

Critical thinking and self-efficacy
Useful concepts in nursing practice and education

Henricus Antonius Gloudemans

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PROEFSCHRIFT

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Henricus Antonius Gloudemans,
geboren op 3 mei 1965 te St-Oedenrode.

Promotor: Prof. Dr. M.J.D. Schalk

Copromotor: Dr. W.M. Reynaert

Overige commissieleden: Prof. Dr. Th. van Achterberg
Dr. S. Bolhuis
Prof. Dr. H.F.L. Garretsen
Prof. Dr. R.F. Poell
Prof. Dr. P.R.J. Simons

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Chapter 1

General introduction



INTRODUCTION TO THE STUDY

Over the past decades, there has been a lot of interest in how the professional development of nursing students and nurses can be stimulated. The reason for this is that nurses in health care are confronted with complex demands and rapidly changing health care environments (Simpson & Courtney, 2002; Worrel & Profetto-McGrath, 2007; Marchigiano, Edulvee & Harvey, 2011). To be ready for nursing practice, nurses have to possess competences such as clinical reasoning skills in order to make sound clinical judgements (Standing, 2008; Simpson & Courtney, 2009). In addition to this, the focus on evidencebased nursing is clearly present in nursing practice and education (ProfettoMcGrath, 2005). Nurses are accountable for the care they provide, which is strengthened by the increasing empowerment of health care consumers. These trends and developments have resulted in the fact that nursing requires specific competences, as is illustrated by newlydeveloped professional nursing profiles. Nursing has become a professional practice and is still evolving. Being a nurse requires cognitive skills and the self-confidence to act autonomously. The time of “a doctor orders and a nurse acts” lies behind us. In a series of focus group meetings conducted in this study, the core competences of nursing was the subject of discussion. It was recognised by representatives of the health care sector as well as educational institutions, that cognitive skills and the ability to act autonomously are core proficiencies for nursing. A distinction has been made between the two general nursing levels in the Netherlands (Bachelor degree and diploma nursing level) and several reports and profiles have been published since the mid-1990s, further outlining this distinction (Commissie Kwalificatiestructuur, 1996; VBOC, 2006). The previously mentioned core competences apply especially to Bachelor degree nurses. In this study, these core competences, referred to as critical thinking skills and self-efficacy beliefs, are the main subjects of study. Critical thinking skills are generally seen as major outcomes of nursing education programs (Fero et al., 2010). Self-efficacy beliefs play a central role in performance accomplishments (Bandura, 1997). Critical thinking skills and self-efficacy beliefs are therefore useful concepts in nursing practice and education.

Background of the study

Since the introduction of Bachelor degree nursing education programmes in the mid-1970s, health care institutions as well as educational institutions have been involved in discussions concerning the differences between Bachelor degree and diploma-educated nurses. In practice, the added value of Bachelor degree nurses compared to those with a diploma is the subject of most debate (VBOC, 2006). In this on-going process, some important milestones can be identified. A significant attempt to draw a distinction between the two levels of nursing qualifications was the introduction of the “qualification structure” in 1996 (Commissie Kwalificatiestructuur, 1996). Final qualifications and attainments are described

in detail by level. In addition, differentiation between nursing levels is made based on three criteria: accountability, transfer and complexity (Commissie Kwalificatiestructuur, 1996). Furthermore, within this description, Romiszowsky's taxonomy of knowledge and skills is applied (Romiszowsky, 1988). This taxonomy differentiates between factual knowledge and insightful knowledge, and skills are differentiated into reproductive and productive skills. "Reproductive skills" refers to those requiring the knowledge of how to apply standard procedures and protocols. "Productive skills" refer to those that are required when one has to consider how to apply procedures and protocols, based on learned principles and strategies (Commissie Kwalificatiestructuur, 1996). In the description of the qualifications of diploma nurses and Bachelor degree nurses (also known as level 4 and level 5 nurses respectively), the latter include considerably more insightful knowledge and reproductive skills.

Another major shift took place at the turn of the century. The qualification structure evolved into a competencybased description of nursing, resulting in a definition of the professional roles and core competencies of nurses (Pool, 2001). The description of these roles and competencies is specific to Bachelor degree nursing (Pool, 2007), but in this profile a clear distinction between the two nursing levels is missing (Movisie, 2007; VenVN, 2012). The distinction between the nursing levels in health care practice remains ill-defined and the need for clarity is still prominent (VBOC, 2006; Nivel, 2011; VenVN, 2012). One of the major problems was that both diploma nurses and Bachelor degree nurses act within the same legal framework. They both are qualified by law to carry out reserved procedures. One of the recommendations of the VBOC report (VBOC, 2006) is the introduction of two nursing profiles: nurse and nurse specialist.

In the spring of 2012, a proposal based on the recommendations of the VBOC report was presented, which embodies a distinction between diploma nurses and Bachelor degree nurses (VenVN, 2012). In this proposal, diploma nurses no longer hold a legal title and the job title becomes "*zorgkundige*" (literally, "skilled carer"). The legal term "nurse" is reserved for those with a Bachelor degree. The differentiation has a legal basis, as is borne out by statutory disciplinary law: nurses are bound by this law whereas "*zorgkundigen*" are not. Developments within the profession and society as a whole underpin the argument for a distinction between the nursing levels. Health care has become complex and demanding (Nivel, 2011), and to deal with these demands, the quality of education needs to improve. One of the remarks contained in the VenVN report (2012) is that nursing education in the future will take place at a Bachelor degree level. This is a globally observed trend (Mistiaen, Kroeze, Triemstra & Francke, 2011; Francke, Mistiaen, Van der Velden & Batenburg, 2012). Due to the developments outlined above, the focus within my research has shifted from the distinction between the two nursing levels towards concepts that are essential to (Bachelor degree) nursing education. The challenge for the future is to provide education geared

towards highly qualified nursing, in which the complex demands of health care consumers can be addressed. In the aforementioned professional profile descriptions, reports, proposals and competency profiles, two concepts are emerging that are essential to nursing: critical thinking and self-efficacy. These concepts are introduced in the following paragraphs.

