded as one of the most dominant and broadly employed research models of learning styles, especially in nursing

education (D'Amore, James & Mitchell, 2012; Kolb et al., 2001; Rassool & Rawaf, 2008). In the next paragraph the theory of Kolb and other recognized learning style theories and measurements in nursing are described, with the restriction to theories who view learning as a structure and process.

2.2.1. Kolb's experiential learning theory

One of the best known learning style theories is the experiential learning theory (ELT) developed by David Kolb. This theory considers experience to be a fundamental aspect of learning. According to Kolb (1984), learning should not be regarded in terms of outcomes, but as a process of gaining experience. In the ELT learning is seen as a cyclical process which takes place in daily situations. Kolb (1984) states that employees can enter the cycle at any phase. The experiential learning process consists of four phases, namely: (1*) concrete experience (CE, feeling)*: the learner actively encounters a concrete experience by carrying out an activity,(2) *reflective observation (RO, watching):* the learner reflects on the gained experience, (3) *abstract conceptualization (AC, thinking):* the learner analyses the newly retrieved information, and (4) *active experimentation (AE, doing)*: the learner applies the newly retrieved information in a prospective experience. In Kolb's Experiential Learning Cycle, knowledge is generated through a combination of grasping (CE & AC) and transforming (RO & AE) knowledge (Dochy et al., 2012).

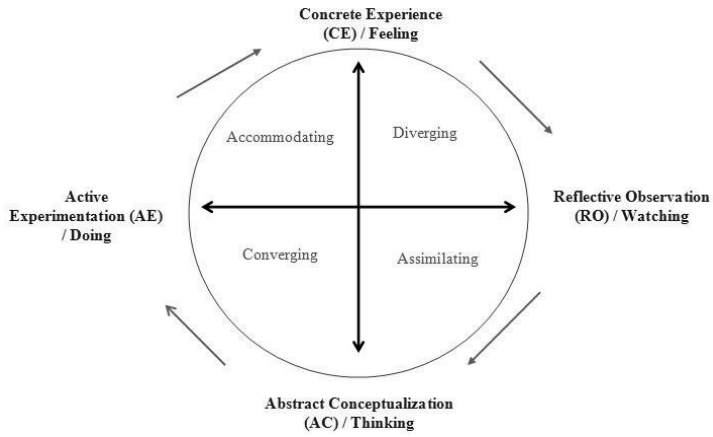

Figure 2. Kolb's (1984) Cycle of Experiential Learning

This model implies that learning demands a set of skills from employees that are in contrast with each other, which leads to employees selecting specific skills for each situation, because all these skills can't be used at the same time. The preference for one or more phases of the learning cycle is therefore translated in strong and weak points of the person's learning style, resulting in the subsequent learning styles; accommodating, diverging, assimilating, and converging (Dochy et al., 2012). The prevailing competencies of the *accommodating style* are 'active experimentation' and 'concrete experience'. This style is characterized by learners who primarily learn from practice and concrete experience. In addition they can adjust adequately to new situations. To solve difficulties faced in practice they would rather ask information in their social network than analyze the problem by themselves. Second, learners with a *diverging learning style* have as dominant skills 'concrete

experience' and 'reflective observation'. Diverging learners can view a problem or situation from different angles. For this reason they are seen as creative learners which skills are especially convenient in situations that require problem solving and brainstorming. Third, the *assimilating learning style* requires skills in 'reflective observation' and 'abstract conceptualization'. These learners are typified by their preference for theory and inductive reasoning, possessing qualities to understand abstract, complex information and rearranging it to a logical and accessible form. Lastly, the *converging style* includes learners with the prevailing competencies 'abstract conceptualization' and 'active experimentation', learners with this style use theories to make efficient decisions and solve problems on a factual basis through their ability to reason deductively. They prefer technical tasks instead of socially related projects (Dochy et al., 2012). Honey and Mumford (1986) adapted the model of Kolb to better fit the learning styles to managers' perceptions instead of individuals in general. In comparison with the LSI of Kolb, the Learning Style Questionnaire (LSQ) of Honey and Mumford (1986) does not explicitly ask persons about the way they learn, but examine overall behavioral dispositions. This was done because employees are generally not aware that they learn and could then possibly only think about formal learning activities (Coffield et al., 2004).

2.2.2 Berings' on-the-job learning styles questionnaire (OLSQ)

One of the more recent attempts to measure learning styles of nurses is from Berings et al. (2007). They argue that existing instruments which analyses employees' learning styles are frequently not suitable to be applied in a workplace context. For example, learning style instruments used in educational settings are often merely translated to work settings, without taking the differences between these two types of settings into account. One of the most fundamental differences is the way that learning is organized. In an educational context learning occurs through instruction by teachers, causing students to learn, for a large part, in a manner that is directed by the teacher. In the workplace employees have a more self-directed mode of learning, which means they have the opportunity to choose their own specific approaches to learn (Berings et al., 2007). Besides that, they state that the social dimension of learning, thus learning from others, does not receive proper attention in the current learning style instruments as well as the influence of the learning situation. Berings et al. (2007) describes that most questionnaires measure learning styles in general, without paying attention to the influence of the learning situation. Next to the under-exposed role of the learning situation, most of the instruments measuring employees' learning styles have weak psychometric values (Berings et al., 2007). Coffield et al. (2004) analyzed thirteen of the most frequently used learning style instruments, including the LSI of Kolb and the LSQ of Honey and Mumford. They concluded that, with the exception of the Hayes Cognitive Style Index (Allinson & Hayes, 1996), these instruments lacked reliability and validity. This study utilizes the OLSQ (Berings et al., 2007) because of the poor psychometric values of other instruments and this questionnaires' focus on learning situations.

The OLSQ employs a situation-response design measuring the frequency in which nurses participate in learning activities in different on-the-job learning situations, that is their actualized learning strategy. The learning activities and situations are derived from a literary review of learning style theories plus on empirical data concerning interviews with nurses, supervisors and educational coordinators (Berings et al., 2007). In their study Berings, Poell and Simons (2008a) reviewed learning

style theories in order to differentiate dimensions that suit workplace settings. The criteria they applied were that the dimensions should be applicable to workplace settings, were uni-dimensional, could be changed by learners and regard behaviors and activities. Their literature review resulted in four core dimensions of on-the-job learning styles, which are; reproductive or developmental learners (Gregorc, 1982; Sternberg, 1997), learning alone or with others (Dunn et al., 1989; Sternberg, 1997), intuitive and analytical learning (Allinson & Hayes, 1996) and forms of reflections (Kolb, 1984; Honey & Mumford, 1986; Jackson, 2002). These core dimensions are operationalized in learning activities and situations in the study of Berings, Poell and Gelissen (2008b). By conducting interviews and observations they examined the actual learning behavior of nurses. Through inductive analysis of the data, various learning activities were uncovered. These activities were organized into seven categories (Berings et al., 2008b), namely:

1. Learning by doing one's regular job: examples are: taking care of patients, learning by doing, learning from success, learning from mistakes, contact with patients and family, watching colleagues and helping others learn.
2. Learning by applying something new in the job: broadening tasks or job rotation.
3. Learning by social interaction with colleagues: consulting colleagues, asking for and obtaining feedback, exchanging knowledge and experiences.
4. Learning by reflection with oneself: prospective (planning), concurrent (during) and retrospective (looking back) self-reflection.
5. Learning by reflecting with others: prospective (planning), concurrent (during) and retrospective (looking back) reflection with colleagues.
6. Learning by theory: checking media, visiting information meetings and educational instruction.
7. Learning by supervision: direct supervision and coaching.

In the validation of these activities by supervisors and educators, it became apparent that some of the categories were related to each other. For example the content of social interaction and reflection with others and oneself are situated in the other categories. Therefore the learning activities: learning by doing one's regular job, learning by applying something new in the job and learning by theory and supervision are viewed upon as first order learning activities which are followed by second order learning activities, such as learning by social interaction, reflecting with others and with oneself. These last named learning activities are employed to deepen the first learning experiences (Berings et al., 2008b). The learning situations were operationalized into six learning contents, which refer more to skills obtained in various domains than concrete situations. The several domains (situations) where learning activities could take place are: the technical practical domain (e.g. technical nursing skills), the organizational domain (e.g. planning patient care), the socio-emotional domain is split in two, namely towards others (e.g. supporting patients and family) and towards oneself (e.g. putting emotionally tough situations into perspective), the developmental domain (looking up theory) and a pro-active attitude to work (e.g. taking initiatives at work) (Berings et al., 2007).

As previously mentioned nurses' choice to employ specific learning activities depends on the learning situation and on their preferences and perceived capabilities (Berings et al., 2005). Although

Berings et al. (2008b) provided more insight into the way that nurses learn, there is still much uncertainty about the role of the learning situation. Because the authors defined situations as learning contents in their study, the actual learning situations in which nurses mostly learn are still unknown. Even as the effect of certain learning situations on combinations made in learning activities. In other words, which learning situations provoke which learning strategies? Besides that, educational coordinators do not always have the financial means or time to analyze individual learning styles and adapt instructional designs to each nurse. For them it could be beneficial to know if there are general characteristics of the individual or situation that influence the preference for certain learning styles in order to adapt educational means to groups of employees. In the next paragraph individual factors that affect learning behaviors or participation in learning activities obtained from literature are reviewed. Thereafter situational factors that are found to have an influence on workplace learning are discussed.

2.3. Individual factors influencing learning styles

In literature certain individual characteristics, namely age and work experience were found to play an influential role in the type of learning activities that nurses employ. Despite the various studies conducted about differences in learning between older and younger workers, the results are sometimes contradicting and the precise relationship between age, organizational tenure and learning remains indistinct. In addition, Onstenk (1994) differentiates two crucial requirements for employees to learn in the workplace: the 'ability to learn' (educational level and experience) and the desire to learn (motivation and willingness). Employees' motivation to learn is a much studied factor, which supposedly has an impact on the matter of participation in learning activities of employees. In the following paragraphs studies examining the relationship between these individual factors and learning are further explored.

2.3.1 Influence of age-related factors on nurses' learning activities

Pool et al. (2013b) recognized different needs and preferences for learning and linked these to age related factors. They examined 27 studies which covered both nurses and general workers their CPD activities in relation to age. All of these studies employed calendar age as a means to divide the participants in age groups. By someone's chronical age is meant the person's calendar age. This concept is often used in research, because it is easy applicable and can determine if there are significant differences between individuals on the basis of age. Pool et al. (2013b) recommend to identify at least three age groups when investigating age-related factors of CPD to be able to recognize the impact of career stages. In their study they found three themes often researched in relation to age differences in CPD. These are motivation, participation and learning outcomes. In organizations stereotypical views can exist that consider older workers, amongst other characteristics, as technological incapable, inflexible and less motivated to learn (Kooij et al., 2008). Pool et al. (2013b) argue that these presumptions result in negative associations of older workers and learning, causing managers to give less support to older employees. In their review however, no evident influences of age processes were found for motivation, social support from managers and for learning outcomes. Yet, for the participation in CPD, most of the studies reviewed by Pool et al. (2013b)

indicated a decrease in the participation of older workers. The studies which made a distinction between younger, middle-aged and older workers showed no significant differences between younger and middle-aged workers in their participation in learning activities, but displayed a significant lower participation of older workers, mostly above the age of 50 (Cully et al., 2000; Simpson et al., 2002; Taylor & Urwin, 2001; Wray et al., 2009). In addition Pool et al. (2013b) found a remarkable result which revealed that studies examining participation of formal CPD activities in relation to age found a negative relationship, where studies concentrating on informal learning activities found a positive relationship between age and participation in these activities. These results propose that older and younger workers learn in a different way. They conclude that workers in their late-career (>50/55 years) generally appear to participate less in formal learning activities and more in informal CPD activities. The studies of Lammintakanen and Kivinen (2012) and Berg and Chyung (2008) confirm these findings, while their results displayed a higher participation of older workers in CPD activities, above all in the more informal learning activities. They revealed that older workers did participate in formal learning activities, such as information meetings and assessments or evaluation moments. However, they showed a deviation in the participation in training courses/programs and in activities like mentoring in comparison with younger colleagues. For other career stages these influences were less apparent. Urwin (2006) agrees with these findings by stating that older employees do participate in formal learning activities, but that they prefer short training courses. In addition, Simpson et al. (2002) argue that these workers especially partake in such courses to develop or maintain their skills. According to Kanfer and Ackerman (2004), older workers are less likely to engage in activities where new information has to be processed in order to preserve their self-concept. Consequently they rely on their work memory and are more probable to pursue activities that are compatible with their former experience. Although the outcomes of these studies suggest that age influences the manner in which employees learn at their job, most of the findings are contradicting. To account for age-related influences in learning more knowledge about this subject is necessary.

2.3.2 Effect of nurses' work experience on preferences for learning activities

Research focusing on the relationship between work experience and CPD of employees are directed towards two aspects, namely tenure and career stage. In general, studies examining these aspects showed a decrease in the perceived need for CPD of more experienced workers. Although they do not specify which learning activities (formal/informal) it concerns, Kyndt et al. (2011) indicated that more experienced workers felt they had learned enough. More years of experience and mastered skills had a significant negative relationship with the perceived need for professional development (Cully et al., 2000). Felstead (2010) explains this negative relationship by stating that workers past the age of 50 felt they didn't have to participate in learning activities anymore in order to meet the demands of their job. Next to that, they were no longer aiming for a promotion or advance in their career. Moreover, workers with a great amount of work experience could have different preferences and needs in learning than more novice workers. The results of the studies of Maurer et al. (2003) and Van Vianen et al. (2011), who measured both the tenure and chronical age of workers in relation to learning, showed that the effects that were found when researching only chronical age were not significant when tenure was incorporated in the study. The results suggest that these concepts are

interdependent. Results of the study of Daley (1999) point out the preference of experienced nurses for more work-placed learning activities and the predilection of less experienced nurses for formal training and education. These outcomes are in accordance with the focus group study conducted by Pool et al. (2013a) which revealed a variation in perspectives concerning the purpose of CPD between older nurses and younger nurses. Their results indicated that younger nurses had the ambition to increase their skills and knowledge and were more open to career opportunities, while older nurses were more focused on direct patient care and maintenance of their knowledge and skills. The findings of these studies suggest that employees' years of work experience affect their participation in continual professional development and thus in learning activities.

2.3.3 Nurses' educational level and learning competencies

Due to previous developments in health care the educational level of nurses became a topic for political debate (V&VN, 2012). According to this report nursing education in the future will merely be taught at a bachelor degree (HBO). Lambregts and Grotendorst (2012) call this project Bachelor 2020 which comprehends new occupational profiles that were created in The Netherlands to be prepared for the more complex need for care that is predicted in the upcoming years. This trend is also envisioned by studies in other countries, stating that the quality of health care will improve by commissioning a nursing staff with at least a bachelor degree (Mistiaen et al., 2011). Gloudemans, Schalk and Reynaert (2013) explain that the discussion about the differences between nurses with a HBO education or MBO education, also called bachelor degree or diploma degree originates from the introduction of the HBO degree in the 1970's. Differentiations between these educational levels are mostly based on the taxonomy of Romiszowsky (1988). According to Romiszowsky (1988) nurses with a diploma degree have factual knowledge (recall or recognize facts and procedures) and reproductive skills. In contrast, nurses who obtained a bachelor degree possess insightful knowledge (knowledge based on comprehension) and productive skills. Reproductive skills refer to the knowledge and skills performed when following standard procedures that already exist. Productive skills are required when new situations are encountered where no standard procedure or instruction is available, hence the employee has to consider how to handle the situation. According to Gloudemans (2010) the terms: analyzing, evaluating, assessing, relating and testing are often allocated to nurses with a bachelor degree. He states that nurses with a higher educational level perform these competencies more often than nurses with a diploma degree. Thereby nurses, educational coordinators and managers perceive these competencies as the most distinctive differences between nurses with a bachelor or diploma degree (Gloudemans, 2010). In addition, the results of the questionnaire study of Gloudemans et al. (2013) pointed out that nurses with a bachelor degree scored significantly higher on critical thinking than nurses with a diploma degree. In this study they assumed that there also would be a relationship between level of education and self-efficacy beliefs. This relation turned out not to be significant. However, work experience and age did reveal to have a significant positive relationship with self-efficacy scores. Self-efficacy relates to the perceive capability to learn and thus could influence learning styles. Because of the presumption that nurses with a HBO diploma (bachelor degree) have different competencies than nurses with a MBO diploma (diploma degree), nurses their educational level is assumed to affect the preference for learning activities.

2.3.4 Intrinsic motivation to learn

According to Onstenk (1994) employees' willingness or motivation to learn is an important factor to be able to successfully learn in the workplace. Greller (2006) agrees and supposes a relationship between career motivation and time invested in professional development. Besides time, motivation affects learning goals and is a crucial predictor to explain the effect of workplace learning (Poortman (2007). The analysis of more than hundred studies of Colquit et al. (2000) into the factors that explain employees' training motivation also reveal intrinsic motivation as an influential factor. Research concentrating on motivation and workplace learning are often viewed from the perspective of knowledge workers, because the need to continuously learn throughout their profession is considered a crucial aspect that typifies these workers (Drucker, 1999). The ability to create and employ new knowledge in order to improve services, products or processes is called 'knowledge productivity' (Kessels, 2001). According to Kessels (2001) knowledge productivity requires the capacity to learn, creativity, persistence and commitment from employees. One of the crucial factors to be able to possess these behaviors, consistent with research about the Self- Determination Theory (SDT) of Deci and Ryan (2008) is intrinsic motivation. Intrinsic motivation is defined by Deci and Ryan (2008) as a person's interest in activities without considering external consequences.

The SDT explains that first three basic psychological needs have to be met before intrinsic motivation can take place. These needs concern autonomy, competence and relatedness. Variables of the work environment are related to intrinsic motivation. For example motivation can decrease due to a high workload or increase as a result of manager's support or perceived freedom of choice (Deci & Ryan, 2000). Autonomous decision making or in other words choice independence is the preservation of a high responsibility and influence in the organization and a felt freedom in the employment of tasks (Kirby et al. 2003). This concept was found to be related to the need for autonomy in the SDT and is closely linked to intrinsic motivation and knowledge workers (DeCharms, 1976; Deci & Ryan, 1985; Hackman & Oldham,1976). Intrinsic motivation can thus be enhanced by a climate that stimulates self-direction and freedom for individuals. Besides the effect on intrinsic motivation, Hackman and Oldham (1976) and Tampoe (1993) claim that knowledge workers have a preference for autonomy and self-regulation when performing their tasks. In conclusion, although no direct learning activities have been found to relate to intrinsic motivation this concept is seen as a strong predictor for the participation in workplace learning. Choice independence is thereby the most influential variable which supposedly has a direct effect on intrinsic motivation.

2.4. The impact of situational factors on the learning strategy

In the previous paragraph it became clear that work environment factors such as manager's support, workload and choice independence affect the intrinsic motivation of employees. Next to these variables, literature differentiated several other situational factors which either form barriers for learning or enable learning on the job. These factors can be subdivided into four groups, namely (1) task and job content (2) the information environment (3) the social work environment and (4) the learning climate (Berings et al. 2005; Onstenk 1994).

2.4.1. Task and job content

The specific content of work-related tasks is an important determinant for learning on the job. One of the factors which enable learning from work-related tasks is the degree of autonomy in work. Besides that, the variation in tasks and the complexity of work itself offer important learning opportunities. Finally, the perceived participation in organizational decision making is supposed to stimulate learning on the job (Onstenk, 1997). The variable 'variation' comprises the richness of tasks that need to be performed and the degree of innovation that takes place in work. The autonomy or choice independence can be seen as the perceived degree of freedom to decide when and how to perform tasks, to determine if others need to be involved and which criteria have to be met (Frieling, 2006). As previously stated autonomy is linked to intrinsic motivation. When learners are autonomously motivated, they learn out of personal interest, enjoyment or attach personal value to learning (Deci and Ryan, 2000). The competence of problem solving is a third crucial aspect in on the job learning in order to obtain knowledge. Problem solving together with the amount of task feedback and challenge is linked to the complexity of tasks (Christis, 1998). At last, participation is regarded as an aspect of task and job content that possess learning opportunities. Via participation an employee has the possibility to contribute to organizational decision-making which increases the knowledge and insight in the organization and can therefore offer serious learning opportunities (Frieling, 2006). Van Woerkom (2002) added task demands, such as the required work pace and the experienced workload, to the task and job content that form barriers for learning.