Perspective on critical thinking

A vast number of studies and reports have been published with regard to determining what critical thinking consists of. However, to date, critical thinking is still not defined in a uniform way, and in international literature it has many definitions (Simpson & Courtney, 2002; Banning, 2006; Edwards, 2007; Riddel, 2007). The dominant perspective on critical thinking skills is of a cognitive psychological nature. From this point of view, the skills needed to think critically are characterised in relevant literature as higher-order thinking skills (Ten Dam & Volman, 2004). Facione, Facione and Giancarlo (2000) state that the cognitive skills of analysis, interpretation, inference, explanation, evaluation, and of monitoring one's own reasoning are at the heart of critical thinking. In international literature, similar terms such as clinical reasoning or clinical decision-making are frequently applied to illustrate critical thinking skills (Edwards, 2007; Fero et al., 2010; Riddel, 2007). Although critical thinking skills are a prerequisite in order to make sound clinical decisions, it is recognised in relevant literature that critical thinking is about the cognitive processing that drives clinical problem-solving, decision-making and reflective thinking (Forneris & Peden-McAlpine, 2006; Cormier, Pickett-Hauber, & Whyte IV, 2010). From this point of view, critical thinking skills can be seen as a metacompetence (Dries, Vantilborgh, Pepermans & Venneman, 2008). In addition to this, critical thinking encompasses reflective thinking. A person has to analyse his or her own interpretations and decisionmaking processes (Simpson & Courtney, 2002; Banning, 2006). The importance of the use of reflective skills in the process of critical thinking is stressed by several authors (Facione, 1990; Paul, 1990; Edwards, 2007). "Thinking about thinking", defined as a meta-cognition (Kuiper, Murdock & Grant, 2010), is related to critical thinking. It is helpful in managing the development of skills such as clinical decision making (Kuiper et al., 2010).

In summary, critical thinking is defined in many different ways, and often confused with concepts such as clinical decision making. In this study, we consider critical thinking as a meta-competence.

Critical thinking in nursing education and practice

To date, critical thinking has generally been viewed as a core element of nursing education and practice (Daly, 1998; Scheffer & Rubenfeld, 2000; Boychuk Duchscher, 2003; Fero et al., 2010). Its origin stems from the mid-1980s, when the American Psychological Association conducted a Delphi study on critical thinking (Boychuk Duchscher, 2003). Since then, nursing

education programmes have recognised the importance of developing critical thinking skills (Brunt, 2005; McMullen & McMullen, 2009; Cormier et al., 2010) and these skills are therefore seen as major desired outcomes of nursing education programmes (Staib, 2003; Marchigiano et al., 2010). Critical thinking skills are required to deal with complex care demands (Kaddoura, 2010) and are therefore essential to nursing practice and education. Problems arise when evidence is sought in literature to prove that teaching critical thinking improves clinical performance (Riddel, 2007; Marchigiano et al., 2010). The underpinning assumption is that critical thinking skills can be taught (Riddel, 2007), yet measuring the development of critical thinking skills turns out to be problematic. Evidence regarding if and how teaching methods and strategies affect critical thinking skills is inconclusive and inconsistent (Banning, 2006; Riddel, 2007; Marchigiano et al., 2010). In this study, we address the above mentioned issues, looking into scores on critical thinking skills of Bachelor degree and diploma-educated nurses, and exploring factors that affect critical thinking skills.

Self-efficacy

The concept of self-efficacy was developed by Bandura and is a key concept in social cognitive theory (Bandura, 2001). Social cognitive theory explains human functioning with the emphasis on a dynamic and interactive process in which cognitive processes play a central role. Cognitive processing is applied by observing others and the environment, and then reflecting on these interactions. In doing so, a person can alter self-regulatory functions (Burney, 2008). Self-efficacy is about the belief in one's competence to tackle difficult or novel tasks and to cope with adversity in specific, demanding situations.

Bandura (1997) defines self-efficacy as “the belief in one's capabilities to organise and execute the courses of action required to produce given attainments”. Self-efficacy beliefs makes a difference to how people feel, think and act (Bandura, 1993), and they regulate human functioning. In doing so, cognitive, motivational, affective and decisional processes are involved (Bandura, 2002). Self-efficacy beliefs affect whether individuals think in self-enhancing or self-debilitating ways (Bandura, 2002) and are derived from four principal sources of information: enactive mastery experiences, vicarious experiences, verbal persuasion, and physiological states (Bandura, 1997; Lane, Lane & Kyprianou, 2004; Zulkosky, 2009). In everyday life, people act and interact in many different situations, and in reflecting on situations and experiences, the appraisal of how well one is acting or interacting includes cognitive and affective processing. In predicting events and developing ways to control them, effective cognitive processing of information is required (Bandura, 1993), such as considering options and testing one's judgments. Self-efficacy beliefs affect the amount of stress and anxiety that is experienced in threatening and difficult situations. This is the emotional mediator of self-efficacy beliefs, which also affects motivation (Bandura, 1993).

Increased self-efficacy enhances the sense of self-control and helps one to perform at a higher level (Bandura & Locke, 2003). Those with high self-efficacy beliefs want to overcome difficult situations instead of avoiding them (McLaughlin, Moutray & Muldoon, 2008; Zulkosky, 2009).

Self-efficacy in nursing education

Zulkosky (2009) illustrates the implications of self-efficacy in nursing education by utilising the sources of self-efficacy. In clinical settings, nursing students observe the performance of colleagues, discuss this performance and carry out certain actions themselves. In utilising these various sources, the students form self-efficacy beliefs that will help them when they encounter difficulties and challenges in nursing practice. Hence, self-efficacy is a factor in metacognitive self-regulation (Kuiper et al., 2010). Ofori and Charlton (2002) found that students' self-regulated learning strategies are related to self-efficacy beliefs. Depending on how high this belief is, students put effort into studying, or seek help and support. In line with this, Lenz and Shortridge-Baggett (2002) state that self-efficacy is the most important predictor of change in behaviour. Self-efficacy is often linked to a specific task (Lane et al., 2004). Knowing what it takes to perform well at a task is positively related to self-efficacy beliefs in relation to the future performance of such tasks (Bandura, 1997). In education research, however, evidence is found that students' efficacy expectations are also based on other competences generalised from past educational performance (Lane et al., 2004). Research results indicate that self-efficacy beliefs are domain specific as well as task specific (Lane et al., 2004).

The relationship between critical thinking and self-efficacy

Critical thinking is determined as a set of skills, consisting of cognitive components. Bandura (1993) argues that it takes self-efficacy beliefs to make good use of these skills. People can have the same level of cognitive skills, but perform differently. Wangenstein, Johansson, Björkström and Nordström (2010) support this line of reasoning. They state that skills such as critical thinking skills alone are not enough to perform well in the workplace, as a person must also be disposed towards using the critical thinking skills that have been learned. Reflecting on how critical thinking skills are applied in various situations is helpful in building self-efficacy beliefs. Bandura (2001) states: “Verification of the soundness of one's thinking also relies heavily on self-reflective means. In this metacognitive activity, people judge the correctness of their predictive and operative thinking against the outcomes of their actions, the effects that other people's actions produce, what others believe, deductions from established knowledge and what necessarily follows from it”. Research findings by Fenollar, Román and Cuestas (2007) suggest that the confidence students have in their own capabilities is helpful to them in determining what to do with their knowledge and skills.

Self-efficacy influences how people think and act and is therefore an important contributor to the academic performance of students (Bandura, 1993). This influences the quality of decision making and also academic achievement. In line with this, Zulkosky (2009) relates self-efficacy beliefs to thinking, stating that a strong sense of efficacy facilitates cognitive processes and performance. Furthermore, Greene, Miller, Crowson, Duke and Akey (2004) found significant relationships between self-efficacy and the use of meaningful cognitive strategy. Chowlowski and Chan (2004) as well as Whyte, Ward and Eccles (2009), demonstrated the influence of anxiety on performance through examining the clinical decisionmaking ability and performance of (student) nurses. Anxiety operates as a source upon which self-efficacy beliefs are built: a physiological source (Bandura, 1997).