2.4.2 The information environment

The information environment refers to the physical resources that allow employees to learn in their work environment. These resources encompass the presence of computers, technology, manuals, media and other means to obtain information and support learning from theory. Also the opportunities to visit information meetings, professional networks, conferences and symposia are included in this group (Onstenk, 1994; Skule, 2004). The learning opportunities that organizations offer can vary between hospitals. When nurses do not have a lot of means to look up theory, it is presumed to affect the quality of learning on the job.

2.4.3. The social work environment

The social work environment is related to several positive and negative outcomes and plays a central role in learning on the job, for the reason that learning often takes place when interacting with others. Learning with others leads to clarification and enrichment of insights, approaches, thinking and problem-solving (Eraut, 2004). The social work environment can be partitioned into three variables, namely the social support of supervisors, the social support of colleagues and the feedback culture (Berings et al., 2005). Reamdonck et al. (2014) state that the manner in which employees support each other and the way that managers support their employees and show compassion are important determinants for negative or positive outcomes. For example a lack of social support is linked to the development of work stress. On the contrary, high supervisor support is related to better transfer of training and higher training outcomes (Baldwin & Ford, 1988; Taylor, 1992). Social support of managers should provide the employee reinforcement to better learn on the job. Important tasks for

supervisors are goal-setting, assistance and giving feedback (Russ-Eft, 2002). A prerequisite for the social support of colleagues is the existence of good relationships with colleagues. Good work relationships are based upon trust and understanding, where help is given and correct information is shared (Johnson & Hall, 1988; Raemdonck et al., 2014). Social support of both supervisors and managers takes place in daily cooperation, communication, guidance and in organized meetings (Onstenk, 1997; Poell, 1998). Feedback is embedded in this social support, which is considered to be a crucial factor for successfully learning from others at the workplace (Van Woerkom, 2008). Eraut (2004) states that learning mostly occurs by obtaining feedback from actions and procedures which take place in daily practice, resulting in a better insight in the best way to handle these work tasks. The perceived feedback culture is a crucial component for employees to provide feedback to colleagues in their daily work. The feedback culture refers to the quality and amount of feedback that is given by supervisors and colleagues and the manner in which feedback is provided. In a strong feedback culture employees improve their performance by continuously receiving, giving and processing formal and informal feedback. A strong feedback culture is linked to effective continuous learning and career development and can only take place in combination with the existence of positive work relations and a good learning climate (London & Smither, 2002).

2.4.4. Learning climate

In the study of Berings et al. (2005) the learning climate is seen as an important determinant of the learning situation. In their study the learning culture is defined as the temporal manifestation of dominant norms, opinions and regulations with respect to shared learning in groups, departments or organizations which implicitly affect het participation in learning activities (Berings et al., 2005; Poell et al., 1998, p35). In addition, Stefen et al. (2014) highlight the role of emotional safety in nurses their learning. They state that nurses often learn from others, by observing colleagues or by being observed by supervisors. To be able to learn they need to feel safe to make mistakes and to practice their skills. Thus, creating a supportive environment that feels emotionally safe for employees is crucial to allow them to learn on the job.

2.5. Conclusion theoretical framework

This study's main goal is to gain more insight in how nurses actually learn on the job. Literature on workplace learning of nurses provided the necessary evidence that the interrelation between the perceived learning situation and learning style results in the actual learning behavior of nurses. Researchers studying learning styles in a workplace context are in agreement that learning has to be viewed upon as both a state as process and consist out of informal as well as formal learning activities (Berings et al., 2005; Honey & Mumford, 1986; Kolb, 1984). From the literature it becomes evident that individual factors as nurses' age, work experience, educational level and intrinsic motivation are supposed to influence learning styles and thus the personal mix of learning activities that nurses prefer to employ. In addition, the situational factors: task and job content, the information environment, the social work environment and the learning climate are indicated to affect the learning behavior of employees at the workplace. These factors lead to a slight modification in the model of Berings et al. (2005) (See Figure 3).

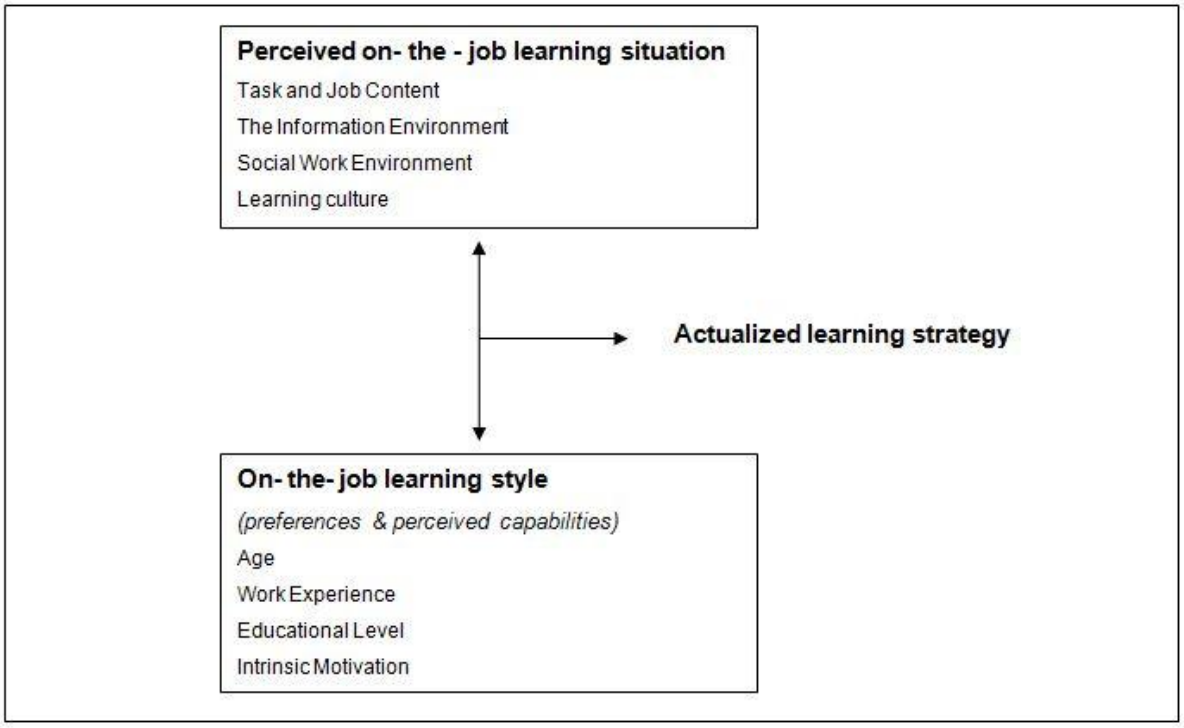

Figure 3. Conceptual model interrelation learning styles and learning situations

The conceptual model in Figure 3 was used as a starting point to empirically explore individual and situational characteristics that affect nurses' learning styles. In addition, this study focused on similarities in the learning process of nurses by examining possible patterns in the employment of learning styles in different situations. In the theoretical framework many studies were found which already investigated learning styles, resulting in a variety of instruments measuring this concept. The learning situation, on the contrary, is relatively unknown. To gain a better understanding of the interrelation between the perceived learning situation and the individual learning styles, these concepts were studied in an explorative manner. This design was used for its possibility to investigate phenomena in their specific context, providing the researcher the option to examine on the job learning in the nursing profession (Dooley, 2009).In general, processes are often studied using a qualitative research design, while studies assessing the outcomes, mediators or moderators of these processes mostly employ a quantitative design (Tashakkori & Teddlie, 1998). Moreover, the OLSQ is especially designed for the nursing profession and distinguishes actual learning behavior of nurses in a variety of domains (Berings et al., 2007). Based upon these arguments, it was decided to measure learning styles (state) quantitatively and learning situations (process) in a qualitative manner. Therefore the first study examined the effect of individual and situational factors on nurses their learning styles preferences by means of a questionnaire. To be able to discover important learning situations, semi-structured interviews were conducted in the second study. The following chapter will explain the chosen instruments, the research process and results of Study 1. Subsequently, Chapter 4 will describe the research design and results of Study 2.

3. Study 1: Questionnaire

3.1 Research Design

The theoretical framework showed that older workers are inclined to have specific learning approaches and preferences. Previous studies about CPD and organizational learning points out that older workers tend to have a preference for more informal manners to learn rather than more formal ways of learning. In the literature about on-the-job-learning however, no clear indication is found how older workers vary in their learning approaches. As well as the influence of other individual factors such as nurses' work experience, educational level, intrinsic motivation to learn and perceived autonomy at work. With the use of a questionnaire the following question was explored:

"How do individual and situational factors affect the learning styles of nurses?"

In order to answer the main question two sub questions were developed which address the effect of individual factors on nurses their learning styles (e.g. personalized mix of learning activities).

RQ1: *"What is the influence of nurses' age, educational level and work experience on their participation in learning activities?"*

RQ2: *"Which personal and situational factors (significantly) contribute to participation in learning activities of nurses?"*

To gain more insight into the influence of the described factors on workplace learning behavior, nurses were asked to fill in a questionnaire. In this paragraph the procedure and respondents are going to be further described first. On account of missing values in the dataset, the chosen method dealing with this problem is addresses next. After which, the chosen instrument will be depicted. The results of the analyses will be reported in paragraph 3.2.

3.1.1 Procedure

The data used in this research was gathered as part of an evaluation project of the e-learning modules of the organization Noordhoff Health. The survey was sent to educational coordinators working at various hospitals in The Netherlands, which were all clients of Noordhoff Health. Nurses received the link to the online questionnaire via their educational coordinators. The second part of the survey included the questions about learning styles and the introduction explicitly stated that this part was for a graduation project and that participation was completely anonymous. To prevent socially desirable answers the real goal of the research was not mentioned. In the introduction was made clear that participation was voluntary and anonymous. After the introduction, the survey started with questions about the variables *choice independence* and *intrinsic motivation to learn*. After which the variable *learning activities* was measured by six questions concerning different work situations. Finally, the respondents were asked to fill in some background characteristics.

3.1.2 Respondents

In order to obtain a representative sample population, hospitals from different regions were contacted, resulting in a sample consisting of nurses working in various hospitals across the Netherlands. Nurses of different age groups, gender, work experience and educational levels participated in this study. A total of 234 nurses filled in the online questionnaire (86% female and 14% male). The age of the respondents varied: 66 (28%) of the respondents were between 16 and 34 years old, 80 (34%) were between 35 and 49 years old, and 88 (38%) respondents were in the age category between 50 and 65 years old. The average amount of work experience in their profession ranged from 1 to 45 years (M= 15, SD= 11.98). Of the respondents 129 (55%) completed a MBO education and 105 (45%) finished a HBO education. In total 11 hospitals participated in the study and were situated in the regions: Friesland, Overijssel,Utrecht, Zuid-Holland, Zeeland, Flevoland, Gelderland and Noord-Brabant.

3.1.3 Multiple imputation

In the data set missing values occurred. This was probably due to the length of the questionnaire. To prevent bias by data which are missing in a systematic way and to maintain sample size, a multiple imputation analysis was used in order to decide how to deal with the missing data. This technique is used when there are items missing due to non-response or drop-out of subjects. By analyzing the patterns of missing values with help of the program *Statistical Package for the Social Sciences (SPSS),* it was determined that there was a fairly large amount of missing values. Of the 234 subjects 38% were missing at least one variable and there were missing values in 91% of all the variables, so only 9% of the variables were complete. This analysis made clear that there didn't seemed to be a pattern in how the values were missing. It appeared to be a random arrangement of missing values across the variables. On account of the reasonably large amount of missing data and the random arrangement of the missing values, trimming or removing the subjects that were missing was not appropriate, for the reason that it would significantly reduce the sample size. Because the data seemed to be missing at random (MAR), multiple imputation of the missing values appeared to be the best solution (Peng, Harwel, Liou & Ehman, 2006). Huisman (2007) compared different techniques that can be used to deal with missing data. He argues that one of the main problems with using single imputation is that it can lead to inaccurate estimates of the mean and/or variances or covariance's. Therefore he also recommends the multiple imputation technique. According to Huisman (2007) variances and standard errors can be correctly estimated using this technique. He states that by repeatedly imputing the data the estimates of the scores become more efficient. Besides that Graham & Schafer (1999) reason that this method even is highly efficient for small sample sizes. Therefore it was decided to replace the missing data utilizing the multiple imputation technique, where the imputation procedure was repeated five times leading to five different datasets. When analyzing the data by using the MANOVA, MANCOVA, Pearson Correlation and Hierarchical Regression Analysis, five outputs were generated providing different estimates of the parameters. These estimates can be used to correct for the standard error of that parameter. For each of the conducted analyses in this research the scores on the pooled results of the five datasets are incorporated in the study. For the MANOVA and MANCOVA a pooled result could not automatically be calculated by *SPSS*. Therefore

each of the score on the five outputs were added up and divided through five to calculate the mean of the scores. These means are included in the result section in Table 2 till 6 and compared with the original results to check for possible bias. Due to technical deficiencies the reliability analysis could not be conducted with the multiple imputation dataset. The Cronbach alphas of the scales were therefore calculated using list wise deletion. Peng et al. (2006) argue that although list wise deletion leads to a loss in statistical power, it is a robust method when data is MAR. The number of valid cases and the Cronbach alphas of every scale are included in the description of the scales in the following paragraph. Per variable less than 15% of the all cases were missing.

3.1.4 Instrument

Data was collected using a digital questionnaire consisting multiple choice questions. The measures that are going to be described below were combined into one survey. All the items were formulated in Dutch; the native language of the sample population. The questionnaire was used to measure the relationship between the variables: *age, educational level, work experience, learning activities, intrinsic motivation and choice independence.* The main goal was to better understand how nurses differ in their learning activities. In this study, existing scales of three questionnaires were combined. Some of the scales were already present in Dutch and other scales were translated. To obtain a valid translation of the questions the translation-back-translation technique (Vermeulen, 2007) was used to achieve an optimal coincidence between the original and the translated items. Therefore the questions were translated twice. The researcher first translated the items from English into Dutch, after which the second translator rendered the questions back to English. In a pre-test the comprehensibility of the questions was tested. Four persons, of which two former nurses, completed the survey while reading the questions out loud and commenting when necessary. This was done to check if the questions were clearly formulated. The pre-test led to the removal of four items of the intrinsic motivation variable. Next to the short introduction the first question (measuring the different learning activities) was complemented by emphasizing that the research is about their own work environment and their learning experiences at the workplace. The internal consistency reliability of the scales was measured using Cronbach's (1951) alpha coefficient. The Cronbach's alpha of the used scales lied between 0.88 and 0.97. According to Cronbach (1951) a value from $\alpha > 0.70$ is acceptable, between $0.80 > \alpha < 0.90$ is good and $\alpha > 0.90$ is excellent. Therefore, the overall Cronbach's alpha of this questionnaire is considered to be very good. The Cronbach's alpha scores are listed per scale in the section below. The original scales are enclosed in Appendix B. The Dutch translated scales are presented in the entire questionnaire which is included in Appendix C.

Demographics

The demographic variables that were included in this study comprised the variables gender (male=1, female=2). Chronical age was measured by utilizing age groups (1=16–34, 2= 35-49, 3=50-65). Years of work experience was answered by an open question and the educational level was coded as 1=MBO and 2=HBO. The control variable was the name of the hospital; to check the type of hospitals and regions that participated in the study, respondents were asked to fill in the name of the hospital they worked for in the form of an open question.

Intrinsic motivation to learn (IM)

To measure nurses' intrinsic motivation to learn, sections of the *Intrinsic Motivation Inventory* (Ryan & Deci, 2000) were utilized. *The Intrinsic Motivation Inventory (IMI)* is a multi-dimensional measurement that has been used in many previous studies, in a wide variety of study domains, in order to determine the respondents subjective perception and experience of an activity or behavior (ex. McAuley, Duncan & Tammen, 1989; Plant & Ryan, 1985; Ryan & Connel, 1989); Ryan, Koestner & Deci, 1991;Tas et al., 2012). McAuley, Duncan and Tammen (1989) investigated the psychometric properties of the IMI and found satisfactory reliability and a strong support for the factorial validity. The IMI has seven subscales to assess the perceived competence, value/usefulness, effort/importance, interest/enjoyment, perceived choice, relatedness and pressure/tension of respondents when carrying out an activity. For the purpose of this study only the subscales interest/enjoyment and value/usefulness were chosen. According to Ryan and Deci (2000) the interest/enjoyment subscale is regarded as the main self-report instrument that specifically measures intrinsic motivation. The other subscales are often used as positive or negative predictors of self-report measures of intrinsic motivation. The value/usefulness subscale is also incorporated in this study because it is the only other subscale which assesses respondent's significance and regard for the activity and behavior itself, which fits the purpose of this study. The other subscales merely measure the state of being while doing the activity. The questions were translated into English and were modified slightly by incorporating the activity, namely 'learning' into the question. After that, the questions were checked by four persons using the thinking-out-loud method. The original scales of interest/enjoyment and value/usefulness consisted of seven questions. Two questions of each subscale were removed during the auditing phase. The items within the two subscales had a rather large overlap which would make the questions less salient and the different meanings unclear to respondents. Each subscale thus had five questions based on a five-point Likert scale (ranging from 1= strongly disagree to 5=strongly agree). An example statement of the interest/enjoyment scale is *'I enjoy learning very much'*. A sample item of the value/usefulness scale is *'I believe learning could be of some value to me'*. As previously explained, the Cronbach's alpha of all the scales were calculated using list wise deletion due to missing values. A total of 224 cases turned out to be valid and were included in the reliability analysis of this variable. The Cronbach's alpha for intrinsic motivation to learn in this study is 0.88.

Choice independence (CI)

Because of the described link between intrinsic motivation and choice independence, a part of the *Workplace Climate Questionnaire (WLQ)* validated by Kirby et al. (2003) is incorporated to measure the perceived choice independence of nurses. The variable choice independence measures the perceived freedom of choice of the respondents along with the independence they believe to have when they execute tasks (Kirby et al., 2003). The reliability of the original WLQ which also included the variables workload and supervisor was quite high (0.74 >α <0.84) (Kirby et al., 2003). The subscale *choice independence* contained five items and had to be answered by a Likert scale from (1=strongly disagree till 5=strongly agree). A sample question is '*We seem to be given a lot of choice here in the work we have to do'.* In total 228 cases were valid and included in the reliability analysis for this variable. The Cronbach's alpha for choice independence in this study is 0.88

Learning activities

To be able to measure the learning activities in which nurses participate, the *On-the-job Learning Styles Questionnaire (OLSQN)* is used. This questionnaire validated by Berings et al. (2002) is specifically designed for the nursing profession and contains 42 items. In their study they tested the psychometric properties of the *OLSQN,* which were considered to be satisfactory, for example Cronbach's alphas of all scales ranged from 0.67 to 0.87 (Berings et al., 2007). The questionnaire employs a situation-response design and assesses nurses their tendency to perform learning activities in various situations (e.g. domains) at the workplace. Berings et al. (2007) operationalized the learning situations into six domains of learning. The learning activities were operationalized into 7 different activities. At the beginning of every question the respondent was asked through which learning activity they progressed in the last two years in a certain domain. All items asked respondents to indicate to which extent they participated in a specific learning activity per situation. Answers were given on a 6-point Likert scale ranging from 1= never to 6=always. An example of a question is *'In the last two years I have developed myself in planning the care for my patients by adopting new tasks in which this can be developed.'* The mean scores per learning activity over all situations were accumulated. This was done to be able to research the preference of nurses to conduct certain learning activities apart from the situation. Besides that, the mean score of all the learning activities together (overall learning styles) was accumulated to measure the general participation in learning activities. Cronbach's alphas were computed per learning activity, which ranged between 0.88 and 0.92. For the learning activities the valid cases that were included in the reliability analysis varied between 206 and 212. At last, the reliability for the overall learning styles was calculated for 138 valid cases (α= 0.97).