Kuiper et al. (2010) link metacognitive thinking strategies to self-beliefs. A lack of these strategies leads to an overestimation of one's capabilities. The result of this is that one does not select the appropriate action to become more competent. On the other hand, underestimating one's capabilities or knowledge means not using established capabilities. In line with this, Zimmerman and Schunk (2001) state that well-developed metacognition enhances performance. It optimises one's capabilities, meaning that one is aware of strengths and weaknesses in order to manage skill development. They argue that key to this process are self-efficacy beliefs. Chen, Casper and Cortina (2001) state that individual differences, such as cognitive ability, are believed to influence the formation of self-efficacy beliefs. Given the idea that cognitive abilities are of a general and stable nature, this has consequences for the formation of self-efficacy beliefs. Personal resources such as cognitive ability become important in addressing complex tasks. Therefore, the influences of these abilities on self-efficacy beliefs are greater when performing complex tasks (Chen et al., 2001; Kanfer & Ackerman, 1989).

AIMS AND OUTLINE OF THE DISSERTATION

In this study, the main objective is to investigate the role of critical thinking skills and self-efficacy beliefs in nursing and nursing education. The research questions that are addressed are as follows:

- What is the effect of educational programmes and strategies on critical thinking skills in nursing education?
- How can critical thinking contribute to the differentiation between nursing levels?
- How do nursing students form self-efficacy beliefs?
- What are the effects of learning environments on the formation of self-efficacy beliefs?
- Is there a relationship between critical thinking skills and self-efficacy beliefs?

In Chapter 2, an overview of studies examining the effect of educational programmes and strategies on critical thinking skills is presented. A literature review is conducted, focusing on research using standardised measures to assess critical thinking skills. Finally, outcomes as well as methodological issues are discussed.

In Chapter 3, critical thinking skills are discussed as a means of making a distinction between nursing levels. Critical thinking skills are assessed as a factor related to educational nursing levels, particularly the Bachelor degree level.

Frameworks of critical thinking are presented in Chapter 4 and theoretical works by Benner, Hammond and Eraut are discussed. The focus is on how well these frameworks explain the use of cognitive and critical thinking skills by nurses. It is discussed how this can contribute to the debate concerning the distinction between the educational levels for nurses in the Netherlands.

The development and validation of a "sources of self-efficacy inventory" is presented in Chapter 5. Based on Bandura's theoretical model on sources of self-efficacy (1997), a fifth source is added to this model.

In Chapter 6, the research question of how learning environments contribute to the formation of self-efficacy beliefs is addressed. Results from comparison between regular clinical learning workplaces and care innovation centres are presented and discussed.

The relationship between critical thinking skills and self-efficacy beliefs is the subject of Chapter 7. Building on earlier research, it is investigated whether Bachelor degree nurses have higher critical thinking skills than diploma nurses do. If so, does this have a significant effect when comparing their self-efficacy beliefs?

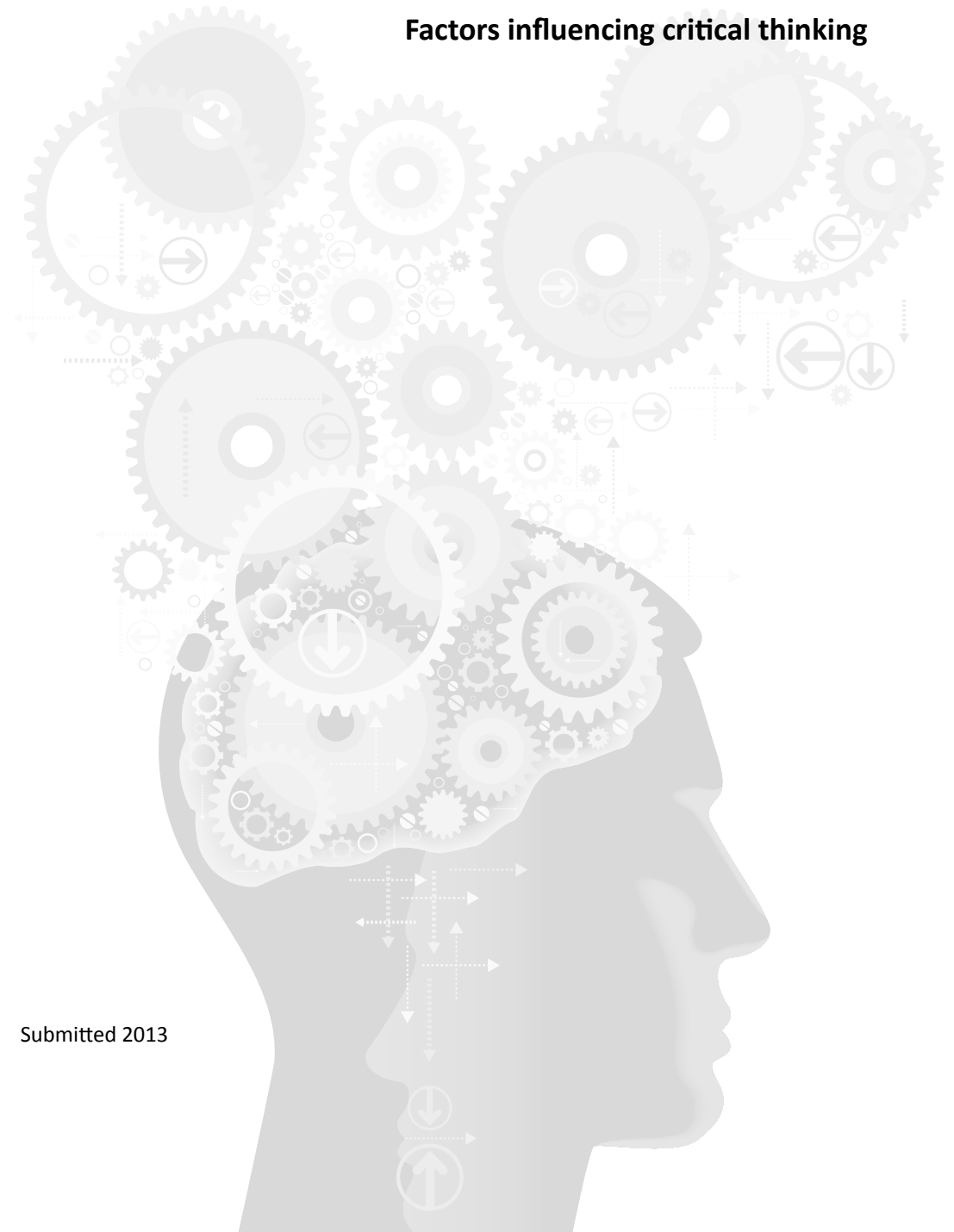
Finally, an overall conclusion and discussion is presented in Chapter 8. The study's main conclusions as well as a reflection on the methodology and implications for practice are described.

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Chapter 2

Factors influencing critical thinking



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INTRODUCTION

Critical thinking skills are seen as major desired outcomes of nursing education programmes (Banning, 2006; Beckie, Lowry & Barnett, 2001; Drennan, 2009; Scheffer & Rubenfeld, 2000; Spelic et al., 2001). The development of critical thinking skills is essential to nursing for various reasons, including that health care has become increasingly complicated (Brunt, 2005a; Simpson & Courtney, 2002). Technological and sociocultural changes (for example, the ageing population and increasing amount of home care) also influence the nature of health care. To deal with these changes, higherorder thinking skills are required (Edwards, 2007). Scheffer and Rubenfeld (2000) used the Delphi method to identify critical thinking in nursing: “critical thinking in nursing is an essential component of professional accountability and quality nursing care”. Critical thinking is required to support clinical decisions and judgements about client care (Brunt, 2005; Edwards, 2007; Simpson & Courtney, 2002), as nurses need to understand both the context of care and patients’ experiences (Ironsides, 2003). This process requires strong critical thinking skills and nursing education programmes reflect the importance of developing these skills (Brunt 2005b). Critical thinking has become a core element of nursing education programmes and thereby an outcome of them (Edwards, 2007; Marchigiano, Eduljee & Harvey, 2011).

Over the years, many studies have focused on the assessment of the development of critical thinking skills in educational programmes. However, research findings show inconsistent results (Adams, 1999; Banning, 2006; Spelic et al., 2001; Staib, 2003; Zygmunt & Schaefer, 2006). Many studies have investigated the relationship between complete programmes and the overall development of critical thinking skills in nursing education (Brown, Alverson & Pepa, 2001; Drennan, 2009; McCarthy, Schuster, Zehr & McDougal, 1999; Shin, Jung, Shin & Kim, 2006; Walsh & Seldomridge, 2006). Other studies have examined the relationship between critical thinking skills and teaching strategies or methods such as problembased learning (Tiwari, Lai, So & Yuen, 2006) or simulation (Ravert, 2008). Problems identified by several authors (e.g. Walsh & Seldomridge, 2006b) are the variety of definitions of critical thinking used in studies and the differences in the instruments used to assess critical thinking skills. This makes it difficult to compare the outcomes of studies. Staib (2003) conducted a review of studies on critical thinking strategies in nursing education. One of the findings was that only a few methods used to develop critical thinking skills have been systematically evaluated and that many conclusions have been drawn based on anecdotal reports. Furthermore, Staib (2003) points out that it is difficult to operationalise critical thinking and to translate it into concrete teaching methods. However, despite the difficulty in measuring the development of critical thinking skills, it is believed that these can be taught (Riddel, 2007).

In this review section, we focus on the following research questions:

- (1) Do nursing programmes in general contribute to increased critical thinking skills?
- (2) Which teaching strategies or methods in nursing education programmes promote critical thinking skills?
- (3) Which factors other than teaching strategies and methods are reported to have an effect on the development of critical thinking skills in nursing students?

BACKGROUND

Definitions of critical thinking

There is no uniformly accepted definition of critical thinking in general, or more specifically in relation to nursing. In relevant literature, concepts of critical thinking are analysed and considered in many different ways (Brunt, 2005a; Riddell, 2007; Romeo, 2010; Scheffer & Rubinfeld, 2000). There are different perspectives on the concept of critical thinking, such as cognitive, pedagogical, and philosophical (Ten Dam & Voldam, 2004). The most dominant perspective is the cognitive, derived from cognitive psychology. This perspective is represented, amongst others, by Ennis (1985) and Facione (1990). In this perspective, critical thinking skills are seen as higherorder thinking skills, such as analytical and evaluating skills (Facione, 1990), and the focus is on rational and logical reasoning. Definitions of critical thinking within the cognitive perspective include, for example “Reasonable and reflective thinking focused on deciding what to believe or do” (Ennis, 1985), “Purposeful, self-regulatory judgement that results in interpretation, analysis, evaluation and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual consideration upon which that judgement is based” (Facione, 1990; Facione, 2006) and “The assessment of what might be called evidence, in order to make a judgement” (Moon, 2008 p. 33). Turner (2005) also conducted a concept analysis on critical thinking in nursing education and practice, and presented the following definition:

Critical thinking in nursing is a purposeful, self-regulatory judgment associated in some way with clinical decision making, diagnostic reasoning, the nursing process, clinical judgment, and problem solving. It is characterized by analysis, reasoning, inference, interpretation, knowledge, and open-mindedness. It requires knowledge of the area about which one is thinking and results in safe, competent practice and improved decision making, clinical judgments, and problem solving.

These definitions have in common that critical thinking skills are considered to be required in order to make clinical decisions and/or judgements and can therefore be conceived of as a metacompetence (Gloude-mans, Schalk & Reynaert, 2010).

In both the pedagogical and philosophical perspectives, definitions are not formulated in a concrete way. The boundaries of what critical thinking skills encompass are not clearly articulated, though both perspectives consider cognitive skills as a dimension of critical thinking skills. Additionally, affective and emotional components, intuition and dialogue, are seen as key elements of critical thinking (Ten Dam & Voldam, 2004).

In nursing literature, different concepts have been introduced to explain critical thinking, such as clinical decision making, reflective practice and problem solving (Edwards, 2007; Fero et al., 2010; Riddell, 2007). Turner (2005) notes the use of many different terms (surrogate terms) and concludes that critical thinking is well defined in literature but that the concept lacks clear boundaries.

Measurement of critical thinking in nursing

Many different instruments are used to assess critical thinking skills. Depending on the definition used to assess critical thinking and how it can be measured, researchers have chosen specific measurements. Reviewing relevant literature, the three most widely and globally used instruments are: The Watson Glaser Critical Thinking Appraisal (WGCTA), the California Critical Thinking Skills Test (CCTST), and the California Critical Thinking Disposition Inventory (CCTDI) (Fero et al., 2010; HicksMoore & Pastirik, 2006; Ku, 2009; Romeo, 2010; Walsh & Seldomridge, 2006a).