3.2. Results

This research focused on the effect of individual characteristics on the participation in work-related learning activities. In this section the results of the analyses on the dataset are going to be explained. First off, the descriptive statistics are presented. The corresponding means and standard deviations are summarized in Table 1. After which the multivariate analysis reports the significant mean differences between the groups on their participation in the learning activities. The multivariate analysis is split up into a MANOVA and a MANCOVA analysis. First, the MANOVA examines the effect of nurses' *age* and *educational* level on the participation in *learning activities*. Second, the MANCOVA investigates if there are significant mean differences between nurses of different *age groups* and *educational levels*, while controlling for a third independent factor, namely *work experience*. The choice for a separate MANOVA analysis had two reasons; due to technical deficiencies in SPSS, a post hoc test could not be executed in the MANCOVA analysis, which would make it impossible to determine which age groups differed from each other. Besides that, work experience is a numerical variable which could only be analyzed as a covariate. At last, the correlation and multiple hierarchical regression analysis depict the relationships between the learning activities and the independent variables: *age, educational level, intrinsic motivation to learn, choice independence and years of work experience.*

3.2.1 Descriptive statistics

Table 1 shows some minor differences between the scores on the various learning activities. The variable *learning by doing one's regular job* (M=3.80, SD=0.81) and *learning through critical reflection with oneself* (M=3.69, SD=0.84) have the highest ratings. These scores are close to four, which means that in general nurses feel that they have often learned by doing their regular job or by critical self-reflection in various situations the past two years. Subsequent were the scores on the variables *critical reflection with others* (M=3.49, SD=0.80), *learning through social interaction* (M=3.46, SD=0.82) and *learning by applying something new in the job* (M=3.43, SD=0.86). These scores are all rated between three and four. This means that nurses participate in these activities on an incidental or regular basis. The variables *learning by theory* (M=3.30, SD=0.85) and *participation in formal events* (M=3.16, SD=0.90) have a score closer to three, which indicates that nurses occasionally learn from looking up theory or from participation in formal events. At last one work environment variable and one motivational variable were assessed. In general nurses evaluated their *intrinsic motivation to learn* (M=3.92, SD=0.70) and *choice independence* at work (M=3.04, SD=0.69) positively. *Perceived choice independence* is rated slightly more negative. The score is close to the middle, which means that nurses are more neutral about their perceived autonomy at work. The means and standard deviations of all the variables are presented in Table 1.

Table 1

Descriptive statistics for all variables

Variables	M	STD
Intrinsic motivation to learn *(five-point Likert scale)*	3.92	0.49
Choice independence *(five-point Likert scale)*	3.04	0.69
Learning activities ***(six-point Likert scale)***		
Learning by doing one's regular job	3.81	0.81
Learning through social interaction	3.46	0.82
Learning through critical reflection with oneself	3.69	0.84
Learning through critical reflection with others	3.49	0.80
Learning by applying something new in the job	3.43	0.86
Learning by theory	3.30	0.85
Participation in formal learning events	3.16	0.90
Overall learning styles	3.48	0.70

Note: Means (M) and standard deviatons (STD) are reported for 234 respondents.

3.2.2 The effects of nurses' educational level and age on learning activities

A one-way MANOVA was performed to test if significant differences exist between respondents with different background characteristics and their participation in learning activities. Therefore the learning activities across the situations were measured in relation to the independent variables *age* (which was subdivided into three age groups 16-34, 35-49 and 50-65) and the respondents' *educational level* (MBO, HBO). Subsequently Levene's F test suggested that homogeneity of variance assumption was considered to be satisfied. First only the main effects will be described per independent variable on the learning activities. After which a univariate test between subjects was calculated. Finally a Bonferroni Post Hoc test explored the differences between groups in more detail.

Differences in level of education

Table 2 shows a significant difference between nurses of different educational levels and their participation in learning activities. Surprisingly, the univariate test between subjects pointed out that the significant mean difference between these groups was only found on the learning activity: l*earning by applying something new in the job* (F (1, 232) ≈ 5.10; p ≈ 0.03; partial η2 ≈ .02). The scores on the Bonferroni Post Hoc test revealed that nurses with a HBO education (M=3.75, SD=0.08) perceived to learn more often from engaging in new activities, tasks or procedures than do nurses with a MBO education (M=3.31, SD=0.08).

Table 2

Influences of Nurses' Age and Educational level on Learning activities

Variables	Wilks's λ	F	df	Significance	η2
Age	0.84	2.47	16,448	p≈0.00	0.08
Educational level	0.93	2.14	8.225	p≈0.03	0.07
Age x Ed. level	0.94	0.81	16,442	p≈0.68	0.03

Note. p ≤ 0.05 indicate a significant difference between age groups. Data is analyzed using a Multivariate Analysis.

Age differences in learning activities

By conducting a one-way MANOVA a statistically significant difference was found between nurses' *age* and their participation in learning activities (Wilks' Lambda ≈ .84, F(16, 448) ≈ 2.47, p ≈0.00, η2 ≈ .08) (See Table 2). The following univariate test demonstrated a significant mean difference between the age groups in the following activities: *learning by doing one's regular job, learning through social interaction, learning through critical reflection with oneself and with others* and *on the overall learning styles* (See Table 3).The only learning activities were no significant mean difference was found was in *learning by theory* and *participation in formal events*.

Table 3

Between-Subjects Effects per Dependent Variable in relation to Age

Variables	F	df	Significance	η2
Learning by doing one's regular job*	8.61	2	p≈0.00	0.07
Learning through social interaction*	4.14	2	p≈0.02	0.03
Learning through critical reflection with oneself*	5.57	2	p≈0.01	0.05
Learning through critical reflection with others*	7.49	2	p≈0.00	0.06
Learning by applying something new in the job*	6.05	2	p≈0.00	0.05
Learning by theory	1.69	2	p≈0.19	0.01
Participation in formal learning events	2.84	2	p≈0.06	0.02
Overall Learning styles *	5.12	2	P≈ 0.01	0.04

Note. p ≤ 0.05 indicate a significant difference between age groups. Data was analyzed using a univariate test of the MANOVA.

The Bonferroni Post Hoc test indicated that in general the youngest group differed the most from the other age groups in their participation in learning activities. The post hoc means comparisons are presented in Table 4 together with the standard deviations of the learning activities per age group. A relatively strong mean differences was found between the younger and middle-aged nurses on the activity *learning by doing one's regular job*. The dependent variables: *learning through social interaction* and *learning through critical reflection with others* displayed only a significant mean differences between the youngest and oldest age group

Table 4

Mean Scores and Standard Deviations on Learning Activities per Age Group

Dependent variables	16-34	35-49	50-65
Learning by doing one's regular job**	4.15 (0.10)a	3.72 (0.09)b	3.64 (0.08)b
Learning through social interaction*	3.69 (0.99)a	3.43 (0.90)	3.32 (0.86)b
Learning through critical reflection with oneself**	3.97 (0.10)a	3.62(0.09)b	3.52 (0.89)b
Learning through critical reflection with others**	3.78 (0.10)a	3.49 (0.09)	3.29 (0.08)b
Learning by applying something new in the job**	3.74 (0.10)a	3.34 (0.10)b	3.28 (0.10)b
Learning by theory	3.44 (0.10)	0.18 (0.09)	3.30 (0.09)
Participation in formal events	3.17 (0.11)	2.98 (0.10)	3.30 (0.10)
Overall learning styles *	3.71 (0.08)a	3.40 (0.08)b	3.38 (0.07)b

Note: Variables were measured on 6-point scales (1 = never; 6= always)

In the table first the means are displayed, after which the standard deviations are written in brackets.

**p < .05, **<0.01; a and b indicate significant differences between these groups in the Bonferroni post hoc test.*

3.2.3 Effect of nurses' work experience on participation in learning activities

Years of work experience was added as a covariate in this research, since it was assumed that this factor would impact the relationship between *age* and the various *learning activities*. To account for possible effects of this variable a Multivariate Analysis of Covariance (MANCOVA) was performed with the seven *learning activities* and the *overall learning styles* as dependent variables, the variables *age* and *educational level* as independent variables and the *years of work experience* as covariate. In a MANCOVA the mean score differences between groups are analyzed after correction for the influence of the covariate. First, Box's Test of Equality of Covariance Matrices was checked and revealed that homogeneity of covariance assumption was considered to be satisfied. The main effects of every independent variable on the learning styles are displayed in Table 5. Next to the main effects, the two-way interaction effect of nurses' *age* in combination with their *educational level* is incorporated in Table 5. The results of the univariate tests between subjects are shown in Table 6.In the theoretical framework was suggested that older, more experienced or lower educated workers could possibly have less intrinsic motivation to learn. Therefore a second one-way MANCOVA was performed with the independent variables *age, educational level* and *work experience* and the dependent variables *intrinsic motivation to learn* and *perceived choice independence*.

Differences in work experience and age of nurses

Table 5 shows that after correction by the covariant, there is only a significant main effect noticeable for the variable *age* on the learning activities, but this effect endured a loss in power. The results displayed no significant mean differences between the *educational levels* of nurses on the various *learning activities* after controlling for the effect of years *of work experience*. Again no interaction effect was found for nurses' *age* in combination with their *educational level*

Table 5

Influences of Demographics on Learning activities

Variables	Wilks's λ	F	df	Significance	η2
Age	0.87	2.07	16,44	p≈0.01	0.07
Educational level	0.94	1.87	8.22	p≈0.07	0.06
Work experience	0.98	0.64	8,22	p≈0.74	0.02
Age x Ed. level	0.94	0.81	16,44	p≈0.68	0.03

Note. Data is analyzed by means of a Multivariate Analysis of Covariance and used years of 'work experience' as covariate.

Before interpreting the results of the univariate test between subjects, Levene's F test was controlled for, which reported that homogeneity of variance assumption was considered to be satisfied. Table 6 presents the results of the univariate test and shows that there are less significant mean differences found between the age groups when corrected for by the covariate *work experience*. Only the activities: *learning by doing one's regular job, learning through critical reflection with others* and *participation in formal events* presented a significant mean difference between age groups. In general the found age effects on the earlier conducted MANOVA decreased by adding the covariate. Remarkable is the uncovered significant mean difference on *the participation in formal learning events*. In the previously described one-way MANOVA, which tested the effect of *age* on the eight *learning activities*, there was no significant difference found on this activity. The effect of *age* on *participation in formal events* is therefore the only effect that became stronger when corrected for *work experience*. The effects of *age* on the learning activities: *learning through social interaction, learning trough critical reflection with oneself* and *learning by applying something new in the job* and the *overall learning styles* were not significant after controlling for the influence of the *years of work experience* of nurses.

Table 6

Between-Subjects Effects per Dependent Variable in relation to Age

Variables	F	df	Significance	η2
Learning by doing one's regular job*	4.70	2	p≈0.01	0.04
Learning through social interaction	1.83	2	p≈0.17	0.02
Learning through critical reflection with oneself	2.74	2	p≈0.07	0.02
Learning through critical reflection with others*	4.09	2	p≈0.03	0.03
Learning by applying something new in the job	2.16	2	p≈0.12	0.02
Learning by theory	0.30	2	p≈0.28	0.01
Participation in formal learning events*	3.83	2	p≈0.02	0.03
Overall learning styles	2.15	2	p≈0.13	0.09

*Note. * p≤0.05 indicate a significant difference between age groups.*

Data is analyzed by means of a univariate test of the MANCOVA and used years of 'work experience' as covariate.

Differences in intrinsic motivation to learn and perceived choice independence

A second one-way MANCOVA was conducted to control for possible differences between nurses of different *age, educational level* and *work experience* in their *intrinsic motivation to learn* and *perceived choice independence*. The outcomes of the MANCOVA for *age* when corrected *by work experience* displayed no significant mean differences between the groups (Wilks' Lambda ≈ .98, $F(4, 460) \approx 1.08$, $p \approx 0.37$, $\eta^2 \approx .01$).The results indicate that there are no significant mean differences between the age groups on these variables, thus there are no significant age-related differences noticeable in nurses their *motivation to learn* or *perceived autonomy at work*. Furthermore, no significant mean differences existed between the *educational level* of nurses and their perceived *choice independence* and *intrinsic motivation to learn* (Wilks' Lambda ≈ .98, F (2, 231) ≈ 3.00, p ≈0.06, η2 ≈ .03). There only seemed to be a significant mean difference present between *work experience* on *choice independence* and *intrinsic motivation to learn* (Wilks' Lambda ≈ .92, F (2, 227) ≈ 9.23, p ≈0.00, η2 ≈ .08). Subsequently, the univariate test between subjects pointed out that the significant mean difference between these groups was only found for *intrinsic motivation to learn* F(1, 3242) ≈ 17.85; p ≈ 0.00; partial η2 ≈ .07). Finally, the two-way interaction between *age* and *educational level* also showed no significant effect on their *perceived choice independence* and *intrinsic motivation to learn* (Wilks' Lambda ≈ 0.99, F(4, 454) ≈ 0.47, p≈ 0.76, η2 ≈ .00).

3.2.4 Correlation and regression analysis

In this paragraph the variable *learning activities* is going to be further investigated by means of a Pearson correlation analysis and a hierarchical multiple regression analysis. Besides the effects of the demographic variables, nurses their perceived *choice independence* and *intrinsic motivation to learn* are going to be explored in more detail to research a possible mediation effect. The Pearson correlation analysis is used to explore which relationships exist between the independent variables: *work experience, age, educational level, choice independence* and *intrinsic motivation to learn* and the dependent variables, namely the *learning activities*. The hierarchical regression analysis examines if the independent variables have an effect on the several dependent variables and how much of the variance of the dependent variables can be explained by its predictors. This analysis is done in two stages. In the first step the effect of the demographic variables on the *learning activities* and on the *overall learning style* was measured. In the second stage the effects of these demographic variables together with the individual characteristic *intrinsic motivation to learn* and the work environment factor *choice independence* on all the *learning activities* and *the overall learning style* were calculated.

Pearson Correlation

First of all, a Pearson correlation analysis was conducted between each independent variable and the various learning activities in order to determine the relationship between all variables. And if this was either a positive or negative relationship. The correlations and reliabilities of all the variables are presented in Table 7 on the next page. In general, highly positive correlations were found between the different *learning activities*. With the exception of *participation in formal events and learning by theory,* which displayed smaller correlations in relation to the other *learning activities*. Looking at the independent variables, all *learning activities* have a significant, but small, positive correlation with *intrinsic motivation to learn*, thus the higher their intrinsic motivation to learn, the more nurses participated in the seven learning activities over the past two years. *Intrinsic motivation to learn* also has a significant positive correlation with *choice independence*. This means that higher levels of *perceived choice independence* are associated with a *stronger intrinsic motivation to learn*. There was no significant relationship found between nurses' *age* and *educational level* and their *intrinsic motivation to learn*. For *years of work experience* on the other hand, a significant negative relationship was found. The *perceived choice independence* of nurses presented no significant relationship with the *learning activities* as well as with the demographic variables: *age, work experience and educational level*. On the whole, *age* and *work experience* have a significant negative correlation with most of the *learning activities*, except for *participation in formal events*. Also *age* doesn't have a significant correlation with *learning by theory*. Besides that, there were no significant relationships found between nurses their *educational level* and the various learning activities. The demographic variables all had a significant relationship with each other, especially the variables *age* and *work experience* showed a strong correlation. In the hierarchical multiple regression analysis these effects are further investigated.

Table 7

Correlations and Reliabilities for all variables

	A	B	C	D	E	F	G	H	I	J	K	L
A.Age	X											
B.Work experience	-.46**	X										
C.Educational level	-.19**	-.20**	X									
D.Intrinsic Motivation to learn	-.08	-.16*	.16	X								
E.Choice independence	.03	.06	.04	.18**	X							
F.Learning by doing one's regular job	-.26**	-.18**	.09	.28**	.08	X						
G.Learning through social interaction	-.17**	-.13*	.09	.24**	.10	.72**	X					
H.Learning through critical reflection with oneself	-.21**	-.16*	.04	.38**	.12	.73**	.70**	X				
I.Learning through critical reflection with colleagues	-.22**	-.17**	.02	.32**	.11	.74**	.85**	.82**	X			
J.Learning by applying something new in the job	-.22**	-.21**	.14*	.37**	.13	.75**	.67**	.76**	.74**	X		
K.Learning by theory	-.10	-.13*	.05*	.46**	.06	.54**	.55**	.64**	.61**	.69**	X	
L.Participation in formal events	-.02	-.06	-.04	.31**	.02	.42**	.41**	.44**	.45**	.55**	.76**	X

*** Correlation is significant at the 0.01 level (p <0.01, 2-tailed)*

** Correlation is significant at the 0.05 level (p< 0.05, 2-tailed)*

Hierarchical Multiple Regression

A hierarchical multiple regression was conducted to examine the influence of respondents' *age*, *educational level* and *years of work experience* on the participation in specific *learning activities*. Also the role of *intrinsic motivation to learn* and *perceived choice independence* on the relationship between the demographic factors and *learning activities* is explored. To be able to conduct a regression analysis the variable *age* was split up in two groups. In the multivariate analysis it became clear that the differences in mean scores were almost exclusively between the older or middle-aged group and the younger age group. For the purpose of this analysis these groups were merged together to form one group (1= 16-34, 2= 35-65).Before the regression analysis could be used certain assumptions must be met. A set of control analyses were conducted on each of the independent variables per dependent variable. First off, an analysis of standard residuals was carried out to control for outliers, which resulted in the removal of 6 respondents .Because of the high correlation between some of the independent factors, all the data was checked to see if it met the assumption of collinearity and independent errors. The scores of these tests are included in Tables 9 and 10 in appendix A. The results indicated that multicollinearity was not a concern and the data also met the assumption of independent errors. Furthermore the scatter plot of standardized residual values showed that the data met the assumptions of homogeneity of variance and linearity.

After the control analyses, a two stage hierarchical multiple regression was conducted eight times with each *learning activity* and the *overall learning styles* as dependent variables. The variables: *age, educational level and work experience* were entered at the first stage. The variables*: intrinsic motivation to learn* and *choice independence* were put in at stage two. The regression statistics of the first model and second model were reported in Table 8.Using the enter method it was found that model 1 explains a significant amount of the variance in the learning activities: *learning by doing one's regular job, learning by social interaction, learning by critical reflection with oneself, learning by critical reflection with others, learning by applying something new in the job and learning by theory*. With merely one exception; *age, educational level* and *work experience* combined do not clarify a significant amount of the variance in the learning activity *participation in formal events*. This result is in accordance with the results of the Pearson correlation where no relation was found between the independent variables and the *participation in formal events.*

Table 8

The effect of all Individual Factors and Choice Independence on Learning activities

	A	B	C	D	E	F	G	H
Model 1								
Age	-.30*	-.12	-.25	-.22	-.16	.01	.10	-.13
Educational Level	.14	.15	.08	.02	.25*	.13	.01	.11
Work Experience	-.01	-.01	-.01*	-.01*	-.01**	-.01*	-.01	-.01**
R^2	.10**	.05**	.07**	.06**	.11**	.04*	.01	.08**
Adjusted R-Square	.09**	.04**	.06**	.05**	.09**	.03*	-.02	.06**
Model 2								
Age	-.30*	-.12	-.24*	-.22	-.16	.01	.10	-.13
Educational Level	.07	.09	-.02	-.06	.16	.01	-.07	.03
Work Experience	-.01	-.01	-.01	-.01	-.01*	-.01	-.01	-.01*
Choice Independence	.15*	.16*	.17*	.16*	.18**	.06	.03	.13*
Intrinsic Motivation to learn	.41**	.36*	.59**	.49**	.55**	.77**	.55**	.53**
R^2	.19**	.13**	.24**	.19**	.25**	.25**	.11**	.27**
Adjusted R-Square	.18**	.11**	.22**	.17**	.23**	.24**	.09**	.25**
R Square Change	.10**	.08**	.16**	.13**	.14**	.21**	.09**	.19**

Note. A≈Learning by doing one's regular job; B = Learning through social interaction; C = Learning through critical reflection with oneself; D = Learning through critical reflection with colleagues; E = Learning by applying something new in the job; F= Learning by theory; G = Participation in formal events, H = Overall learning style.

Data is analyzed by conducting a hierarchical regression analysis.