The WGCTA, developed by Watson and Glaser (1980), is a general measurement for critical thinking and is a non-disciplinespecific measurement of both the logical and creative components of critical thinking (Brunt, 2005b). The WGCTA is divided into five subsets: inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments. The CCTST resulted from a Delphi study (Facione, 1990; Kuiper & Pesut, 2004). It consists of 34 items, divided into five subscales: analysis, evaluation, inference, deductive reasoning, and inductive reasoning (Brunt, 2005b; Romeo, 2010). The CCTDI, also a result of a Delphi study (Facione, 1990), assesses internal motivation towards critical thinking (Fero et al., 2010). It contains seven dispositions: truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and cognitive maturity (Brunt, 2005b; Romeo, 2010). Staib (2003) and Brunt (2005b) identified, in addition to the above described instruments, two commonly used standardised critical thinking instruments. The EnnisWeir Critical Thinking Essay Test (Ennis & Weir, 1985) and the Cornell Critical Thinking Test (Ennis, Millman & Tomko, 1985). The latter has not been used in studies examining critical thinking skills in nursing. The Ennis-Weir Critical Thinking Essay Test assesses to what extent participants can evaluate given arguments in the format of a written essay. Subsets that are measured are: getting the point, seeing reasons and assumptions, stating one’s point, offering good reasons, seeing other possibilities, responding appropriately, and avoiding legal arguments (Brunt, 2005b; Ennis & Weir, 1985).

The abovementioned instruments are all standardised and quantitative in nature, and are generally applicable. One of the key discussion points regarding measuring critical thinking skills in nursing education is whether these instruments reflect critical thinking skills that are specific to nursing (Adams, 1999; Brunt, 2005; Romeo, 2010; Simpson & Courtney, 2002; Worrel & ProfettoMcGrath, 2006). Brunt (2005b p. 261) points out that these types of instruments “may not capture the richness and qualitative aspects of critical thinking in professional nursing practice”. This has resulted in a number of newly developed critical thinking evaluation tools, often developed by faculties to evaluate existing or newlydeveloped educational programmes (Staib, 2003). Romeo (2010) gives an overview of quantitative standardised critical thinking measurements. These are all specifically designed to measure critical thinking in students of nursing. All five measurements are lesser known and therefore have not generally been applied in relevant research (Romeo, 2010). In addition to the already mentioned instruments, there are studies that use the Critical Thinking Scale (Chen, Casper & Cortina, 2011; Lee et al., 2012; Tseng et al., 2011). This instrument contains 60 items and is divided into five subscales (Lee et al., 2012). The Critical Thinking Scale is mostly applied in research conducted in Taiwan.

Qualitative designs and measurements are an alternative to quantitative approaches. Staib (2003) gives an overview of studies evaluating critical thinking strategies. The evaluation methods are predominantly of a qualitative nature, such as anecdotal reports. Walsh and Seldomridge (2006b) report on the use of portfolios, reflective assignments and narratives. Fero et al. (2010) discuss the use of simulation-based performance to measure critical thinking skills and Marchigiano et al. (2011) go into selfreported perceptions. Limitations to the use of these designs are low interrater reliability and the inability to compare outcomes across different studies.

As mentioned before, the evaluation of critical thinking in nursing education is difficult. Designs and measurements used in studies to evaluate critical thinking strategies show a great variation. This problem has already been highlighted in earlier reviews and studies (Brunt, 2005b; Walsh & Seldomridge, 2006a). This may explain the contradictory and inconclusive results of studies on the development of critical thinking. Given the fact that the cognitive perspective on critical thinking is the dominant one, we assume that nursing educational strategies and programmes are based on this perspective. To be able to compare research findings, we made a selection of measurements of critical thinking that are of a cognitive nature and are standardised. In this review, we therefore focus on the three most commonly and globallyused instruments: the WGCTA, the CCTST and the CCTDI.

METHODS

The databases PubMed, Cinahl, ERIC and Sage were searched for publications from January 2000 to December 2011. The keywords (both separately and combined with the Boolean

operators “or” and “and”) searched were: critical thinking, critical reflection, clinical decision making, and nursing education. In order to be included, studies had to meet the following criteria:

- (1) the article or paper should describe empirical research;
- (2) one of the following critical thinking measurements had to be used in the study: the California Critical Thinking Skills Test (CCTST), the Watson Glaser Critical Thinking Appraisal (WGCTA) or the California Critical Thinking Dispositions Inventory (CCTDI);
- (3) the study had to address one of the following topics: teaching methods in nursing (associate degree and Bachelor programmes), teaching strategies in nursing, or educational programmes in nursing, together with their relationship to the development of critical thinking skills.

The abstracts from publications were initially screened based on these criteria, and in case of insufficient information, the entire article was screened.

RESULTS

In total, fourteen articles met the criteria that focussed on educational programmes and five on the relationships between teaching strategies and/or methods and critical thinking.

Educational programmes

Fourteen studies focused on the development of critical thinking skills during an educational programme. The results of the studies are mixed. Five (Daly, 2001; Girot, 2000; Profetto-McGrath, 2003; Rogal & Young, 2008; Stewart & Dempsey, 2005) found no significant increase in critical thinking skills. One study (Giddens & Gloeckner, 2005) found a significant increase on subscales, but not on total scores. Within the remaining eight studies, significant increases in critical thinking skills were found. An overview of the studies is presented in Table 1.

The studies we have included used a variety of research questions and designs. Some focus on the development of critical thinking skills during a nursing programme, others focus on different pathways or curriculum revisions and the relationship with critical thinking skills. Beckie et al. (2001) investigated the effect of a curriculum revision (that incorporated more emphasis on critical thinking skills) on critical thinking scores using two experimental cohorts and one control cohort (using the old curriculum). One of the experimental cohorts showed a significant increase compared to the control cohort. The authors suggest that the personal characteristics of the students in the second experimental cohort affected the results.

Table 1. General Description of Included Studies on Educational Programmes in Nursing

Author/year	Research subject	Design	Instrument(s)	Sample	Findings
Giro (2000)	Examining the development of critical thinking at different stages of the academic process	Quasi-experimental design	WGCTA	32 undergraduates 19 year four students 17 graduate practitioners 15 non-academic practitioners	No significant increase in critical thinking scores
Beckie et al. (2001)	Assessing critical thinking skills after curriculum revision in a Bachelor degree nursing programme	Pre-test post-test control group design	CCTST	55 old curriculum students (cohort 1) 55/73 new curriculum students (cohorts 2 and 3)	Significant increase to cohort 2 over cohort 1. Cohort 3 showed no significant increase
Brown et al. (2001)	Assessing the influence of a baccalaureate programme on critical thinking skills with students pursuing different pathways	Pre-test post-test design	WGCTA	Traditional: 45 RN-BSN: 35 Accelerated: 43	Significant increase in traditional and RN-BSN students. No significant increase with accelerated students.
Daly (2001)	Exploring the effect of a common foundation programme on critical thinking	Multi-method design including pre-post-test	WGCTA	43 preregistration nursing students	No significant differences between pre and post-programme scores.
Spelic et al. (2001)	Evaluation of critical thinking outcomes of a BSN programme	Pre-test post-test design	CCTST	Traditional: 51 Accelerated: 68 RN-BSN: 17	All three groups showed an overall significant increase, with the exception of 1 subscale for RN-BN students
Profetto-McGrath (2003)	Development of critical thinking skills in a baccalaureate nursing programme	Crosssectional design	CCTDI CCTST	228 Bachelor degree students	No statistically significant difference over the four years of the programme.
Stewart and Dempsey (2005)	Examining dispositions towards critical thinking in a Bachelor degree nursing programme.	Longitudinal descriptive design	CCTDI	Sophomore II: 55 Junior I: 49 Senior I: 36 Senior II: 34	No significant increase in critical thinking throughout the programme
Giddens and Gloeckner (2005)	Investigating the relationship between critical thinking skills and performance on NCLEX-RN	Nonexperimental ex-post-facto design.	CCTDI CCTST	218 Bachelor degree students	With the exception of two subscales, no statistically significant increase in critical thinking was found.

Table 1. (Continued)

Author/year	Research subject	Design	Instrument(s)	Sample	Findings
Sulliman (2006)	Comparing a conventional programme with an accelerated programme	Survey design	CCTDI	Conventional: 80 Accelerated: 50	Accelerated students showed significantly higher scores compared to conventional students
R.K. Shin et al. (2006)	Assessing the development of critical thinking skills in a Bachelor programme	Longitudinal design (four questionnaires)	CCTDI	32 Bachelor degree nursing students	Significant increase on scores by academic year
K. Shin et al. (2006)	Investigating the critical skills of senior nursing students	Survey design	CCTDI CCTST	Associate: 137 Bachelor: 102 RN to BSN: 66	Bachelor students showed significant higher scores on critical thinking, compared to associate and RN to BSN students.
Rogal and Young (2008)	Assessing registered nurses' critical thinking skills in a critical care course	Pre-test post-test design	CCTST	31 postgraduate nurses	No significant difference in scores
McMullen and McMullen (2009)	Examining changes in critical thinking skills in a graduate nursing programme	Pretest post-test design.	CCTST	82 nursing students in a graduate NP programme	Students low on critical thinking skills at programme entry, showed substantial growth.
Drennan (2009)	Comparing critical thinking skills in graduate and commencing Master degree nursing students	Cross-sectional cohort study	WGCTA	Commencing: 110 Graduates: 222	Significantly (modest) higher scores for graduates

Sulliman (2006) found that accelerated students show significantly higher scores on the CCTCI compared to conventional students. This is in contrast to the findings of Brown et al. (2001), who found that accelerated students did not show a significant increase, whereas RN-BN and traditional nursing students did. Shin et al. (2006) found that Bachelor degree students showed significantly higher scores compared to associate and RN-BN students. Spelic et al. (2001) found that all pathways (traditional, RN-BN and accelerated) showed an increase on critical thinking scores. They do not report the differences in the scores between groups.

McMullen and McMullen (2009) found mixed results when examining critical thinking skills in a graduate nursing programme. Using the CTTST, they found that students who scored low on critical thinking skills at programme entry showed a substantial growth in critical thinking scores. Those high on critical thinking scores at programme entry showed a decline

in analytic skills (subscale CCTST) during the programme. They reason that the level of support for the latter group was insufficient to maintain higher analytical skills. Rogal and Young (2008) investigated the development of critical thinking skills during a critical care course. They report that the pre-test mean scores on the CCTST were above the established norms and they conclude that this was the reason for a non-significant increase or even decline in post-test critical thinking scores.

Drennan (2009) found that graduates from a Master degree programme made statistically significant gains in critical thinking scores when compared to students commencing the programme. Shin, Lee, Ha and Kim (2006) found significant increases by academic year during a Bachelor programme. Using a longitudinal design, they noted significant increases on CCTDI scores. These results are not in line with those produced by Daly (2001), Profetto-McGrath (2003), and Stewart and Dempsey (2005). Stewart and Dempsey (2005) found no significant increase in critical thinking dispositions during a four-year Bachelor programme. The research findings of Profetto-McGrath (2003), using a cross-sectional design, also showed no significant increase. Daly (2001), using a pretest post-test quasiexperimental design, found that there was no significant increase over a period of 18 months. It is argued that the period of time (18 months) over which the research took place, is rather too short to develop critical thinking skills.

In summary, the results of the studies that focus on the development of critical thinking skills during a programme are varied. There is no conclusive evidence allowing us to state that nursing programmes promote critical thinking skills. Research topics vary in the studies included and we also note that they used different populations. Initial, as well as accelerated and Master programmes are included in the studies. This, together with the use of predominantly small sample sizes, makes it difficult to draw solid and robust conclusions. Further, other variables such as entry level and experience are suggested as having an impact on the development of critical thinking scores (McMullen & McMullen, 2009), and these factors were not always taken into account in the studies.

Teaching methods or strategies

We included nine studies that reported the effects of teaching strategies or methods on the development of critical thinking skills. Five studies focused on problembased learning, three on simulation techniques and one on concept mapping (Table 2).

Table 2. General Description of Included Studies on Teaching Methods or Strategies in Nursing

Author/year	Research subject	Design	Instrument(s)	Sample	Findings
Magnussen et al. (2000)	Evaluating the effects of inquiry-based learning on critical thinking scores	Pre-test post-test design	WGCTA	228 first semester and 257 final semester nursing students	When stratified, the group with initially low scores on WGCTA scored significantly higher, the medium group no changes and the high group a significant decrease on WGCTA scores
Chau et al. 2001	Effect of videotaped vignettes on critical thinking skills	Pretest posttest design	CCTST	83 first and second year Bachelor nursing students	No significant increase on CCTST scores
Day and Williams (2002)	Effect of one year PBL programme on critical thinking skills	Pretest posttest design	CCTST CCTDI	27 year one baccalaureate nursing students	Significant increase on CCTST and CCTDI
Wheeler and Collins (2003)	Effect of concept mapping on critical thinking skills	Pre-test post-test experimental design	CCTST	76 baccalaureate nursing students (44 concept map group and 32 control group)	Significant increase on CCTST overall scores for experimental group, various results on subscale scores. Between-group posttest scores not significant
Tiwari et al. (2006)	Comparing the effects of problem-based learning and lecturing on critical thinking skills	Pre-test posttest experimental design	CCTDI	PBL group: 40 undergraduate nursing students Control group: 39 undergraduate nursing students.	PBL students showed significant increase on CCTDI scores
Ravert (2008)	Comparing the effects of simulation techniques combined with enrichment sessions on critical thinking scores	Pre-test posttest experimental design	CCTDI CCTST	Simulation: 12 Non simulation: 13 Control: 15	No significant difference between groups on critical thinking scores
Yuan et al. (2008b)	Effect of problem-based learning on critical thinking skills	Pretest posttest design	CCTST	PBL group: 23 undergraduate nursing students Control group: 23 undergraduate nursing students	Significant increase and higher scores for PBL group
Ozturk et al. (2008)	Effect of problem-based learning on critical thinking skills	Survey design	CCTDI	PBL group: 52 senior nursing students Control group: 95 senior nursing students	Significantly higher scores on CCTDI for PBL group
Wu et al. (2010)	Comparing changes in critical thinking dispositions, related to simulation as a learning style	Nonexperimental descriptive design	CCTDI	409 nursing students (207 year one, 202 year two) undergoing enrolled nurse training.	Year two students showed higher scores on critical thinking

Problembased learning

Problembased learning (PBL) is a method in which small groups of students work together on real-life tasks (Oldenburg & Hung, 2010). It is a self-directed and studentcentred learning method in which students learn to apply concepts and generate and evaluate solutions in a real-life context (Worrel & Profetto-McGrath, 2007). Other terms that are frequently used to describe this method are inquiry-based learning (Magnussen, Ishida & Itano, 2000) and context-based learning. Based on the results of a literature review, Simpson and Courtney (2002) conclude that PBL promotes critical thinking scores. Yuan, Williams and Fan (2008a), however, conclude that there is no supportive evidence that PBL leads to higher critical thinking skills among nursing students. In their review, they included studies that used a variety of designs (descriptive and quasi-experimental).