All the values in this table are Beta values.

**p<0.05, **p<0.01*

For the learning activities as a whole, Model 1 shows to predict approximately 8% of the variance of *overall learning styles* (R^2 =0.08, $R^2_{Adjusted}$ = 0.06, p<0.01). Which indicates that Model 1 is a minor but significant predictor for the overall participation in learning activities. The beta scores in Table 8 point out that nurses' participation in learning activities are mainly influenced by their *years of work experience*. The analysis shows that *work experience* significantly predicts the participation in the learning activities: *learning by critical reflection with oneself and with others, learning by theory, learning by applying something new in the job* and *on the overall learning styles*. Nurses their obtained level of education was only a significant predictor for the participation in the activity *learning by applying something new in the job,* confirming the previously conducted MANOVA results where

significant mean differences were found between nurses with a HBO and MBO education on this. learning activity. For *age* just one negative significant beta value was found on *learning by doing one's regular job*.

Introducing the variables *choice independence* and *intrinsic motivation to learn* in stage two led to a significant contribution to the regression model. From the results can be obtained that Model 2 predicted approximately 27% of the variance of the overall learning styles (R^2 =0.27, $R^2_{Adjusted}$ = 0.25, ΔR^2= 0.19, p<0.01). Which means that by adding *choice independence* and *intrinsic motivation to learn*, the predictive power of the general participation of nurses in all the learning activities increased with 19%. This change in R^2 was significant (p<0.01). Furthermore *intrinsic motivation to learn* revealed to have a strong positive effect on all the learning activities. Choice independence showed a slightly weaker positive effect on six of the eight learning activities. No significant effect was found for *choice independence* on *learning by theory* and *participation in formal events*. Moreover, model 2 disclosed *intrinsic motivation to learn* as a unique predictor of the *participation in formal events* and *learning by theory*. The beta value of *work experience* was the only significant factor of model 1 on the learning activities: *learning by critical reflection with oneself and with others, learning by theory, learning by applying something new in the job* and for *the overall learning styles*. The beta value of *work experience* on *critical reflection with oneself and others* and *learning by theory* became non-significant after adding *choice independence* and *intrinsic motivation to learn*, suggesting a mediation.

The beta values on *the overall learning styles* and the activity *applying something new in the job* remained significant, but did endure a loss in power, displaying a p value of less than 0.05 in model 2. The significant beta value of *educational level* on *applying something new in the job* also became non-significant in model 2, whereby *educational level* became the only factor that did not have any significant beta values and thus no individual predictive power on the participation of nurses in the several learning activities. Table 8 shows that when adjusted by the influence of nurses' *intrinsic motivation to learn* and *choice independence*, only *age* was a significantly negative predictor of the participation in *learning by doing one's regular job* and *learning by critical reflection with oneself*. By adding these two variables, the beta value of *age* on *learning from critical reflection by oneself* became significant, suggesting a mediation effect *of intrinsic motivation to learn* and *choice independence between age* and this activity.

3.3. Discussion Study 1

The starting point of Study 1 was to gain a better understanding which individual factors actually influence nurses their learning behavior on the job. This was done by assessing nurses' tendency to perform learning activities in various situations at the workplace, which together forms their learning style. Nurses' *educational level, age, years of work experience* and *intrinsic motivation to learn* were analyzed to be able to examine differences in nurses' learning styles. Thereby the situational factor *perceived choice independence* was included because of it supposed effect on intrinsic motivation.

3.3.1 Main findings

The hierarchical regression analysis pointed out that the factors *work experience, intrinsic motivation to learn* and *perceived choice independence* are significant predictors of the overall participation of nurses in learning activities. In addition, the factor *age* contributed to two specific learning activities, namely *learning by doing one's regular job* and *learning by critical self-reflection*. The results showed nurses' *age* to be a unique predictor of the participation in *learning by doing one's regular job*. The predictive value of *age* on *learning by critical reflection with oneself* became significant by adding *choice independence* and *intrinsic motivation* to the model, suggesting a strong influence from these two factors. Furthermore, the effects nurses' educational level could not be proven.

Overall, *intrinsic motivation to learn s*howed to be the strongest contributor to all learning activities, while being the only predictor for the *participation in formal events* and *for learning by theory*. These results are in line with the findings of Greller (2006), who stated that career motivation, rather than age or work experience, predicted the time spent on professional development. The *perceived choice independence* of nurses contributed to almost every learning activity, except for *participation in formal events* and *learning by theory*. Due to the more formal character of these learning activities nurses could feel more obliged by their organization to participate in these activities. The correlation and hierarchical regression analysis demonstrated no direct relationship between *perceived choice independence* and the learning activities. Nurses' *perceived choice independence* seemed to affect their learning style merely because of its positive effect on their *motivation to learn*.

The findings showed *work experience* to be third significant predictor for the overall participation in learning activities. This factor thereby demonstrated to be the only *predictor for learning by applying something new in the job*. This result indicates that differences in nurses' *years of work experience* do influence the amount of new tasks or situations that nurses perceive to have encountered or applied in their daily work. The outcomes of the MANCOVA confirmed previous results of Maurer et al. (2003) and Van Vianen et al. (2011), which showed that the effects of chronical age disappeared when incorporating tenure. For this reason, *age* and *work experience* seem to have a strong interrelation and thus combined effect on the participation on learning styles. When correcting age effects for *years of work experience* only the activities*: learning by doing one's regular job, learning through critical reflection with others* and *participation in formal events* revealed to have a significant mean difference between age groups. Therefore age-related effects seemed to be stronger on the participation in these three learning activities, because the analysis factored out the noise or error from the covariate *work experience*. *Age* appeared to have the strongest effect on *learning by*

doing one's regular job, since age revealed to have the only significant beta value on this activity. Age had a significant negative correlation with almost all learning activities. This means that when nurses increase in age their participation in these learning activities decreases. These results are in line with the majority of the studies in CPD, which claim a decreasing participation in learning activities with the aging of employees (Pool et al., 2013b). Yet, several studies have to be taken into account which also utilized clearly defined age groups. These studies merely distinguished a lower participation in CPD between employees younger than 50 years old and the groups that surpassed this age (Cully et al., 2000; Simpson et al., 2002; Taylor and Urwin, 2001; Wray et al.,2009.

When looking at the found differences between age groups, the general tendency was that nurses in the youngest age group (16-34) differed from the middle-aged (35-49) and oldest (50-65) age group. This tendency was also visible for *learning by doing one's regular job,* which is not surprising considering that younger nurses probably have less work experience and could have to perform operations they never experienced before in their daily work. Significant differences between just the younger and the oldest group were visible in the learning activities *learning by critical reflection with others* and *participation in formal learning events.* However, it could be possible that the effect on *participation in formal events* is influenced by intrinsic motivation to learn, because intrinsic motivation revealed to have the only significant correlation with this activity. These findings indicate a general decrease in the participation in more informal learning activities from older and more experienced nurses. These results are in line with Urwin (2006) *a*nd Simpson et al. (2002) who explained that older, more experienced workers prefer short training courses that are targeted to increase professional skills. This can be explained by the results of Pool et al. (2013a) who found that older nurses have a different perspective on the purpose of CPD than younger nurses. The perspective of younger nurses revealed an ambition to increase their skills and knowledge, they were also more open to career opportunities. Older, more experienced nurses were more focused on direct patient care and maintenance of their knowledge and skills.

3.3.2 Limitations

In this study the following limitations have to be taken into account. First of all, missing data in this study were analyzed by using the multiple imputation technique. Although, this technique offers a powerful and recognized tool to deal with this problem, it remains something to bear in mind when inferences are made on the basis of the results of this research. Secondly, the middle-aged and older age group were merged to be able to perform the hierarchical regression analysis. After this merge, the distribution between the younger and older group was no longer representative for the nursing population, because the younger group (16-34) consisted of 66 nurses in relation to the older group (35-65) of 168 nurses. Thirdly, respondents in general rated their intrinsic motivation to learn relatively high. Moreover, the overall mean scores on every learning activity were all positive (above three), indicating that the sample in general occasionally or often participated in every activity the past two years. Besides that, there was no significant mean difference found on the intrinsic motivation to learn between any of the groups. The MANOVA analysis, on the contrary, did show significant mean differences between age groups. Looking at these results, it could be possible that a more homogenous group participated in this study, containing nurses who are, more than averagely,

interested in learning on the job and in their professional development. Because of the current retrenchments in health care the workload of nurses increased. Nurses have only limited spare time at their jobs. It is therefore conceivable that nurses with a generally higher intrinsic motivation would be more inclined to complete the survey. Finally, the learning activities, perceived choice independence and intrinsic motivation to learn were assessed by self-report measurements. It is possible that self-report bias may have occurred due to the tendency of persons to respond in a socially desirable way. If respondents answer in this way, they may tend to over report behavior that they think is viewed as most desirable or appropriate by researchers and society (Donaldson & Grant-Vallone, 2002). This may have led to the high scores on every learning activity.

3.4 Conclusion Study 1

The aim of Study 1 was to gain a better understanding how individual and situational factors affect the learning styles of nurses. The most important conclusion of this study is that nurses' *intrinsic motivation to learn* has the strongest impact on the learning behavior of nurses above and beyond what can be accounted for by the other personal factors, namely *age, work experience* and *educational level*. Furthermore, nurses seem to be more intrinsically motivated when they perceive enough choice independence in their job. This implies that nurses' learning style is influenced by both individual and situational factors. Of the demographic variables, *work experience* showed to have the largest impact on the learning styles of nurses together with their *age*. In general, the results indicate an overall decrease in nurses' participation in learning activities when becoming older and more experienced. A remarkable finding was the higher participation of nurses past the age of 50 in formal learning events and the generally low participation of older and more experienced workers informal learning events, such as *learning by critical reflection with others* and *learning by doing one's regular job.* These results can be attributed to the fact that younger nurses still can increase their skills and knowledge from situations and new tasks in daily practice, whereas older, more experienced nurses already encountered most situations and generally don't face the challenge to execute new tasks anymore. They still have to keep their knowledge updated, which could possibly explain their higher participation in formal learning events.

4. Study 2: Interviews

From the theoretical framework was obtained that nurses their actualized on-the-job learning strategy is influenced by the perceived learning situation as well as their personal preferences in learning activities (i.e. their learning style).Study 1 concentrated on learning styles to uncover the effect of individual and situational factors on the participation in learning activities. In Study 2 the interrelation between learning styles and the learning situation is further investigated by focusing on the manner in which nurses learn (e.g. their learning styles) in actual on-the job learning situations.

4.1 Research Design

In the second study the interrelation between learning situations and learning activities was examined by the use of semi-structured interviews. These interviews were conducted to gain a better understanding in which way perceived learning situations affect nurses' on-the-job learning behavior. In literature many researchers acknowledged the importance of the learning situation as a decisive determinant for the actual learning strategy that nurses employ (Kolb, 1984), but these studies primarily focus on situational factors. The objective of Study 2 is to discover actual learning situations in which nurses perceive to learn on their job. In order to examine the interrelation between the learning styles and the perceived situation, this study focuses on possible similarities in the learning process of nurses by examining patterns in the deployment of learning styles in various situations. By investigating these patterns, the possibility that certain learning situations provoke a specific mix of learning activities (e.g. learning style), was explored. To be able to meet the research goal, the following research question was developed:

"How do nurses perceive to learn in different on-the-job situations?"

To be able to answer this question the following sub questions needed to be answered first:

RQ1: *"In which concrete on-the-job situations do nurses perceive to learn?"*

RQ2*:* *"How do nurses learn in these on-the-job situations?"*

As explained in chapter two, the perceived learning situation could be influenced by various situational factors. To gain more insight into factors of the learning situation that inhibit or promote learning, the following sub question is taken into account.

RQ3: *"Which situational factors affect nurses' on-the-job learning behavior?"*

Qualitative interviews provided a suitable methodology to explore the learning behavior of nurses in a specific context, namely a hospital environment. This exploratory approach was used to develop a grounded understanding of nurses' perceptions of their on–the–job learning. In this chapter, the research procedure, respondents, instrument and data analysis are further depicted.

4.1.1 Procedure

Before starting the interview the respondent was asked to read an introduction letter which explained the purpose of the research. This letter guaranteed the anonymity of the respondent when partaking in the study, after which a couple of questions concerning background characteristics followed. In addition the researcher asked permission to tape the conversation. The interviews were conducted at the respondent's homes to make sure they were comfortable to speak about their work and could give open and frank responses. Due to circumstances three interviews took place in the respondents' work environment. To ensure the respondents' privacy, these interviews were conducted in an empty office at their departments. The interview protocol (see Appendix E) acted as guideline during the conversations to make sure the researcher wouldn't miss any relevant information. At the beginning of the interview the researcher emphasized the context of the study, making sure the respondents would only think about learning situations encountered in their personal work environment. The interview then started by asking respondents to think about a situation or occurrence in which they felt to have learned in the past year. They were asked to describe this situation as comprehensively as possible. After the opening question, probing techniques were used to ensure that every aspect of the situation was well described. The opening question was repeated a second time. In the second phase the respondents were asked about individual and situational factors concerning their learning motivation and learning environment. This was done to gain more in-depth information about specific characteristics of the learning environment. In every phase probing techniques were used to acquire a valid interpretation and understanding of the respondents' perceptions. When using the probing techniques, the researcher was alert not to steer the answers in a specific direction, but to remain neutral (Means, 2004).

4.1.2 Respondents

Respondents were selected by using purposive sampling. The majority of the respondents were selected within the researcher's personal network. Five respondents were reached via the method of snowball sampling, which comprehends reaching respondents via earlier selected candidates (Bryan, 2008). Purposive sampling was used to ensure that certain selection criteria were met. One of these criteria was to include nurses working in different types of hospitals in The Netherlands. The Dutch health care system contains two types of public hospitals, namely academic or top clinical hospitals and general hospitals. Academic or top clinical hospitals have, for the large part, the same functions as general hospitals. Additional functions contain collaboration with universities and the focus on scientific medical research. In general, academic hospitals are larger and have more financial means for education, because these hospitals work on improving medical technologies, medicines or treatments (RIVM, 2015). The emphasis on academic research and the financial means of academic hospitals could possibly influence the perception and quality of the learning environment. To prevent bias due to generalization of results and to be able to research situational factors that influence the learning situation, different types of hospitals were included in this study. Second, the work experience of the respondents was controlled for. In the first study this aspect showed to influence the participation in learning activities of nurses. Based upon Study 1, no selection criteria were formed in

terms of the age, educational level and gender of the respondents. The sample size was based upon the study of Guest et al. (2006), which indicated guidelines for non probabilistic sampling. They argued that the sample size has to be based on the concept of saturation. By analyzing empirical data they found that the most important data is collected within twelve interviews and no new information or themes are added when analyzing more interviews. In total twenty nurses participated in this study, of which ten were working at an academic or top clinical hospital and ten in general hospitals in The Netherlands. Overall, six academic or top clinical hospitals in relation to five general hospitals participated. These hospitals were located in five different regions in the Netherlands, which were: Groningen, Overijssel, Friesland, Utrecht and Drenthe. All the respondents were female of which thirteen possessed a HBO degree and seven completed a MBO education. The age of the respondents varied from the age of 23 till 57 years old (M= 33, SD= 9.27). Fourteen nurses were between 16 and 34 years old, five were between 35 and 49 years old, and eleven nurses were in the age category between 50 and 65 years old. The average number of work experience ranged from five months up to forty years (M=12.5, SD=10.06). Nine of the nurses had less than ten years of work experience, eleven nurses had more than ten years of work experience.

4.1.3 Instrument

To obtain more insight into the characteristics of the perceived learning situation semi-structured interviews were conducted. These face-to-face interviews were based on the critical incident technique (CIT) (Flanagan, 1954), a technique which is used for the exploration of critical incidents, in this case on-the-job learning situations. This technique formed an integral part of the interviewing process by presenting the researcher a method to reveal critical learning situations and providing a way to research the complex dynamics and interrelationships between learning activities and situations. The semi-structured interview was split into two stages. In the first stage the CIT was used to start off the interviews by letting respondents reflect on two learning situations they experienced in the past year. The researcher emphasized that the respondent had to think about situations in which they perceived to have learned in the workplace. The respondent was asked to describe these situations in detail. Although CIT is considered to be a ‘retrospective self-report’ which follows clear interview steps (Butterfield et al., 2005), it is still highly flexible and allows the researcher to use probing techniques to gain rich and in-depth information about the perceptions and interpretations of respondents concerning specific phenomena. In stage two, the researcher asked more specifically about learning activities and individual and situational factors that were not already mentioned in stage one. To ensure the quality and trustworthiness of the data, standardized procedures were used. The opening question and a few follow-up questions in stage one were standardized. The questions of stage two were pre-determined and based upon factors derived from theory, which are described in paragraph 2.3 and 2.4. These precautions were used to prevent leading questions and thus socially-desirable and biased answers (Dooley, 2009). In addition, the standardized questions made sure the researcher would act as neutral as possible during the interview. The interview protocol is enclosed in Appendix E.

4.1.4 Data analysis

All of the interviews were transcribed verbatim, leading to 237 transcript pages. The transcriptions were analyzed using ATLAS.ti software, to be able to find patterns in the data. The five steps to analyze qualitative data of Baarda et al. (2009) were used. These steps were in accordance: coding the data, linking codes, interpreting and defining code structure, defining main categories and determining inter-subjectivity by calculating the Cohen's Kappa. The first analysis round was based on open coding using the grounded theory approach to discover critical learning situations (Boeije, 2005). By inductive analysis four learning situations were derived from the data. These situations were combined into one codebook. The second coding round was based on themes. These themes referred to the learning activities of nurses and the situational factors of the learning environment. In total three codebooks were used, including the inductively based codebook of the learning situations and the deductively based codebooks comprising the situational factors and the learning activities. The learning situations and learning activities were derived from literature and described in Chapter 2. The codebook containing the learning activities was derived from the study of Berings et al. (2008b). All of the codebooks are displayed in Appendix F. Every citation in the interviews was coded using these codebooks. To ensure the reliability of the codes the inter-reliability was assessed by a second coder. A random selection of four interviews was send to the second coder. Initially the first coder found it hard to make the distinction between the learning activities *learning by social interaction* and *learning by supervision* in situations where nurses were coached. Therefore it was decided to enhance the explanation of learning by supervision to make the distinction clearer. This was done by making 'coaching by physicians, supervisors or managers' an explicit label within *learning by supervision*. After that, the four interviews were sent to the same second coder, which linked all the citations to the codes of the three codebooks. This sample was coded on a main code level and represented 20% of the total data. Subsequently the coded interviews of the first and second coder were compared. The Cohen's Kappa, or in other words the inter-reliability, was based upon this data. The Cohen's Kappa was found to be 0.88. According to Landis and Koch (1977) this score is considered to be good.

4.2. Results

In the result section the intrinsic motivation to learn of the sample population is going to be attended first. Both the theoretical framework and the results of Study 1 regard intrinsic motivation as an important determinant for the participation in learning activities at work. In order to take account of the influence of this individual factor, the respondents were asked about their motivation to learn at their job, which is described in paragraph 4.2.1. Subsequently the results of the interviews are going to be described per sub question. By conducting an inductive analysis, four critical learning situations were derived from the data. These four learning situations provide the answer to the first sub question, namely *"In which concrete on-the-job situations do nurses perceive to learn?."* For every situation, patterns in learning activities were examined to depict how nurses learn in these critical learning situations. The four learning situations and the manner in which nurses learn in these situations will be described in paragraph 4.2.2 till 4.2.5. Finally, nurses mentioned several situational factors of the learning environment that affected their learning. These factors will be discussed in paragraph 4.2.6.

4.2.1 Intrinsic motivation to learn

Almost every respondent named not one, but multiple reasons why they felt motivated to learn. The majority of the respondents indicated to be primarily motivated to be able to provide quality patient care. They state that the condition of their patients is their first and foremost concern and that learning is necessary to guarantee the best quality of patient care.