Magnussen et al. (2000) used the WGCTA to determine whether inquirybased learning promotes critical thinking skills. In a sample of 228 nursing students in the first semester and 257 students in the final semester of a programme, they found mixed results. After stratifying the scores into three different groups (low, medium and high on pre-test scores), they found that the students in the low group showed a significant increase in the mean score. In the medium group, no significant change was found. In the high group, a significant decrease in scores was found.

Day and Williams (2002) found that first year baccalaureate nursing students showed a significant increase on both CCTST and CCTDI scores after a year of using PBL as a teaching strategy. They did not use a control group in their study.

Tiwari et al. (2006) conducted a study comparing a PBL teaching strategy to traditional lecturing in a nursing programme at Hong Kong University. First year undergraduate nursing students were randomly assigned to a PBL group (n=40) or a lecture group (n=39). At pre-test, no significant different scores on the CCTDI were found. After year one, all the students underwent the same educational teaching strategies, which did not include PBL. The results showed a significant difference in CCTDI total scores and at most of the subscales at the end of the first year and two years afterwards between the two groups.

Ozturk, Muslu and Dicle (2008) found a statistically significant difference when comparing a nursing programme based on problembased learning (n=52) with a traditional programme (n=95). Although they showed that the two groups were comparable (mean age, gender and background), the report of the study lacks a solid description of the traditional programme. It is therefore hard to interpret the results and conclusions. Yuan et al. (2008b) found a significant increase in scores on CCTDI for students who were assigned to a problembased learning group (n=23). They also scored significantly higher than students in a control group (n=23).

Simulationbased learning

Simulation techniques, especially human simulation, provide a safe and secure environment for the development of necessary nursing skills (Cant & Cooper, 2010). The aim of simulation is to replicate the essential aspects of clinical situations, so they can be managed and understood when occurring in real practice (Hovancsek, 2007). Bland, Topping and Wood (2011) conducted a concept analysis of simulation and defined it as “A dynamic process involving the creation of a hypothetical opportunity that incorporates an authentic representation of reality, facilitates active student engagement and integrates the complexities of practical and theoretical learning with opportunity for repetition, feedback, evaluation and reflection”. There are various simulation techniques, such as peertopeer learning, screen based computer simulations and standardised patients (Cant & Cooper, 2010).

The study by Chau, Chang, Lee, Ip, Lee and Wootton (2001) was conducted among first and second year baccalaureate nursing students, investigating the effect on critical thinking skills of videotaped vignettes of simulated clinical situations. Each of the videotaped vignettes incorporated critical thinking components specific to the simulated situation and critical thinking guidelines were developed for each. There was no significant increase in scores on the CCTST by year. This suggests that the students involved in the study had limited experience with the intervention and that therefore the effect was not reflected in the CCTST scores.

Wu Xi, Tham, Tan-Toh, ST and Than (2010) compared critical thinking dispositions between first and second year nursing students while undergoing simulation based learning. They found that second year students had stronger critical thinking dispositions than those in year one. However, the study has limitations in terms of its design: second year students had experience of various forms of learning (including clinical placement) and were more familiar with discussing and reflecting on their own performance among peers. Second year students also had higher preference scores in simulationbased learning. These experiences and circumstances stimulate the use of critical thinking skills and enhance critical thinking dispositions.

Ravert (2008) conducted a pretest posttest design study, comparing a group of students undergoing regular education plus non-human patient simulation with a group of students undergoing regular education plus human patient simulation. A third group acted as a control group. All groups showed an increase in scores on the CCTDI and CCTST, however none was statistically significant. In addition, there was no statistically significant difference in the scores between groups. The small sample size (40 students divided into three groups) might be the reason for this result. The researcher also pointed out that the experimental

conditions meant that groups received almost the same guidance (personal attention, time to ask questions, etc.) and that human patient simulation did not add anything to the discussion, and hence neither to a significant increase in critical thinking scores.

Concept mapping

Concept mapping involves creating hierarchical arrangements of concepts (and sub concepts) and identifying the relationships between these concepts (Wheeler & Collins, 2003). It is an active way to involve students, in which they develop new knowledge based on prior experience. Cognitive skills used in concept mapping, such as analysis, evaluation and reasoning, are believed to promote critical thinking skills (All & Havens, 1997; Chabeli, 2010). Chabeli (2010) highlights how critical thinking skills are grounded in the different stages of concept mapping. Research findings from the 1990s provide indications that concept mapping does contribute to critical thinking skills (Wheeler & Collins, 2003). However, these studies did not use standardised tests to measure critical thinking skills, and used for example self-reported perceptions or specially developed concept mapping measurement tools that incorporate critical thinking skills (Wilgis & McConnel, 2008).

Using the CCTST, Wheeler and Collins (2003) found that concept mapping contributed to the development of critical thinking skills within a group (n=44). However, no significant difference on scores was found when compared to a control group (n=32).

In summary, in reviewing literature concerning the relationship between teaching methods and the development of critical thinking skills, we found mixed results. The results from four studies focusing on problembased learning supports the idea that this will lead to an increase in critical thinking skills. One study (Magnussen et al., 2000) showed inconclusive results. It should be noted that different designs were used and that most samples were relatively small. Results of studies investigating the effect of simulationbased learning on critical thinking skills are mixed. Finally, only one study focused on concept mapping, where no significant increase in critical thinking skills was found.

Other factors that influence critical thinking skills outcomes

In the articles included in this study, several authors discuss the effect of factors other than educational programmes and/or strategies on the development of critical thinking skills. These factors (age and experience, learning style and entry level) were not research topics themselves, but were often the subject of discussion in interpreting the results of the studies. In this section, we add research findings from studies that support the impact of the aforementioned factors.