> *''Yes, it is maybe something specific of nursing, but I think it is really important to provide patients with good care and service. That patients return to their home with a good feeling. That you did everything to ensure that a patient is nursed as good and comfortably as possible. That is my goal, my aspiration.''*

On the other hand, respondents explained that learning is sometimes experienced as mandatory when subjects are repeated often or when the subject material is not applicable to their specific job. An example of learning that felt obligatory included e-learning courses which the respondents have to complete every year to keep their official registration as nurse. Although almost all formal learning activities are mandatory, the majority of the respondents considered these courses to be very interesting. Respondents indicated to participate in these courses to keep their knowledge updated. They consider formal learning a necessity to be able to perform their tasks sufficiently.

> *''I think because you want to be a perfectionist, because you want to do your work properly. And I think you are obliged, since your work is evaluated. It is mandatory to work according to protocol. I think you first and foremost want to learn to do your work well and to keep up to date. You don't want to be lagging behind.''*

In addition to the previous mentioned reasons, respondents described to enjoy learning new things. For example, eight nurses stated to be eager to learn and curious of the functioning of the human body. Five nurses explained they were motivated to learn, because they enjoyed their work and six nurses mentioned career development as a reason to learn for their job. There were no noticeable

differences between experienced and less experienced nurses in their motivation to learn. Overall, the respondents were all intrinsically motivated to learn and named a combination of the previously stated reasons as an explanation for this motivation.

4.2.2 Acute work situations

When asked for meaningful learning situations or experiences at work, a great deal of the respondents mentioned acute or urgent situations. These situations varied per respondent but had certain characteristics in common. Overall these settings concerned patients who became unwell, for example became short of breath, patients who passed out or patients of whose condition suddenly deteriorated. To summarize, situations where immediate action was necessary were considered 'acute work situations'. Eleven nurses recalled to have learned from such circumstances in the last year, of which four described a reanimation procedure. By analyzing these situations, certain successive steps of action became palpable, from where a pattern in the participation in learning activities was made clear. From the data was obtained that the type and order of learning activities, in which nurses participated during an acute situation, differed between nurses with more than ten years of work experience and nurses with ten or less years of work experience. Six experienced nurses mentioned to learn from an acute situation in relation to five less experienced nurses. First, the sequence of steps that were taken by experienced nurses are going to be described. Since the learning behavior of less experienced nurses comprised more steps, the additions in this sequence are depicted next.

Learning behavior experienced nurses

When experienced nurses encountered a sudden deterioration in the condition of the patient, they recalled to first ask for help by pushing an alarm button and calling for reinforcement in the form of a physician, other nurses of the department, and in complex cases, other specialists belonging to that specific ward. In case of a reanimation a special team of the Intensive Care, named the "reanimation team" was also called in. When help arrived, the nurses supported the physicians or other nurses by carrying out procedures, by reanimating the patient, by coaching others and delegating tasks or giving feedback during reanimation. Their description of the situation and the actions they took implicated that they acted based on experience and only exchanged short communication about the division of tasks. These results indicate that experienced nurses are more likely to learn from *doing their regular job,* by taking care of the patient in acute situations, rather than from coaching or learning from others. Nevertheless, experienced nurses do state to learn from helping others, while some nurses explained they often take on a leading role in these situations by delegating tasks and managing the situation. For example, a nurse working at a cardiology department explained that seeing that they only have cardiac patients, they experienced acute situations on a general basis. For that reason, her tasks during reanimations are fixed in order to efficiently handle the process. In every reanimation situation her tasks are to administer medicines and to defibrillate the patient's hart while also coaching and checking her colleague who is applying cardiac massage. This example shows that more experienced nurses not only learn from dealing with each acute situation, but also learn by helping or coaching others. Next to the actual acute situation, five of the six nurses with more than ten years of work experience perceived to find these types of situations particularly educational because of the

evaluation that takes place afterward. Respondents described that after every critical situation, the incident is reviewed with all staff that was involved. They indicate that in this evaluation session the strengths and weaknesses of the operation procedure are discussed. Additionally, their teamwork is evaluated and personal feedback about the way they individually handled the situation is provided. Because of the elaborate evaluation and feedback, nurses see these evaluation sessions as great opportunities to learn. Three nurses especially mentioned the variation in teams as an informative aspect of these evaluation sessions, because the changing teams resulted in the exchange of knowledge and feedback from various departments, levels and specializations in the hospital.

> *"I experienced a reanimation in the last year, which are always evaluated afterwards, how everybody acted together and that is in any case a learning opportunity. […] I have done this before, but it remains educational, because you always work with different people. No reanimation is conducted with the same persons."*

Summarizing, more experienced nurses participate in the following learning activities in acute situations: *learning by doing one's regular job* (taking care of patients, helping others) and *learning by reflecting with others* (looking back and evaluating the situation).

Learning behavior less experienced nurses

In the descriptions of the younger respondents more steps of action, and thereby, participation in more learning activities were revealed. Starting with the beginning of the situation where the nurses discover the deterioration in the condition of the patient. Three nurses experienced a sudden deterioration in the condition of the patient they were taking care of and dealt with this in different ways. A common thread was that they did not immediately call for help, but elaborated about how they had to estimate if the patient was critical. One of the nurses first conducted a check-up test, before calling in help. Another nurse explained that her patient was a complex case who, because of his illness, already spewed blood. It was therefore harder to asses if the patient's condition actually deteriorated, describing to reflect with herself to gain a better assessment of the patient's situation before asking for reinforcement. The third nurse was working under supervision of a colleague and immediately asked her supervisor how to act. The learning activity involved in the last example is learning by social interaction, thus by first consulting colleagues. This learning activity was also mentioned by a more experienced nurse. She stated that when she wasn't sure about what she saw, which occurred the most in acute situations, she would ask a colleague for a second opinion. Two nurses with more work experience who followed a specialization and therefore worked in a new department, stated that when they did not feel competent to handle the situation, they would ask for help or let colleagues perform the acute operation. The following step remained the same: younger nurses called in reinforcement. However, in their description of the operation procedure, they pointed out to follow the instructions of their colleagues or were being coached by physicians, or in case of a reanimation, an IC team. The nurse, who was working under supervision, followed the instructions of her supervisor who advised her to observe the situation and take notes of the actions that were being performed. She experienced this role as very informative, because she was able to observe her colleagues and learn from their actions.

The common thread in the descriptions of the actions of the younger nurses was that they learned a lot from being coached or by following instructions and subsequently executing these instructions in practice under critical circumstances. In addition, nurses regarded the feedback they receive in the evaluation session as very educational.

In general, younger nurses described to participate in more learning activities in acute situations, which are in succession: (1) assessing the situation by *learning from social interaction* (e.g. consulting colleagues) or by *critical reflection with oneself* (e.g. prospective reflection: reasoning, logical thinking), (2) executing the procedure while *learning by supervision* (e.g. coaching from physicians, colleagues), (3*) learning by doing their regular job* (e.g. from practice, learning by doing, from successes or mistakes) and (4) *learning by reflecting with others* (e.g. looking back on the situation). Whereas more experienced nurses assessed acute situations as educational because of the opportunity to reflect with multiple disciplines, younger, less experienced nurses claimed to learn the most from critical cases because of the necessity to make immediate decisions and actions in practice. Younger nurses argued that skills to manage these types of situations and to provide acute care can't be fully learned from theory. Besides that, the changing nature of these situations and the evaluations moments were also assessed as very informative.

> *"Yes, I especially learn a lot from acute situations. Some things you can't really prepare for, such as reanimations or people who suddenly suffer of tightness in the chest. Those are situations where you genuinely learn a lot from in practice. You can learn the theory from school. Which I have obtained. But yeah, it is always different in practice."*

> *"For example children who eventually go to the Intensive Care, where you have to apply a gamut of steps on the ward before a child can go there. I think that is something you can really read and learn much about, but only actually experience when the crisis arrives."*

Overall, nurses in both groups find these types of learning situations meaningful in two ways, because of the diversity in diseases and the team of caregivers, claiming that no acute situation is the same. In addition they state that they learn from working closely together with various colleagues and value the moment of reflection with colleagues at the end of an acute situation, assessing this moment as very educational.

4.2.3 Recap work situations

Respondents described several recap work situations from which they learned. Twelve nurses described situations in their daily work, where they encountered certain medicines they were not familiar with, or diseases or clinical pictures that were blurred or out of their focus. These situations were bundled together and named "recap work situations". Recap work situations could entail medical surgeries they performed a long time ago, or only performed on an incidental basis. Another example of recap work situations were minor changes that nurses encountered in their daily work, such as adjusted protocols, new insights or approaches or new medicines. Summarizing, recap work situations comprehend situations in which nurses need to refresh their memory or skills, but who are not seen as completely new settings. Ten out of twelve respondents reviewed learning by theory as the main

learning activity they employed during these situations. Five nurses combined this learning activity with learning by social interaction with colleagues. In the following section several examples of recap working situations will be described. There were no differences visible between more or less experienced nurses, therefore the results should be interpreted for the sample in general.

The majority of the respondents mentioned medical procedures they hadn't carried out or seen before in a long time. All of them first looked up the corresponding protocols to get acquainted with the procedure again (e.g. *learning by theory*) or asked colleagues who recently executed the same medical procedure for tips (*learning by social interaction*). When feeling secure about their competencies and knowledge, they would perform the procedure, keeping the protocol at hand to check if they did not forget anything. If they didn't feel secure enough they described to ask colleagues for help or to cooperate with each other.

> *"If a physical is conducted which relatively hardly ever occurs, a thoracoscopy for example, in other words looking between the two pleurae of each lung. Now, I personally encounter that, one or two times a year. And I don't feel secure to perform that procedure. So I don't perform this procedure alone. Which I also make clear."*

A similar learning process was visible in the narrations of nurses who came across clinical pictures or other aspects they were not familiar with when talking to the patient or estimating their condition. They indicated to search for information on intranet or to check protocols in the hospital's database when they didn't feel they possessed enough knowledge about the subject. Respondents explained that protocols and compositions of medicines rapidly change with new insights in health care, therefore they often have to check themselves, when preparing medicines or before procedures, by scanning the protocols.

> *"I have the feeling that I still learn on a daily basis. For example, we recently had, because our enteral-tube feeding-protocol was not completely up to date, a changed protocol. So now every time I administer tube feeding, I have to check the protocol to quickly remind me again."*

In sum, nurses seem to learn from recap work situations by refreshing their memory, updating their knowledge and practicing their skills. Generally nurses tend to *learn by theory* and *learn through social interaction* in these situations.

4.2.4 New work situations

Situations that were often mentioned by nurses, especially the less experienced nurses, were new work situations. In these situations nurses came across new treatments or medical equipment they had yet to get acquainted with. Also clinical pictures that differed from the norm or regular clinical procedures which had to be performed in a new setting were frequently cited learning situations. Furthermore, nurses described situations where they merely knew the theory but never performed the procedure before. The patterns in learning activities and description of the situations are depicted according to the previously mentioned examples of new work situations. Because less experienced nurses described more of these situations, variances between nurses with more or less work

experience are depicted per situation.

Six nurses, of which three experienced and three less experienced nurses, depicted a situation where they had to use new medical equipment, e.g. enteral feeding pumps or new materials for oxygen or vacuum therapy. The steps the respondents took, were pretty similar, recalling to first received training in the form of e-learning or information meetings to gain basic knowledge about the new system. One of the new pumps was sometimes placed in the coffee room, where the nurses practiced to utilize the machine. In this case, there were always nurses present in the hospital which received extra training to answer possible questions. Some of the nurses asked them to demonstrate the workings of the machine in practice, where they could observe first, before using the equipment their selves. These examples displayed a general order of learning activities, namely: *learning by theory* (e.g. receiving education), *learning by doing one's regular job* (watching colleagues or practicing with the equipment oneself). In only a few cases *learning by social interaction with colleagues* was involved, when nurses merely asked some questions instead of observing their colleagues. In this situation, no differences were found between the different hospitals or between more or less experienced nurses.

The second new work situation contains new, unknown or complex situations that eleven nurses ran into in their daily work. This were, amongst other examples, medical procedures they hadn't performed before or had to carry out on other types of patients, temporarily working in another department, unknown illnesses or clinical pictures that differed from the norm. For example one nurse just finished her specialization to become a pediatric nurse. Therefore she obtained the theory but explained that the execution of almost all medical procedures varied tremendously, stating that the way to perform these procedures on a child differed in comparison to an adult. She argued that even in child care, the procedures vary when dealing with a baby, a toddler or for instance a twelve-year old. The following situation explains this very well: she learned that she needed to blow wind in the babies face to let it sneeze and give toddlers something to drink to let them swallow in order to be able to administer tube feeding. She stated to have obtained this knowledge by first reading the protocols, then learning by observing colleagues and asking them questions and reflecting with them on the reason and way they acted. When this situation occurred the next time, she administered the tube herself under supervision and coaching of her colleagues. After which she asked for feedback. When she felt secure enough she performed the procedure alone and is still learning from doing this task regularly. If she didn't feel secure enough she would ask a colleague to observe a second or third time, before handling the situation herself. These steps are quite in line with the actions that other nurses stated to apply when they had to perform new or unknown medical procedures on their own or in other departments. In these situations, nurses generally perceived to observe colleagues first *(learning by doing one's regular job).* In the next step, they asked their colleagues to attend the operation, but executed the medical procedure themselves *(learning by supervision)*. This recurs till they were secure enough to perform the procedure on their own. A large share of the less experienced nurses or nurses who just finished a specialization, stated to check the protocols first or look for more theory before observing colleagues *(learning by theory).* With one exception, where two different hospitals recently merged. Two older and experienced nurses, who worked in one of these hospitals,

had to read all the protocols and other information again, because the protocols differed between the two hospitals. Hence, they had to look up protocols for every procedure. However, they claimed they didn't search for theory very often in their old hospital. Some of the nurses stated that when they already knew the theory well and came across a complex or unknown clinical picture, they would ask the physician right away, thus *learning through social interaction.*

> *"For example, a child was brought in today with something we weren't familiar with. At a certain point his saturation was low. So you have to know which actions you have to undertake by conferring with the physician and observing precisely the color of the lips or other signs that indicate a lower saturation […] But for example a lowering in saturation, in the meanwhile I experienced such a thing regularly. So I know what it is. I just don't know what the physician wants me to do in that specific case. So then I quickly ask the physician […] Then I don't search for information in books, because I know the fundamental options."*

Something different was mentioned by two respondents, who described to *learn by applying something new within the job*. Three experienced nurses, two working in general hospitals and one in an academic hospital, described a situation, where they had to temporarily help out at another department. This was a completely new situation for them where they had to perform a new and unknown procedure. These nurses learned to conduct this procedure by first watching colleagues. The second time they would learn to execute the procedure by following the instructions of an expert of that specific department. These nurses stated that by job rotation, *thus applying something new in the job*, they learned a lot.

> *"We sometimes are being lent out to other departments. I work at the cardiology/lung and when you suddenly have to work at the chirurgical department […] You just have entirely different things on a chirurgical department, encountering entirely different situations."*

In general, students or less experienced nurses perceived to encounter more unknown or new situations or described situations in which they never performed the procedure in practice before.

4.2.5 Daily work situations

Besides new, acute or recap work situations, nurses stated to have learned from small daily events. All of the respondents affirmed that they learned from just doing their regular job; taking care of patients. Thereby they mentioned certain small events they learn from on a daily basis, concerning: collaboration, daily evaluations, physician ward rounds and formal learning events. These events are going to be described in accordance.

Collaboration

In the nursing profession, collaboration is a necessity. One of the respondents described this clearly by naming the tasks they have to do together, namely: preparing medicines, checking antibiotics, moving patients and helping each other with procedures. Most nurses described to work at a ward and explained that nurses consult each other, ask for a second opinion about the best way to handle things or about uncertainties in reports. Due to the large amount of time in which nurses work closely

together, respondents explained that they just talk about small things concerning the patient. One of the respondents mentioned practical consultations, about how to move a patient for example. Also nurses working more individually, who had their own office, claimed to regularly walk in at their colleague's office to ask some questions.

> *''It depends. It could be anything, such as patients which didn't go very well, then you want to ventilate it to that colleague. Sometimes I think, this doesn't work, this policy we thought out for the patient. For wound care. And that I frequently thought: 'how should I handle this?' And then I ask a colleague: 'What do you think?'[…] But yeah, sometimes the story of the patient is not in line with what you are reading in the report and you think: 'what should I believe?' Those are moments for small consultations.''*

Besides these moments, where they *learn from social interaction*, three nurses also stated to often observe colleagues to see how they perform procedures and to check if they can do their operations in a more efficient way. Since nurses often work together, this happens naturally. Furthermore, nurses described to learn when working together with different disciplines, like childcare or wound care. At last, several nurses mentioned 'feedback' as a personal learning opportunity. Although the majority of the respondents claimed to give personal feedback to their colleagues, they mentioned to sometimes find it difficult to do so, only providing feedback to certain persons.

Daily evaluation

Nine nurses mentioned daily evaluations as workplace learning opportunities. These evaluations often took place during or at the end of the day to evaluate their shifts. In this evaluation there is the possibility to discuss difficult cases, assess their workday or just exchange how the day proceeded. Nurses found this moment useful to evaluate the day and to be able to list possible difficulties or strange things they ran into during their shift. Also the nurses, of whom the evaluation occurred in the morning or afternoon, explained they could ask for help if they had a heavy case load or a lack of time. In general, nurses perceived this moment as valuable, because they could ventilate their feelings, discuss their patients and interact with colleagues. Two nurses explained that these daily evaluations were removed by their hospital. One of these nurses explicitly stated that this is due to the heavy workload she and her co-workers face with every day. Both nurses regretted the removal of these moments, attaching much value to them.

> *"In the past we had more mutual consultations about patient situations. We would have, for example, every afternoon half an hour to evaluate patients. […] No, that completely vanished in our department and I would like to see it being reinstalled. I think this work became very soloist and I would like it if we, as nurses, would consulate more. Or could take part in supervision or evaluations of patients. That you learn more from each other on a nursing level."*

Physician ward rounds

Eleven nurses recalled to have learned from doing physician ward rounds, where they would visit all of their patients together with the physician. Nurses depicted several ways in learning from this daily event. The majority of the nurses described to learn from these rounds by listening to the communication between the physician and patient. Thus, by listening to the explanations of physicians and their answers to the patients questions. In the meanwhile also taking on an active role, because they have to supply information about the patient's condition. Nurses stated to obtain more medical information from these ward rounds.

> *"I think I learn the most during physicians ward rounds. When the physicians visit the patients […] The communication towards a patient, when the patients asks questions. And from the physician self, when he explains the actions that he undertook. And we can also always ask the physician any question."*

A second way of learning, brought up by a large share of nurses, is the possibility to ask the physician questions and learn from them in a more direct manner. Similarly, nurses mentioned consultations with all physicians of one specialism as a learning opportunity. In these consultations all of the patients are reviewed. In this review, the patient's condition and the kind of medical examinations they are going to execute are discussed. In other words, these consultations are aimed to think about casuistry and from there on develop a policy to treat the patient. In the stories of four of the nurses, the influence of the social work environment and the learning culture became apparent. Four nurses acclaimed to feel safe to ask questions because they don't feel like there is an internal hierarchy anymore, making physicians more approachable. One of the nurses who just started working in her profession argued she would mainly listen to the communication of the physician with patients, because she didn't feel like she could ask everything. Another more experienced nurse described her relationships with physicians as alternating. She explained that some of the new physicians think they know everything and are a bit full of themselves, which is something that is not appreciated by the experienced nurses. She explains that she does learn from physician's dependant on their relationship. The previous examples suggest that the perceived learning culture and the relationship between physicians and nurses has a strong influence on this learning situation.

Formal learning events

These learning events comprehend more structured situations that were often implemented by the organization. For example, two experienced nurses stated to have learned from a test inspecting their nursing skills. In a years' time they had to perform every medical procedure in front of a special team of testers to prove they still master these skills. Therefore they had to show to know the protocol and the right way to execute these procedures. When asked why they found this informative, they stated that during these test, they were more aware of their actions and had to check their protocols again to make sure that nothing changed. Four other nurses mentioned to guide interns, giving the same arguments as the nurses who found the practical tests of educational value.

"But where I still learn a lot from, is from guiding interns. That you become aware again of what you actually are doing. I am more conscious about it then. Sometimes I tend to, because everything has to be done quickly, prepare antibiotics without gloves on. And now and then an intern asks 'oh don't you do that with gloves here?' Or inserting an infusion without gloves on; this happens on a daily basis. And if you are guiding an intern you become aware of this again."

Another more formal learning event that was mentioned, was learning by supervision. Three student nurses described to learn a lot from supervision, because they could confer about their patients every morning and could perform procedures in a safe environment. Two of those nurses, one working in a general hospital and one working in a top clinical hospital, experienced a special program during their specialization period called 'coaching-on-the-job' and 'bedside teaching'. In these programs they were linked to an experienced nurse who followed them around during the day. By having an experienced nurse at their disposal at any time, they could ask questions or request this nurse to demonstrate a procedure. The more experienced nurse also gave tips and suggestions. One nurse stated to especially learn from this program, because she felt save to perform a procedure she had never done before.

"Yeah, you undertake much more than you normally do. Because you can perform it under supervision. You feel secure, safe, by having someone around who exactly knows how it has to be done. […] So if you are doing something you can ask someone at the same time or if you have doubts you can directly reflect about it. […] you just learn so much if you constantly have someone next to you. Because normally your supervisor has its own patients, so you can't talk to them all the time."

Three nurses mentioned to learn, because they broadened their task and took part in several work groups. These work groups were implemented by the organization in order to increase the quality of health care in the organization. In addition three nurses mentioned to learn from programs implemented at their departments, which objective was to increase the efficiency of the department. Much of these programs are necessary to relieve the workload, because of cutbacks the hospital made in the nursing staff. However, nurses felt to learn by their participation in these groups. In these programs they often worked with themes that would change every week. In this week they had to pay special attention to a certain theme, including for example giving feedback and the preparation of medicines. The workgroups on the other hand, covered not one department, but the quality of the whole hospital. The three nurses who participated in these workgroups described to learn from their participation, because they had to gain knowledge about their specific subject, such as nutrition, working conditions, environmental issues, medical equipment and so forth. Besides that, they had to collaborate and confer with different specializations and work groups around the hospital. One of the nurses argued to find this work group valuable, because she would like to have more influence on the organization. Due to the cutbacks, she wanted to ensure her already high workload wouldn't increase.

4.2.6 Situational factors of the learning environment

In the interviews respondents mentioned several situational factors that influenced their participation in learning activities. The common theme running through all of them were the cutbacks hospitals had to make in education and personnel. These cutbacks have led to an increased workload, which is indicated by nurses working in both general as academic or top clinical hospitals. The implications of these cutbacks and increased workload are described per situational factor. Found differences in the information environment, social work environment and learning culture between the hospitals are also depicted per situational factor. In addition the researcher asked about certain influential situational factors that were derived from theory.

Task and job content

First off, the respondents were asked to assess their perceived choice independence at work and their variation in tasks. Nurses perceived to have plenty of variation in their work and perceived to have enough freedom to decide when and how to execute their tasks. The majority mentioned the fact that every patient and situation is different and although they have their fixed tasks, they can assess which tasks have priority. As previously stated, nurses argued to participate more often in *learning by social interaction* and *learning by supervision* in complex cases, where for example, they found it harder to assess the patient's condition or to execute the required procedure. When situations were more complex, nurses stated to ask colleagues for a second opinion or help. Also they would ask a colleague to observe or to take over the procedure. The factor 'workload' was mentioned most often to affect nurses their learning. Three quarter of the respondents perceived to have a high workload. Most of the respondents thus named time constrains as the primary barrier for learning on the job. Respondents of almost every hospital indicated that due to budget cuts in personnel the number of patients per nurse increased. Additionally, nurses observed an increase in the complexity of care.

> *''But the work pressure is relatively high, certainly because you can see that there are more and more elderly and often more neglected people that are currently hospitalized. […]And when they arrive at the hospital and we think, huh, how is it possible that this person is still living on its own, because he is already in the early stages of dementia and isn't capable to take care of himself.''*

The information environment

All of the nurses stated to have enough opportunities to search for information. The majority of the nurses worked with COW's (Computers On Wheels) and thus could always access the hospital's database. However, many nurses experienced a lack of time to be able to look up theory during their work. As a side note, four nurses mentioned that they experienced difficulties to find the right search terms in their online portals. Nurses from both type of hospitals described to have many learning opportunities which are provided by the organization, such as clinical lessons, symposia, courses, e-learning, lectures, training programs on the job and schooling days. Although the hospitals still offers many learning opportunities, almost all of the respondents described that learning opportunities became more restricted. Most of the nurses named a couple of learning activities that were organized

less than previous years or activities that were currently not organized at all. Four nurses of whom three are working in a general hospital, explicitly stated to experience a substantial decrease in time and financial means for educational trainings outside of the hospital.

The social work environment

In general, the respondents described their cooperation with colleagues to proceed in a pleasant and open atmosphere. Fourteen nurses explained that although the atmosphere is pleasant, it remains difficult to provide feedback to one another. Three younger nurses argued that more experienced and older nurses are not as used to give feedback as younger nurses are. Two nurses thereby explained to find it harder to give feedback, because they were until recently still a student. Overall, the quality of the feedback culture in most of the hospitals is not perceived to be very strong.

> *''Yes certainly, the only thing is that I think that nurses are too caring for one another. And that we do not often enough dare to directly say what we feel or want.''*

Only one of the twenty nurses described to learn from their manager. The majority of the respondents stated to have a head of department or team captain, which they would only go to if they experienced any problems. They explained to only receive supervision or guidance of colleagues. As mentioned before, respondents indicated to have less evaluations or opportunities to confer with colleagues, because of the work pressure. Nurses of both general as academic hospitals perceived to receive sufficient guidance. Nursing working in academic hospitals did mention more examples of direct supervision in the form of buddy systems. Overall, there were no striking differences found between these type of hospitals. The workload seemed to be high in both general and academic hospitals. For example, two nurses described their training periods in academic hospitals, when they just entered the organization. The first nurse received direct supervision and was linked to five colleagues. The other respondent indicated to have merely received a month of supervision by two colleagues. In reality, she didn't feel to have gotten direct supervision at all.

> *"My training period at the department was for a month, that I was under supervision. I was assigned two colleagues who were my supervisors. But frankly, I didn't get much out of it. We were pretty much thrown in at the deep end […] Because of a high workload, which is one of the main reasons. There is no time […] But I must say I learned a lot from it."*

The learning climate

Despite their feelings about the cutbacks in health care, the respondents were still positive about het learning climate. Respondents indicated to feel safe to make mistakes, to ask each other questions and to practice their skills. Older nurses mentioned that the hierarchy within hospitals disappeared over the years, causing nurses to learn more from physicians. Likewise, younger nurses described physicians as easy accessible.

4.3 Discussion Study 2

The aim of Study 2 was to gain more insight in how nurses perceived to learn in different on-the job situations. Since little is known about the specifics of the learning situation, this study made a first attempt to uncover nurses' actual on-the-job learning situations. Subsequently, it was important to gain knowledge about the way that nurses learned in these situations. Therefore, patterns in the type and order of learning activities, in which nurses participated, were identified. These patterns in learning could provide starting points for more specific research about the interrelation between nurses' learning style and the perceived learning situation. In addition, several situational factors showed to have an effect on nurses' learning process.

4.3.1 Main findings

The grounded theory analysis of the interviews revealed four main on-the-job learning situations in which nurses perceived to learn during their work, namely: (1) acute work situations, (2) recap work situations, (3) new work situations and (4) daily work situations. The findings showed that all of the learning situations provoked a specific mix of learning activities. Overall, the nurses mentioned learning activities which coincided with the existing categorization of nurses' on-the-job learning activities of Berings et al. (2008b). The general pattern in the participation in these activities seemed to be dependent on both individual and situational factors. This was especially apparent in acute and new work situations, which is illustrated in the next example.

Most of the acute work situations included patients whose condition suddenly deteriorated. Experienced nurses explained to call for help and described to learn from performing the required procedures under pressure or letting colleagues execute the procedure while coaching them. They stated to learn the most from the evaluation of the situation afterwards. Less experienced nurses revealed to experience more difficulties assessing the patient's condition. Therefore they participated in more learning activities, such as asking colleagues for a second opinion (e.g. *learning by social interaction*) or analyzing the condition of the patient by themselves (e.g. *learning by critical reflection with oneself*). These nurses described to be feel insecure and therefore would rather not perform the procedure on their own or weren't able to execute the procedure by themselves. Their second learning activity was therefore *learning by supervision,* because they performed the procedure while being coached. When less experienced nurses conducted certain procedures a couple of times and were more secure about their actions. they would conduct the procedure without supervision, gaining knowledge and skills by executing the procedure in daily practice.

In new work situations similar patterns in the participation in learning activities were identified. In these situations nurses encountered unfamiliar clinical pictures or procedures they had never done before. The complexity of the situation and their insecurity about their capabilities often led to a more elaborate learning strategy. Similar to the previous example, nurses tended to look up theory, ask colleagues questions or observed colleagues while they performed the procedure. After these first learning activities, they often executed the procedure under supervision. These results suggest that nurses' years of *work experience and perceived capabilities* in combination with the *complexity* of the task and situation influenced the learning strategy of nurses. These outcomes are in line with Onstenk

(1997), who argued that the complexity of tasks offer important learning opportunities. More important, these findings confirm the original theoretical model of Berings et al. (2005), since nurses' learning style (e.g. mix of learning activities), seemed to be dependent on both their preferences and perceived capabilities, as well as on the learning situation.

Patterns in learning activities were also visible in the other two learning situations. Two learning activities seemed to be associated with recap work situations, namely *learning by theory and learning by social interaction.* Nurses tended to first search for theory and/or asked colleagues when they had to deal with unfamiliar situations. The daily work situations on the other hand all had a more social character, where nurses learned by collaborating with colleagues, from interactions during the physicians' ward round or from daily evaluations or work groups. The most employed learning activities in the daily work situations thus were: *learning by social interaction with colleagues* and *learning by critical reflection with others*. The cutbacks in health care revealed to have the largest impact on these situations due to their effect on the information environment. Nurses stated to experience time constraints to look up theory at their work. In addition, the high work load and resulting time pressure led to a decrease in learning opportunities, whereas several nurses indicated not to take part in daily evaluations anymore. Furthermore, nurses described to receive less opportunities to attend other formal training programs, such as symposia and courses from external parties. Another important factor which influenced the daily work situation was the feedback culture. Nurses evaluated the feedback culture poorly and described to still find it difficult to provide feedback to colleagues. These findings were in contradiction with London & Smither (2002) who stated that a strong feedback culture can only take place with the existence with positive work relationships and a good learning climate. Since all of the nurses rated the social support of colleagues and the learning climate positively, it is possible that the opportunities for feedback decreased, due to the smaller amount of social learning opportunities, such as evaluations and the cutbacks in personnel. Overall, the participation in learning activities depended on the situation. In contrast with Berings et al. (2008) the learning activities could not be organized into first-order and second-order learning activities, because the perceived situation seemed to determine which activity nurses participated in first.

4.3.2 Limitations

In interpreting the results, the limitations of this study should be acknowledged. Due to the qualitative research design the results of this study cannot be generalized. Even though, data saturation is found to be reached within twelve interviews (Guest et al., 2006), it is not possibly to state that the findings in this study are applicable to all nurses. Additionally, this study was limited to a specific context and group, namely nurses working in the Dutch health care sector. This study is therefore not representative for nurses working at hospitals in other countries. Another limitation concerns the sample population. Nurses indicated that there would be no opportunity to interview them during their work, because they already experienced a lack of time as a result of their high workload. For this reason, respondents argued that it would be impossible to recruit respondents by merely visiting hospitals. Respondents therefore were reached via the personal network of the researcher and interviewed in the respondents' spare time. It is conceivable that the respondents in this study were already, more than averagely, interested in continual professional development, since the results of

this study showed that respondents were all intrinsically motivated to learn. It is imaginable that this group employed other learning strategies, because of their already high interest in learning. In spite of the critical incident technique, it is still possible that respondents did not remember crucial learning situations. Although many examples of learning situations were identified, situations which generally don't occur very often could be forgotten. Therefore this study can't guarantee to have found a complete overview of all possible learning situations of Dutch nurses.

4.4 Conclusion Study 2

This study attempted to identify and clarify how nurses perceived to learn in different on-the-job situations. This was done to provide more insight into their learning process. From the in-depth interviews four learning situations were derived, namely acute work situation, recap work situations, new work situations and daily work situations. The results showed that nurses employed specific learning strategies, i.e. mix of learning activities, per situation. In addition, nurses' *years of work experience* and the *complexity of the task and situation* revealed to affect nurses' perceived capabilities and preferences, and thus their personal learning style. Moreover, the retrenchments in health care showed to have an effect on all the situational factors which decreased the amount of learning opportunities of nurses. This effect was most visible in the situational factors *task and job content* and *the information environment*. These findings in combination with the found patterns in the learning activities confirmed the interrelation of the learning style and learning situation. From the results of this study can thus be concluded that nurses' learning strategy depends on the perceived learning situation as well as the learning styles of nurses.

5. General Discussion

The main goal of this study was to gain more insight into the actual on-the-job learning behavior of nurses. Returning to the assumptions of this study it was expected that nurses their actual learning strategy depended on the perceived learning situation as well as on relatively fixed traits based upon personal preferences and perceived capabilities (Berings et al., 2005).

The analysis of the first study pointed out that nurses' age and work experience influenced their participation in learning activities. One of the more remarkable outcomes showed that in general younger nurses preferred to participate more in informal learning activities, such as *learning from daily tasks, reflecting with others* or *applying something new in the job.* In contrast with younger nurses, older and more experienced nurses seemed to prefer formal learning events. Another important result demonstrated *intrinsic motivation to learn* as the main contributor to the participation in learning activities and the only contributor for *learning by theory* and *learning in formal events*. These findings indicate that certain fixed characteristics, such as a person's motivation and age, indeed affect the preference for learning activities and thus their personal learning style. In addition, situational factors demonstrated to influence these fixed traits, since *choice independence* only showed to have an effect on the learning activities due to its positive relationship with *intrinsic motivation to learn.* These findings were in accordance with previous research, which revealed that intrinsic motivation can be enhanced by a climate that stimulates self-direction and freedom for individuals (Deci & Ryan, 1985; Hackman & Oldham, 1976)

The exploration of learning situations in study 2 confirmed the interrelation between learning styles and the learning situation, while nurses demonstrated to employ specific learning strategies in the four different learning situations. This interrelation between situational and individual factors was especially apparent in acute and new work situations, where nurses needed to perform procedures that were more complex, because they had to execute them under high pressure or they (almost) never performed them before. Because of the complexity of the situation and their minor experience in performing the procedure, nurses in these cases stated to not feel competent to assess the condition alone and participated in more activities then they did when the situation was familiar. Nurses would for example ask colleagues for a second opinion. Additionally, they often asked colleagues to observe them while performing the procedure. Similarly, less experienced nurses demonstrated to employ a more elaborate learning strategy in acute situations in comparison with experienced nurses. The participation in more learning activities, especially in *learning by social interaction with colleagues* and *learning by supervision,* seemed to be dependent on both the complexity of tasks (situational factor) and on the experience of nurses (individual factor), since both factors affected nurses their perceived competence to handle the situation on their own. There results were similar to the findings of Gloudemans et al. (2013) who found a significant positive relationship of work experience and age with self-efficacy scores.

In conclusion, the findings of Study 1 and 2 provide strong empirical results for the assumption that nurses their actual learning strategy is based upon both the perceived learning situation as well as their learning style. Furthermore, Study 2 provides a deeper understanding of the results of Study 1.

This is illustrated by the outcomes of Study 1 which showed younger, less experienced nurses to participate more often in *learning by doing one's regular job, learning by applying something new in the job* and *learning by critical reflection with others* then older, experienced nurses. The second study explained these results, by revealing that less experienced nurses encountered more new or unfamiliar situations in their daily work. They therefore had to be supervised when performing procedures in these situations, providing them more opportunities to reflect with colleagues. In addition, the outcomes of the first study suggested a relatively low participation in formal learning events and learning by theory. The results of study 2 however, indicated that this could be due to the cutbacks in health care instead of the personal motivation of nurses. These cutbacks led to an increased workload of nurses, causing nurses to have a lack of time to look up theory. In addition, budget costs were made in the provision of courses, symposia and other formal learning events, leading to less formal learning opportunities. Summarizing, it can be stated that the theoretical review, questionnaire and interviews complemented each other and created a clearer picture of the nurses their actual learning behavior at the workplace.

5.1. Theoretical implications

This study contributes to existing literature in multiple ways. First, by using the critical incident technique four main on-the- job learning situations were uncovered, which contribute to the present categorization of learning activities and learning content for the nursing profession of Berings et al. (2008b).Second, the learning activities that were mentioned in response to the critical incident technique, validated the previously mentioned categorization of learning activities. Thirdly, this study presents empirical evidence that the interrelation between the learning style and perceived learning situation results in the actual learning strategy of nurses. These findings confirm previous research which regards the learning situation as an important determinant for the learning behavior of employees (Berings et al., 2005; Kolb, 1984). In addition, the found patterns in learning activities per situation provide a better understanding how nurses learn in different on-the-job situations. At last, the findings of this study could help to gain a more comprehensive overview of individual and situational factors that influence nurses' learning behavior. To summarize, this research investigated both similarities and differences in nurses' participation in learning activities. The mixed method approach used a quantitative method in combination with a qualitative method to provide a deeper understanding of the learning processes of nurses at the workplace.

5.2. Practical implications

Hospitals are dealing with retrenchments and have less financial means to invest in education. The findings of this study could be useful for educational coordinators to optimize existing learning opportunities at the workplace. The identification of learning situations with their corresponding learning strategies could provide educational coordinators the possibility to enhance learning in specific situations. For example, several nurses indicated to have trouble finding the right search terms in the hospital's database. The heavy workload already limits the time nurses can spent on this learning activity. Hospitals can support employees by improving the interface of the database or

providing a short training for nurses how to efficiently use the database. In addition, this study uncovered situational factors that form barriers for learning. The outcomes of this study can be used to develop interventions to improve the learning environment. Structured interventions could for instance, enhance the feedback culture or the communication between physicians and nurses, providing nurses better opportunities to learn from social interaction with colleagues and increasing the learning potential of daily work situations. At last, the questionnaire showed that nurses of different age groups and with more or less work experience participate in specific and different learning activities. The results of the questionnaire could help educational coordinators to stimulate employees to learn at their job, by tailoring learning opportunities and activities to individual learners.

5.3 Suggestions for future research

Although this study confirmed previous research, which found age, work experience and intrinsic motivation to be of influence on the participation in learning activities, the results of the questionnaire disagreed with previous studies, stating that workers above 50 years old participated more in informal learning activities (Berg & Chyung, 2008; Lammintakanen & Kivinen, 2012). These contradicting findings implicate that more research is necessary to unravel the effects of individual factors on nurses' participation in learning activities. To be able to obtain more insight into the effects of these individual factors, it could be beneficial to conduct a longitudinal research. A longitudinal research design might be able to better assess if changes in the types of learning activities can be attributed to nurses' age or work experience. Besides individual factors, the results of Study 2 showed several situational factors to influence nurses' participation in learning activities. Because, Study 1 focused on individual factors , it would be useful to investigate the effects of situational factors on learning activities in a quantitative manner to reveal underlying relations between these concepts. Even though this study uncovered four learning situations, it is possible that there are other situations or activities that were not mentioned in the interviews. Since individuals are often unaware of their learning, it is recommended for future research to use other qualitative research methods, such as diaries or observations, to be able to reveal more unintentional forms of learning and to uncover additional learning situations. At last, it would be interesting to examine if nurses in other countries have similar learning processes and if they participate in the same type of learning activities as Dutch nurses.

References

Allinson., C. & Hayes., J. (1996). The Cognitive Style Index. *Journal of Management Studies, 33*(1), 119–135.

Baarda, D.B., De Goede, M. P. M., & Teunissen, J. (2011). *Basisboek kwalitatief onderzoek: Handleiding voor het opzetten en uitvoeren van kwalitatief onderzoek.* Groningen: Noordhoff Uitgevers.

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

Berg, S. A., & Chyung, Y. S. (2008). Factors that influence informal learning in the workplace. *Journal of Workplace Learning, 20*(4), 229–244.

Berings, M. G. M. C. (2006). *On-the-job learning styles: Conceptualization and instrument development for the nursing profession* (Doctoral dissertation, Tilburg University, Tilburg, The Netherlands). Retrieved from https://pure.uvt.nl/portal/files/761297/proefschriftberings.pdf

Berings, M.G.C.M, Poell, R.F., & Gelissen, J. (2008a). On-the-job learning in the nursing profession: Developing and validating a classification of learning activities and learning themes. *Personnel Review*, *37*(4), 442-459.

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

Berings, M. G. M. C., Poell, R. F., & Simons, P. R. J. (2008b). Dimensions of on-the-job learning styles. *Applied Psychology*, *57*(3), 417-440.

Berings, M. G. M. C., Poell, R. F., Simons, P. R. J., & van Veldhoven, M. J. P. M. (2007). The development and validation of the On-the-Job Learning Styles Questionnaire for the nursing profession. *Journal of Advanced Nursing*, *58*(5), 480–492. doi:10.1111/j.1365 2648.2007.04252.x

Billett, S. (2001) Learning trough work: Workplace affordances and individual engagement. *Journal of Workplace Learning, 13 (5)*, 209-214.

Boeije, H. R. (2005). *Analyzeren in kwalitatief onderzoek: Denken en doen.* Den Haag: Boom onderwijs.

Butterfield, L., Borgen, W., Amundson, N., & Maglio, A-S. (2005). Fifty years of the critical incident technique: 1954–2004 and beyond. *Qualitative Research, 5*(4), 475-497.

Christis, J. (1998). *Arbeid, organisatie en stress: Een visie vanuit sociotechnische arbeids- en organisatiekunde.* Amsterdam: Het Spinhuis.

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

Colley, H., Hodkinson, P. & Malcolm, J. (2003). *Informality and formality in learning: A report for the learning and skills research centre*. London: Learning and Skills Research Centre. Retrieved from www.lsda.org.uk/files/PDF/1492.pdf

Colquitt, J. A., Le Pine, J. A., & Noe, R. A. (2000). Towards an integrative theory of training motivation: A meta-analytic path analysis of 20 years or research. *Journal of Applied Psychology, 85*(5), 678-707.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16(3*), 297-334.

Cully, M., Van Den Heuvel, A., Curtain, R., & Wooden, M. (2000). Participation in, and barriers to, training: The experience of older adults. *Australasian Journal on Ageing, 19*(4), 172–180.

Daley, B. J. (1999). Novice to expert: An exploration of how professionals learn. *Adult Education Quarterly, 49*(4), 133-147.

D'Amore, A., James, S., Mitchell, E. K. L. (2012) Learning styles of first year undergraduate nursing and midwifery students: A cross-sectional survey utilizing the Kolb Learning Style Inventory. *Nurse Education Today 32*(5), 506–515.

DeCharms, R. (1976). *Enhancing motivation: Change in the classroom*. New York, NY: Irvington.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviouur.* New York, NY: Plenum Publishing Co.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self determination of behavior. *Psychological Inquiry, 11*(4), 227–268.

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology/Psychologiecanadienne*, *49*(3), 182-185.

Dee, C. R., & Reynolds, P. (2013). Lifelong learning for nurses: Building a strong future. *Medical Reference Services Quarterly*, *32*(4), 451-458. doi: 10.1080/02763869.2013.837741

Dochy, F. J., Gijbels, D., Segers, M., & Van den Bossche, P. (Eds.). (2012). *Theories of Learning for the Workplace: Building Blocks for Training and Professional Development Programs*. London: Routledge.

Donaldson, S. I., & Grant-Vallone, E. J. (2002). Understanding self-report bias in organizational behaviour research. *Journal of Business and Psychology*,*17*(2), 245-260.

Dooley, D. (2009). *Social research methods*. Harlow: Pearson Education Limited.

Drucker, P. F. (1999). Knowledge-worker productivity: The biggest challenge. *California Management Review, 41*(2), 79–94.

Dunn, R., Dunn, K., & Price, G. E. (1989*). Learning Styles Inventory.* Lawrence, KS: Price Systems.

Elkjaer, B., & Wahlgren, B. (2006). Organizational learning and workplace learning: similarities and differences. In E. Antonacopoulou, P. Jarvis, V. Andersen, B. Elkjaer, & S. Høyrup (Eds.), *Learning, working and living: Mapping the terrain of working life learning* (pp. 15-32). New York: Palgrave Macmillan.

Emans, B. (2004). *Interviewing: Theory, techniques and training.* Groningen: Wolters-Noordhoff.

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

European Commission (2012). *Commission staff working document on an action plan for the EU health workforce:Towards a job-rich recovery.* Retrieved on 8, December, 2015 from: http://ec.europa.eu/dgs/health_consumer/docs/swd_ap_eu_health care_workforce_en.pdf

Felstead, A. (2010). Closing the age gap? Age, skills and the experience of work in Great Britain.

Ageing and Society, 30(8), 1293–1314.

Flanagan, J. C. (1954). The critical incident technique. *Psychological Bulletin, 51(*4), 327–58.

Frieling, E. B. (2006). Lernen durch arbeit: Entwicklung eines verfahrens zur bestimmung der lernmöglichkeiten am arbeitsplatz. Münster: Waxmann Verlag.

Gijbels, D., & Raemdonck, I. (2010). Het leerpotentieel van de werkplek. *Develop: Kwartaaltijdschrift over Human Resources Development, 6*(3), 2-4.

Gloudemans, H., Schalk, R., & Reynaert, W. (2010). Kritisch denken als onderscheid. *Onderwijs en Gezondheidszorg*, *34*(1), 3-7.

Gloudemans, H. A., Schalk, R. M., & Reynaert, W. (2013). The relationship between critical thinking skills and self-efficacy beliefs in mental health nurses. *Nurse Education Today*, *33*(3), 275 280.

Graham, J. W., & Schafer, J. L. (1999). On the performance of multiple imputation for multivariate data with small sample size. In R. Hoyle (Eds.*), Statistical strategies for small sample research* (pp. 1 – 29). Thousand Oaks, CA: Sage.

Gregorc, A. R. (1982). *Style Delineator.* Maynard, MA: Gabriel Systems

Greller, M. M. (2006). Hours invested in professional development during late career as a function of career motivation and satisfaction. *Career Development International, 11*(6), 544–559.

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough?: An experiment with data saturation and variability. *Field methods*, *18*(1), 59-82.

Hackman, J. R., & Oldham, G. R. (1976). Motivation through the design of work: Test of a theory. *Organizational Behavior and Human performance*, *16*(2), 250-279.

Hamada, A. K., Rashad, M. Z. & Darwesh, M. G. (2011) Behavior analysis in a learning environment to identify the suitable learning style. *International Journal of Computer Science & Information Technology (IJCSIT), 3(2),* 48-59.

Harrison, R., & Kessels, J. W. (2004). *Human resource development in a knowledge economy: An organisational view*. New York, NY: Palgrave Macmillan.

Hodkinson, P., & Hodkinson, H. (2004). The complexities of workplace learning: Problems and dangers in trying to measure attainment. In H. Rainbird, A. Fuller, & A. Munro (Eds.), *Workplace learning in context (pp. 259-275).* London: Routledge.

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

Huisman, M. (2007). Multipele imputatie van ontbrekende scores. In A. E. Bronner, P. Dekker, E. De Leeuw, L.J. Paas, K. De Ruyter, A. Smidts, & J.E. Wieringa (Eds.), *Ontwikkelingen in het marktonderzoek: Jaarboek 2007 MarktOnderzoekAssociatie* (pp. 171-188). Haarlem: Spaar en Hout.

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

Jacobs, R. L., & Park, Y. (2009). A proposed conceptual framework of workplace learning: Implications for theory development and research in human resource development. *Human Resource Development Review*, *8*(2), 133-150.

James, W. & Gardner, D. (1995) Learning styles: Implications for distance learning. *New Directions for Adult and Continuing Education, 67*, 19-32.

Jelfs,E., Knapp, M., Giepmans, P., Wijga, P. (2014) Creating good workplaces: retention strategies in health-care organizations.In: J. Buchanan, M., Wismar, I.A, Glinos, J.,Bremner (Eds.), *Health professional mobility in a changing Europe: new dynamics, mobile individuals and diverse responses volume 2 (pp. 301-324).* Copenhagen: World Health Organisation.

Johnson, J. V., & Hall, E. M. (1988). Job strain, work place social support, and cardiovascular disease: a cross-sectional study of a random sample of the Swedish working population. *American Journal of Public Health*, *78*(10), 1336-1342.

Kanfer, R., & Ackerman, P. L. (2004). Aging, adult development, and work motivation. *The Academy of Management Review, 29*(3), 440–458.

Kessels, J.W.M. (2001). Verleiden tot kennisproductiviteit. Inaugurele rede, Universiteit Twente.

Kessels, J. W. M. (2004) The knowledge revolution and the knowledge economy: The challenge for HRD. In J. Woodall, M. Lee and J. Stewart (Eds.), *New Frontiers in HRD* (pp. 165-197). London: Routledge.

Kirby, J. R., Delva, M. D., Knapper, C., & Birtwhistle, R. V. (2003). Development of the approaches to work and workplace climate questionnaires for physicians. *Evaluation & the Health Professions*, *26*(1), 104-121.

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

Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. (2001). Experiential learning theory: Previous research and new directions. In R. J. Sternberg & L. Zhang (Eds.), Perspectives on thinking, learning, and cognitive styles (pp. 227–247). Mahwah, NJ: Lawrence Erlbaum Associates.

Kooij, D., de Lang, A., Jansen, P., & Dikkers, J. (2008). Older workers' motivation to continue to work: Five meanings of age: A conceptual review. *Journal of Managerial Psychology, 23*(4), 364 394.

Kyndt, E., Michielsen, M., Van Nooten, L., Nijs, S., & Baert, H. (2011). Learning in the second half of the career: Stimulating and prohibiting reasons for participation in formal learning activities. *International Journal of Lifelong Education, 30*(5), 681–699.

Lambregts, J. A. M., & Grotendorst, A. (2012*). Leren van de toekomst: Verpleegkundigen & verzorgenden 2020.* Houten: BohnStafleu van Loghum.

Lammintakanen, J., & Kivinen, T. (2012). Continuing professional development in nursing: does age matter? *Journal of Workplace Learning, 24(1),* 34–47.

Landis, J. R. & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33,* 159-174.

London, M., & Smither, J. W. (2002). Feedback orientation, feedback culture, and the longitudinal performance management process. *Human Resource Management Review*, *12*(1), 81-100.

Manuti, A., Pastore, S., Scardigno, A. F., Giancaspro, M. L., &Morciano, D. (2015). Formal and informal learning in the workplace: a research review. *International Journal of Training and Development*, *19*(1), 1-17.

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(4),* 707–724.

McAuley, E., Duncan, T., & Tammen, V.V. (1989). Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting: A confirmatory factor analysis. *Research Quarterly for Exercise and Sport, 60,* 48-58.

Mistiaen, P., Kroezen, M., Triemstra, M., Francke, A.L. (2011). *Verpleegkundigen en verzorgenden in internationaal perspectief. Een literatuurstudie naar rollen en posities van beroepsbeoefenaren in de verpleging en verzorging.* Utrecht: NIVEL.

Onstenk, J. (1994). *Leren en opleiden op de werkplek: Een verkenning in zes landen.* Bunnik: A&O/MGK.

Onstenk, J. (1997). *Lerend leren werken: Brede vakbekwaamheid en de integratie van leren, werken en innoveren (*Proefschrift, Katholieke Universiteit Nijmegen). Delft: Eburon.

Peng, C. Y. J., Harwell, M., Liou, S.-M., &Ehman, L. H. (2006). Advances in missing data methods and implications for educational research*.* In S. Sawilowsky (Eds.), *Real data analysis* (pp. 31–78). Greenwich, CT: Information Age.

Plant, R. W., & Ryan, R. M. (1985). Intrinsic motivation and the effects of self-consciousness, self awareness, and ego-involvement: An investigation of internally-controlling styles. *Journal of Personality*,*53*, 435-449.

Poell, R. F., Van Dam, K., & Van Den Berg, P. T. (2004). Organising learning in work contexts. *Applied Psychology: An International Review, 53*(4), 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.

Pool, I., Poell, R., & Ten Cate, O. (2013a). Nurses' and managers' perceptions of continuing professional development for older and younger nurses: a focus group study. *International Journal of Nursing Studies, 50*(1), 34–43.

Pool, I.A., Poell, R.F., & Ten Cate, T.J. (2013b) Perspectives on age and continuing professional development for nurses: A literature review. *Vocations and Learning, (6),* 297-321.

Poortman, C. (2007). *Workplace learning processes in senior secondary vocational education* (Doctoral dissertation, University of Twente, Enschede, The Netherlands). Retrieved from http://doc.utwente.nl/57877/1/thesis_Poortman.pdf

Raemdonck, I., Gijbels, D., & Groen, W. (2014). The influence of job characteristics and self-directed learning orientation on workplace learning. *International Journal of Training and Development*, *18*(3), 188-203.

Rassool, G.H., Rawaf, S. (2008) The influence of learning style preference on undergraduate nursing students on educational outcomes in substance use education. *Nurse Education in Practice, 8*(5)*,* 306–314.

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

RIVM (2015) Nationale Atlas Volksgezondheid: Algemene en academische ziekenhuizen. Retrieved at 14, February, 2015 from http://www.zorgatlas.nl/zorg/ziekenhuiszorg/algemene-en academische-ziekenhuizen/

Romiszowsky, A.J. (1988). *Designing instructional systems: Decision making in course planning and curriculum design.* New York, NY: Nichols Publishing.

Russ-Eft, D. (2002). A typology of training design and work environment factors affecting workplace learning and transfer. *Human Resource Development Review*, *1*(1), 45-65.

Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology, 57*, 749-761.

Ryan, R.M., & Deci, E.L. (2000) Self-determination theory and the facilitation of intrinsic motivation, social development, and well being. *American Psychologist, 55*(1), 68-78.

Ryan, R. M., Koestner, R., & Deci, E. L. (1991). Varied forms of persistence: When free-choice behavior is not intrinsically motivated. *Motivation and Emotion*, *15*, 185-205.

Sambrook, S. (2005). Factors influencing the context and process of work-related learning: Synthesizing findings from two research projects. *Human Resource Development International*, *8*(1), 101-119.

Simpson, P. A., Greller, M. M., & Stroh, L. K. (2002). Variations in human capital investment activity by age. *Journal of Vocational Behavior, 61*(1), 109–138.

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*(1), 8-20.

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

Steven, A., Magnusson, C., Smith, P., & Pearson, P. H. (2014). Patient safety in nursing education: Contexts, tensions and feeling safe to learn. *Nurse Education Today*, *34*(2), 277-284.

Streumer, J., & Van der Klink, M. (2001). De werkplek als leeromgeving. *Pedagogische Studiën, 78*(2), 79-85.

Tampoe, M. (1993). Motivating knowledge workers: The challenge for the 1990s*. Long Range Planning, 26*(3), 49–55.

Tannenbaum, S. (2002). A strategic view of organizational training and learning. In K. Kraiger (Eds.), *Creating, implementing, and managing effective training and development* (pp. 10-52). San Francisco: Jossey-Bass.

Tas, C., Brown, E.C., Esen-Danaci, A., Lysaker, P.H., Brüne, M. (2012) Intrinsic motivation and metacognition as predictors of learning potential in patients with remitted schizophrenia. *Journal of Psychiatric Research, 46 (8),* pp. 1086-1092.

Tashakkori, A. & Teddlie, C. (1998). Mixed methodology: Combining qualitative and quantitative approaches. *Applied Social Research: Methods Series*, 46. Thousand Oaks, CA: Sage Publications.

Taylor, P. (1992). Training directors' perceptions about the successful implementation of supervisory

training. *Human Resource Development Quarterly, 3,* 243-259.

Taylor, P., & Urwin, P. (2001). Age and participation in vocational education and training. *Work, Employment & Society, 15*(4), 763–779.

Tynjälä, P. (2008). Perspectives into learning at the workplace. *Educational Research Review*, *3*(2), 130-154.

Urwin, P. (2006). Age discrimination: Legislation and human capital accumulation. *Employee Relations, 28*(1), 87–97.

Van Vianen, A. E. M., Dalhoeven, B. A. G. W., & De Pater, I. E. (2011). Aging and training and development willingness: Employee and supervisor mindsets. *Journal of Organizational Behavior, 32*(2), 226–247.

Van Woerkom, M. (2008). The assessment of critically reflective work behavior in organizations. In W.J. Nijhof & A.F.M. Nieuwenhuis (Eds.). *The learning potential of the workplace* (pp. 241-260). Rotterdam: Sense Publishers.

Van Woerkom, M., Nijhof, W. J., & Nieuwenhuis, L. F. (2002). Critical reflective working behavior: a survey research. *Journal of European industrial training*,*26*(8), 375-383.

Van Woerkom, M., & Poell, R. (Eds.). (2010). *Workplace learning: Concepts, measurement and application*. New York, NY: Routledge.

Vermeulen, V. E. (2007). *Leveraging the Digital Work Style: Identifying Uneven Patterns of Adoption among the IT-enabled Workforce* (Master's thesis, Erasmus Universiteit, Rotterdam, The Netherlands). Retrieved from http://www.erim.eur.nl/centres/erasmus work/research/mastertheses/2007-vincent-vermeulen/

V&VN (2012) *Leren van de toekomst: Verpleegkundigen en verzorgenden 2020.* Houten: Bohn Stafleu van Loghum. Retrieved on 7, May, 2015 from http://www.loov2020.nl/wp content/uploads/2014/02/VV2020-LerenvandeToekomst.pdf

Watkins, K. E., & Marsick, V. J. (1992). Towards a theory of informal and incidental learning in organizations. *International Journal of Lifelong Education, 11*(4), 287-300.

Wray, J., Aspland, J., Gibson, H., Stimpson, A., & Watson, R. (2009). "A wealth of knowledge": A survey of the employment experiences of older nurses and midwives in the NHS. *International Journal of Nursing Studies, 46*(7), 977–985.

Appendix A

Control analyses dataset Study 1

Table 9

Analysis of Model 2 on standard residuals, collinearity, independent errors, variance of all the dependent variables

Dependent variables	Std. Residual Min	Std. Residual Max	Durbin-Watson	Variance
Learning by doing one's regular job	-2.72	2.86	1.86	0.57
Learning through social interaction	-2.98	2.88	1.96	0.59
Learning through critical reflection with oneself	-2.97	2.76	2.03	0.62
Learning through critical reflection with others	-3.23	2.54	2.00	0.57
Learning by applying something new in the job	-2.59	2.56	1.98	0.67
Learning by theory	-2.86	3.07	1.84	0.66
Participation in formal events	-2.50	2.55	1.92	0.73
Overall learning styles	-2.94	2.75	1.99	0.42

Model 2: the independent variables: age, educational level, work experience, choice independence and intrinsic motivation to learn were calculated per dependent variable (learning activities).

Table 10

Test for collinearity and variance per independent variable

Independent variables	Tolerance	VIF	Variance
Age	0.75	1.33	0.20
Educational level	0.93	1.07	0.25
Work experience	0.73	1.37	148.8
Choice Independence	0.95	1.05	0.47
Intrinsic Motivation to learn	0.90	1.11	0.23

Note. The scores of the independent variables were measured per learning activity. The scores per independent variable were equal per learning activity.

Appendix B

Workplace Climate Questionnaire

Good supervision scale

1 Most of the supervisors really try hard to get to know employees.
2 Supervisors here make a real effort to understand difficulties employees may be having with their work.
3 Supervisors in this organization seem to go out of their way to be friendly towards employees.
4 The supervisors in this organization always seem ready to give help and advice on the best way to learn something new.
5 Supervisors in this organization generally take employees' ideas and interests seriously.

Workload scale

1 The workload here is too heavy.
2 It sometimes seems to me that my job requires me to do too many different things.
3 In this organization you're expected to spend a lot of time learning things on your own.
4 There seems to be too much work to get through here.
5 There's a lot of pressure on you as an employee here.

Choice-independence scale

1 There is a real opportunity in this organization for people to choose the particular tasks they work on.
2 The organization really seems to encourage us to develop our own work-related interests as far as possible.
3 We seem to be given a lot of choice here in the work we have to do.
4 This organization gives you a chance to go about your work in ways which suit your own way of learning.
5 Employees here have a great deal of choice over how they learn new tasks.

Intrinsic Motivation Inventory

Interest/Enjoyment

I enjoyed doing this activity very much

This activity was fun to do.

I thought this was a boring activity.(R)

This activity did not hold my attention at all.(R)

I would describe this activity as very interesting.

I thought this activity was quite enjoyable.

While I was doing this activity, I was thinking about how much I enjoyed it.

Value/Usefulness

I believe this activity could be of some value to me.

I think that doing this activity is useful for _____

I think this is important to do because it can _____

I would be willing to do this again because it has some value to me.

I think doing this activity could help me to _____

I believe doing this activity could be beneficial to me.

I think this is an important activity.

Appendix C

Complete questionnaire Study 1

Geachte heer/mevrouw,

Voor uw bij- en nascholing maakt u gebruik van de e-learning cursussen van CampusMed of CampusCare van Noordhoff Health. Wij zijn benieuwd hoe u de e-learning cursussen gebruikt en ervaart om deze mogelijk te kunnen verbeteren. Wij vragen daarom uw medewerking aan deze enquête.

Verloting prijzen
Het invullen van de enquête duurt ongeveer 10 minuten en we verloten een aantal Chromecasts en exemplaren van De Grote Bosatlas. In september worden de winnaars bekend gemaakt. De enquête wordt verder anoniem verwerkt.

Alvast bedankt voor uw medewerking. Mede namens Freya Ernst, student aan de Universiteit van Twente opleiding Communicatiewetenschap. Zij gebruikt deze enquête ook voor haar afstudeeronderzoek naar werkplekleren.

Met vriendelijke groet,

Noordhoff Health

De vragen over de e-learning modules van Noordhoff zijn nu afgerond. Er volgen nu nog enkele vragen over uw eigen werkomgeving en leerervaringen op het werk.

Na deze vragen volgen alleen nog de achtergrondgegevens.

12.

De volgende vraag gaat in op kenmerken van uw werk. Wilt u aangeven welke uitspraken voor uw werk van toepassing zijn door aan te geven in hoeverre u het met de volgende uitspraken eens bent.

	Helemaal niet mee eens	Niet mee eens	Neutraal	Mee eens	Helemaal mee eens
In deze organisatie krijgen medewerkers de kans om te kiezen aan welke specifieke taak zij willen werken.					

Deze organisatie lijkt ons aan te moedigen om onze eigen werkgerelateerde interesses zo veel mogelijk te ontwikkelen.					
We krijgen veel keuze in het werk dat we moeten doen.					
In deze organisatie krijg je de kans om je werk zó in te richten dat het past bij jouw manier van leren.					
Medewerkers krijgen veel keuzevrijheid hoe zij nieuwe taken willen leren.					

13.

Kunt u aangeven in hoeverre u het eens bent met de volgende stellingen?

	Helemaal niet mee eens	Niet mee eens	Neutraal	Mee eens	Helemaal mee eens
Ik vind het leuk om te leren.					
Ik denk dat leren nuttig is voor mij.					
Ik denk dat het belangrijk is om te leren.					
Ik vind leren een saaie activiteit.					
Ik denk dat leren een toegevoegde waarde heeft voor mij.					
Ik zou leren als interessant omschrijven.					
Ik zou graag vaker de kans willen krijgen om te leren omdat het waardevol is voor					

mij.					
Ik vind het best leuk om te leren.					
Ik denk dat leren mij kan helpen.					
Tijdens het leren, denk ik eraan hoe leuk ik het vind.					

U bent aangekomen bij de laatste vragen van de enquête. Deze vragen gaan over de leerervaringen op uw werk. De vragen gaan in op verschillende situaties, maar hebben steeds dezelfde antwoordkeuzes. Let hierbij op de vraagstelling en kies per situatie welk antwoord het beste bij u past.
Denk hier niet te lang over na. De eerste gedachte is meestal de beste. Het gaat bij alle vragen om uw eigen beleving.

A. De afgelopen twee jaar heb ik het uitvoeren van verpleegtechnische handelingen verbeterd door ....

	Nooit	**Bijna nooit**	**Soms**	**Vaak**	**Bijna altijd**	**Altijd**
1. ..... hierover informatieve vragen aan mijn collega's te stellen						
2. ..... zelf te reflecteren over hoe ik deze handelingen uitvoer						
3. ..... samen met collega's te reflecteren over hoe ik deze handelingen uitvoer						
4. ..... het opdoen van werkervaring hierin						
5. ..... nieuwe taken op me te nemen waarin ik dit verder kon ontwikkelen						
6. ..... op zoek te gaan naar de juiste informatie in boeken, vaktijdschriften, op TV of het Internet						
7. ..... deelname aan informatieve bijeenkomsten (cursussen, symposia, klinische lessen) of een coachingsprogramma						

15.

B. De afgelopen twee jaar heb ik mijzelf verder ontwikkeld in de ondersteuning van patiënten en familie door .....

	Nooit	Bijna nooit	Soms	Vaak	Bijna altijd	Altijd
1. ..... hierover informatieve vragen aan mijn collega's te stellen						
2. ..... zelf te reflecteren over hoe ik patiënten en familie ondersteun						
3. ..... samen met collega's te reflecteren over hoe ik patiënten en familie ondersteun						
4. ..... het opdoen van werkervaring hierin						
5. ..... nieuwe taken op me te nemen waarin ik dit verder kon ontwikkelen						
6. ..... op zoek te gaan naar de juiste informatie in boeken, vaktijdschriften, op TV of het Internet						
7. ..... deelname aan informatieve bijeenkomsten (cursussen, symposia, klinische lessen) of een coachingsprogramma						

16.

C. De afgelopen twee jaar heb ik mijzelf verder ontwikkeld in het relativeren van de heftige situaties die ik hier meemaak door.....

	Nooit	Bijna nooit	Soms	Vaak	Bijna altijd	Altijd
1. ..... hierover informatieve vragen aan mijn collega's te stellen						

2. ..... zelf te reflecteren over hoe ik patiënten en familie ondersteun						
3. ..... samen met collega's te reflecteren over hoe ik patiënten en familie ondersteun						
4. ..... het opdoen van werkervaring hierin						
5. ..... nieuwe taken op me te nemen waarin ik dit verder kon ontwikkelen						
6. ..... op zoek te gaan naar de juiste informatie in boeken, vaktijdschriften, op TV of het Internet						
7. ..... deelname aan informatieve bijeenkomsten (cursussen, symposia, klinische lessen) of een coachingsprogramma						

17.

D. De afgelopen twee jaar heb ik mijzelf verder ontwikkeld in de planning van de zorg rondom mijn patiënten door .....

	Nooit	Bijna nooit	Soms	Vaak	Bijna altijd	Altijd
1. ..... hierover informatieve vragen aan mijn collega's te stellen						
2. ..... zelf te reflecteren over hoe ik de zorg rondom mijn patiënten plan						
3. ..... samen met collega's te reflecteren over hoe ik de zorg rondom mijn patiënten plan						
4. ..... het opdoen van werkervaring hierin						

5. ..... nieuwe taken op me te nemen waarin ik dit verder kon ontwikkelen						
6. ..... op zoek te gaan naar de juiste informatie in boeken, vaktijdschriften, op TV of het Internet						
7. ..... deelname aan informatieve bijeenkomsten (cursussen, symposia, klinische lessen) of een coachingsprogramma						

18.

E. De afgelopen twee jaar heb ik meer geleerd over waar betrouwbare informatie te vinden is door.....

	Nooit	Bijna nooit	Soms	Vaak	Bijna altijd	Altijd
1. ..... hierover informatieve vragen aan mijn collega's te stellen						
2. ..... zelf te reflecteren over waar betrouwbare informatie te vinden is						
3. ..... samen met collega's te reflecteren over waar betrouwbare informatie te vinden is						
4. ..... het opdoen van werkervaring hierin						
5. ..... nieuwe taken op me te nemen waarin ik dit verder kon ontwikkelen						
6. ..... op zoek te gaan naar de juiste informatie in boeken, vaktijdschriften, op TV of het Internet						
7. ..... deelname aan informatieve bijeenkomsten						

(cursussen, symposia, klinische lessen) of een coachingsprogramma						

19.

F. De afgelopen twee jaar heb ik mijzelf verder ontwikkeld in het nemen van initiatieven in mijn werk door.....

	Nooit	Bijna nooit	Soms	Vaak	Bijna altijd	Altijd
1. ..... hierover informatieve vragen aan mijn collega's te stellen						
2. ..... zelf te reflecteren over hoeveel en/of de manier waarop ik op mijn werk initiatieven neem						
3. ..... samen met collega's te reflecteren over hoeveel en/of de manier waarop ik op mijn werk initiatieven neem						
4. ..... het opdoen van werkervaring hierin						
5. ..... nieuwe taken op me te nemen waarin ik dit verder kon ontwikkelen						
6. ..... op zoek te gaan naar de juiste informatie in boeken, vaktijdschriften, op TV of het Internet						
7. ..... deelname aan informatieve bijeenkomsten (cursussen, symposia, klinische lessen) of een coachingsprogramma						

Achtergrondgegevens
Tot slot zouden we graag nog enkele gegevens van u willen weten, die wij nodig hebben voor de statistische verwerking van de vragenlijst. Uiteraard worden ook deze antwoorden vertrouwelijk behandeld en zullen de gegevens anoniem worden verwerkt en alleen inzichtelijk zijn voor de onderzoeker.

20.

Naam instelling

21.

Functie

22.

Geslacht

23.

Wat is uw leeftijd?

- 16 – 19 jaar
- 20 – 34 jaar
- 35 – 49 jaar
- 50 – 65 jaar
- 66 jaar of ouder

Ga verder

24.

Hoeveel jaar ervaring heeft u in de beroepsgroep waarin u nu werkt?

25.

Hoeveel jaren bent u in dienst bij uw huidige organisatie?

- 0-5 jaar
- 5-10 jaar
- >10 jaar

26.

Wat is uw hoogst genoten opleiding?

- LBO / VBO / VMBO (kader- of beroepsgerichte leerweg) / MBO 1 (assistentenopleiding)
- MAVO / HAVO of VWO (eerste drie jaar) / ULO / MULO / VMBO (theoretische of gemengde leerweg) / voortgezet speciaal onderwijs
- MBO niveau 2, 3
- MBO niveau 4
- HAVO of VWO (overgegaan naar de 4e klas) / HBS / MMS
- HBO propedeuse of WO propedeuse / HBO (behalve HBO-master) / WO-kandidaats of WO-bachelor
- WO-doctoraal of WO-master of HBO-master / postdoctoraal onderwijs

27.

Hoeveel jaar maakt u al gebruik van e-learning?

- 0-1 jaar
- 1-5 jaar
- 5-10 jaar
- >10

28.

Indien u kans wilt maken op de Google Chromecast of een Grote Bosatlas dient u hieronder u e-mail adres achter te laten. Dit e-mail adres zal uitsluitend worden gebruikt om de winnaar op de hoogte te stellen.

Afronden enquete

Dit was het einde van de vragenlijst. Ik wil u hartelijk bedanken voor uw medewerking! In september zullen de winnaars bekend gemaakt worden.

Appendix D

Introduction letter Study 2

UNIVERSITEIT TWENTE.

Goedendag heer/mevrouw,

Om mijn studie Communicatiewetenschappen aan de Universiteit Twente af te ronden, verricht ik een onderzoek naar het werkplekleren van verpleegkundigen werkzaam in regionale en academische ziekenhuizen in Nederland. Het doel van mijn onderzoek is om inzicht te verkrijgen in de wijze waarop verpleegkundigen leren op de werkplek.

Het onderzoek zal bestaan uit een interview dat ongeveer 20 tot 30 minuten van uw tijd in beslag zal nemen. Gedurende het interview zal er gevraagd worden naar uw persoonlijke ervaringen waarin u geleerd hebt op de werkvloer, welke factoren hier invloed op hebben en hoe uw organisatie vorm geeft aan het leren op de werkplek. U bent hierin vrij om alle informatie te geven die in u opkomt.

Anonimiteit

Alle gegevens van het interview zullen anoniem verwerkt worden. Het gesprek wordt enkel en alleen gebruikt voor het doel van het onderzoek en mogelijke citaten die gebruikt worden zullen niet te herleiden zijn op specifieke individuen. Het interview zal worden opgenomen door middel van audio apparatuur. Dit om het interview zo volledig en nauwkeurig mogelijk te kunnen uitwerken.

Om te starten vraag ik u eerst enkele achtergrondgegevens in te vullen.

Leeftijd: ……..
Geslacht: M/ V
Hoogst afgeronde opleiding en opleidingsniveau:……
Naam ziekenhuis:……..
Afdeling:……...
Hoelang bent u al werkzaam als verpleegkundige?……..

Hoe lang bent u werkzaam binnen uw huidige organisatie?.....

Als u naar aanleiding van deze introductie nog vragen hebt kunt u mij die nu stellen.

Met vriendelijke groet,

Freya Ernst
Studente Communicatiewetenschappen; Universiteit Twente

Appendix E

Interview protocol Study 2

Leeractiviteiten /situaties (leerstijlen)

1. Kunt u zich, in de afgelopen periode, een gebeurtenis herinneren waarbij u op de werkplek een leerzame ervaring hebt gehad?

- Wat gebeurde er?
- Hoe vond dit plaats?
- Wie/wat waren hierbij betrokken?
- Waarom was dit voor u leerzaam?
- Wat droeg hier aan bij?
- Komt het vaker voor dat u op deze manier leert?

2. Kunt u zich nog andere situaties of gebeurtenissen herinneren waarop u hebt geleerd op uw werkplek?

- Wat gebeurde er?
- Hoe vond dit plaats?
- Wie/wat waren erbij betrokken?
- Waarom was dit voor u leerzaam?
- Wat droeg hier aan bij?
- Komt het vaker voor dat u op deze manier leert?

Doorvragen naar leeractiviteiten uit de theorie (afhankelijk van de antwoorden op bovenstaande vragen) :

3. Kunt u een situatie beschrijven waarin u heeft geleerd van van supervisie? (begeleiding: faciliterend /ondersteunend etc.)
4. ‘’ ‘’van anderen (collega’s , sprake van mentoren?)
5. ‘’ ‘’ door iets nieuws op te pakken binnen uw werk?
6. ‘’ ‘’ door het opzoeken van theorie?
7. ‘’ ‘’ door te reflecteren na uw werkzaamheden?

Bij elke leer activiteit doorvragen:

- Wat gebeurde er?
- Hoe vond dit plaats?
- Wie/wat waren erbij betrokken?
- Waarom was dit voor u leerzaam?
- Wat droeg hier aan bij?
- Komt het vaker voor dat u op deze manier leert?

Parafraseren activiteiten

8. Wat is voor uw de belangrijkste leeractiviteit op de werkplek? (manier waarop u op de werkplek leert)

Individuele factor
9. Waardoor wordt u gemotiveerd om te leren op de werkplek? Wat is daarbij belangrijk? (Welke factoren zijn daarbij van belang?*) (extrinsiek /intrinsiek: status, loon, zelfverwezenlijking, steun leidinggevende?*
Leeromgeving (Organisatie context)
10. Hoe wordt het werkplek leren door uw organisatie ondersteund/vormgegeven? 11. Wat zijn mogelijke belemmeringen die u ervaart bij het leren op de werkplek? 12. Welke aspecten hebben voor uw invloed op de kwaliteit van het werkplekleren? 13. Heb je genoeg mogelijkheden om theorie op te zoeken binnen het werk? 14. Hoe is de relatie met de arts? 15. Hoe is de relatie met collega's? 16. Heb je veel variatie in je taken? 17. Heb je veel zelfstandigheid/autonomie in je taken/werk?

Appendix F

Codebook Study 2

Learning situations

Code	Definition	Explanation
Recap work situation	Recap work situations include situations in which nurses need to refresh their memory or skills, but who are not seen as completely new settings.	Examples: Encountering: • Unknown medicines • Revised protocols, procedures • New insights/approaches • Unfamiliar diseases • Incidental medical surgeries
Acute work situation	Acute situations include situations were immediate action is necessary.	Examples: • Patients who became unwell, (e.g. short of breath, patients who passed out) • Patients of which the condition suddenly deteriorated • Patients with heavy (life-threatening) injuries
New work situation	New work situation include situations where nurses have to deal with new, unknown or complex situations they aren't familiar with. Also situations where nurses have to take on a new role or work in a new setting are regarded as new work situations.	Examples: • New or unknown medicines, procedures, medical equipment or clinical pictures • Procedures they only know from theory or have to perform in another setting • Working in another department • Doing another specialization • Broadening tasks.
Daily work situation	Daily work situations include small daily learning events, which occur on a regularly basis and are seen by nurses as a common situation.	Examples: Events containing: • Daily evaluations • Collaboration • Physician ward rounds • Formal learning events (organized by the hospital): clinical lessons, supervising, work groups, tests..

Learning Activities, codebook of Berings et al. (2006)

Code	Label	Explanation
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 behavior, not adopting negative colleague behavior
	Helping others learn	Preparing and giving presentations, answering colleagues'* questions, student supervision *or coaching colleagues*, *delegating*
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 working in different departments or institutions
	Job rotation	Temporarily doing someone else's job in one's own or another 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, team transfers, rounds, workgroups
Learning by theory	Checking media	Books, television, specialist journals, the Internet, protocols
	Visiting information meetings	Internal or external: symposia, congresses, clinical classes, lecture nights, conversations with patient associations
	Education	Internal or external: retraining, courses, workshops, education
Learning by supervision	Direct supervision	Supervision and coaching: practicing with supervision, work supervision, annual performance assessment interviews, personal development plan interview.

	Coaching	Being coached or instructed by supervisors /physicians or managers during medical procedures.
Learning by reflection with others	Planning (before learning activity)	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, together with others
	Making intermediate adjustments (during learning activity)	Concurrent reflection: deep or shallow, on knowledge, skills or attitude, together with others
	Looking back (after learning activity)	Retrospective reflection: at home or at work, deep or shallow, on knowledge, skills or attitude, together with others
Learning by reflecting with oneself	Planning (before learning activity)	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
	Making intermediate adjustments (during learning activity)	Concurrent reflection: deep or shallow, on knowledge, skills or attitude, alone
	Looking back (after learning activity)	Retrospective reflection: at home or at work, deep or shallow, on knowledge, skills or attitude, alone

* 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 health care, colleagues of other disciplines (doctors, physiotherapists, psychologists, etc.), or professionals in external health care.

Situational factors

Code	Label	Explanation
1) Task and job content	Complexity	The amount of problem-solving required The amount of task feedback The amount of challenge
	Variation	Breadth and variety of tasks The degree of innovation
	Autonomy	Degree of control and autonomy / choice independence of the employee in tasks, methods, procedures, and results
	Workload	An individual's perception of a heavy workload, work pace or level of responsibility and the feeling of having to deal with it alone.
(2) The information environment	Richness of information environment	The physical resources of the working environment, including the presence of manuals, job aids, and so forth (Berings et al., 2006).
	Opportunities for learning	Opportunities for extensive professional contacts, such as professional networks and conferences (Berings et al., 2006).
(3) The social work environment	Social support supervisors/ management	Perception of the daily communication, cooperation and organized meetings with supervisors(Poell, 1998). Social support of managers should provide the employee reinforcement to better learn on the job. Important tasks for supervisors are goal-setting, assistance and giving feedback (Russ-Eft, 2002).
	Social support colleagues	Perception of the daily communication and cooperation with colleagues based upon thrust and understanding, where help is given and correct information is shared (De Jonge & Dormann, 2003; Johnson and Hall, 1988; Poell, 1998; Raemdonck et al., 2014)
	Feedback culture	Refers to the quality and amount of feedback that is given by supervisors and colleagues and the manner in which feedback is provided.
4) The learning climate	Quality learning environment	Perception of the quality and atmosphere of the learning in the organization
	Emotional safety	Feeling safe to make mistakes, to practice skills and to learn.