Age and experience

It has been suggested that the development of critical thinking skills takes a considerable time (Daly, 2001; Brown et al., 2001). In the discussion sections of the studies included in this review, some authors relate age and experience to the development of critical thinking skills. For example Sulliman (2006) and Drennan (2009) report that variables such as age and experience might influence outcomes. Looking for evidence to support these suggestions, we found a study conducted by Wangenstein et al. (2010). They concluded that registered nurses over 30 years of age showed statistically significant higher scores on CCTDI than their younger colleagues. Especially within studies using samples of Master students, the level of experience may have influenced the results. Drennan (2009) states that prior (clinical) experience and education contribute to critical thinking skills, and therefore the level of these skills are probably not the result of a programme alone. Earlier research conducted by Macpherson (2002) indicates that maturation and cognitive development have a positive effect on problem solving skills, which are related to critical thinking skills. Macpherson (2002) found that students over 30 years of age were better problem solvers.

Learning style

Zang and Lambert (2008) found that Chinese nursing students scored low on critical thinking dispositions using the CCTDI. They argue that Chinese students in general are visual learners and do not have the learning styles that promote critical thinking skills. This is due to cultural elements of the educational system and is in line with Wu Xi et al. (2010), who argue that passive learners (as a result of the educational system) are weak critical thinkers. They found that students who preferred active learning (such as simulation) showed higher scores on the CCTDI. Sulliman (2006) investigated the relationship between learning styles and subscales of the CCTDI and found that nursing students who preferred abstract conceptualisation showed more positive significant relationships with CCTDI subscales than those with other learning styles.

Entry level

Magnussen et al. (2000) found that students who had a low pre-test score on the WGCTA, showed a significant increase in scores at post-test. Rogal and Young (2008) argue that high scores at pre-test (above the average norms) might be responsible for a non-significant change or even decrease in scores at post-test. McMullen and McMullen (2009) found similar effects in their study, contributing to the evidence that entry level has an effect on the development of critical thinking scores during educational programmes.

DISCUSSION

In this article, we reviewed studies that focus on educational programmes, teaching methods or strategies, and examined factors that promote critical thinking skills. Given the variety of different instruments used in assessing critical thinking skills, we only included research on the development of these skills that used the WGCTA, CCTST or CCTDI.

In reviewing educational programmes, we found that the results from the studies included are inconclusive. In nine out of fourteen of the studies, a significant increase of some kind on critical thinking scores was found. We should point out that these nine studies are based on a variety of research topics and designs. For example, there are studies comparing different learning pathways and others comparing curricula after revision. The designs applied are also varied. Furthermore, not all the studies describe in detail the content of the educational programme or the pathway. For example, Beckie et al. (2001) report “Socratic questioning”, “actively engaging students” and “reflective journal writing” as elements of a revised curriculum, while Spelic et al. (2001) mention activities such as “clinical problem solving” and “diagnostic reasoning” as learning activities. In many studies, it remains unclear how the programme as a whole is responsible for the increase in critical thinking skills.

The level of critical thinking at the beginning of nursing education programmes is reported by some authors as being a significant factor in the degree of development of these skills (Magnussen et al., 2000; McMullen & McMullen, 2009; Rogal & Young, 2009). In general, students with low critical thinking scores at entry show a greater increase. This might explain why, for example, Master degree students showed no increase in critical thinking scores whereas graduate nursing students did (Drennan, 2009).

Reviewing educational methods or strategies, we found some evidence to support the idea that problembased learning stimulates critical thinking skills (Ozturk et al., 2008; Tiwari et al., 2006; Yuan et al., 2008b). However, the evidence is inconclusive. Magnussen et al. (2000) only found a significant increase for those who scored low on critical thinking at programme entry. Furthermore, the studies that found an increase in critical thinking scores used small sample sizes. Wheeler and Collins (2003) found that concept mapping does stimulate critical thinking skills. However, compared to their control group it turned out not to be significant, and again, a small sample was used. There is a lack of results to provide evidence that concept mapping contributes to the development of critical thinking skills. In the studies focusing on simulation techniques, the results are also inconclusive. Two studies (Chau et al., 2001; Ravert, 2008) found no significant increase in critical thinking scores. The one study that did find a significant increase used a control group that did not have the same degree of educational experience. In summary, we did not find convincing evidence that simulation enhances critical thinking skills.

Other factors that are of potential importance in the development of critical thinking skills are learning styles, age, experience and entry level. It turned out that many studies used convenience samples, and that a robust analysis of the abovementioned variables is missing in most of the studies. These issues are addressed in the studies discussion section and it is suggested that, in order to prevent selection bias, these variables are taken into consideration.

General remarks

Various authors discuss the validity of the instruments used, which raises doubts regarding the applicability of critical thinking assessment to nursing education (Beckie et al., 2001; Chau et al., 2001; Stewart & Dempsey, 2005; Shin et al., 2006; Walsh & Seldomridge, 2006a). Particularly when compared to other outcomes, such as self-reported perceptions or nurse educators’ comments, scores on standardised instruments may not entirely reflect the development of critical thinking skills. This is in line with earlier statements (e.g., Walsh & Seldomridge, 2006a).

A number of studies used convenience samples of nursing students. This may influence the generalisation of study results (Lee et al., 2012). In general, the samples used in the studies included are relatively small, which has consequences for the reliability of the results. This issue is frequently addressed in the discussion sections of the studies. For example, Yuan et al. (2008b) recommend the use of larger sample sizes.

The designs applied in the included studies are rarely of a longitudinal nature and not always of experimental nature, in fact many are of quasi-experimental nature. As stated before by Yuan et al. (2008a), there is a lack of high quality designs in research on the development of critical thinking skills. In case of an experimental design, interventions are not always described in detail. In addition, the control conditions (for example the traditional programme in case of a curriculum revision) or influencing variables are not fully described. Traditional programmes might also incorporate elements that will influence the development of critical thinking skills (Yuan et al., 2008b). Because of all these factors, any potential bias in the results is difficult to identify.

Several studies (Brown et al., 2001; Daly, 2001; Profetto-McGrath, 2003), have suggested that it takes considerable time to develop critical thinking skills. A fouryear baccalaureate programme may be too short to show a significant increase in cognitive development. We found that in some studies, the period during which the intervention and research took place was limited. Brown et al. (2001) argue that accelerated programmes do not offer sufficient time for students to reflect on the information presented in the course.

The number of articles included in this study is limited, as few met the criteria that were set. We are aware of the fact that the criteria exclude studies using other instruments than the WGCTA, CCTST and CCTDI.

CONCLUSIONS AND IMPLICATIONS

In addition to the need for a clear and consistent definition of critical thinking in order to compare the outcomes of research (Brunt, 2005a), it is also necessary to describe in detail teaching strategies and how they relate to the development of critical thinking. As Simpson and Courtney (2002) state, critical thinking skills develop as a result of various experiences. We found that the studies we included lack a detailed description of interventions and/or control group conditions. Furthermore, the studies investigating the development of critical thinking skills use relatively small sample sizes and are often not of longitudinal nature. In order to determine whether educational programmes or strategies contribute to the development of critical thinking skills, experimental designs over a sufficient period of time with substantial sample sizes are recommended. Additionally, influencing factors other than educational strategies, such as age and experience, should be taken into consideration. Finally, exploring and defining a multiple perspective on critical thinking is recommended.

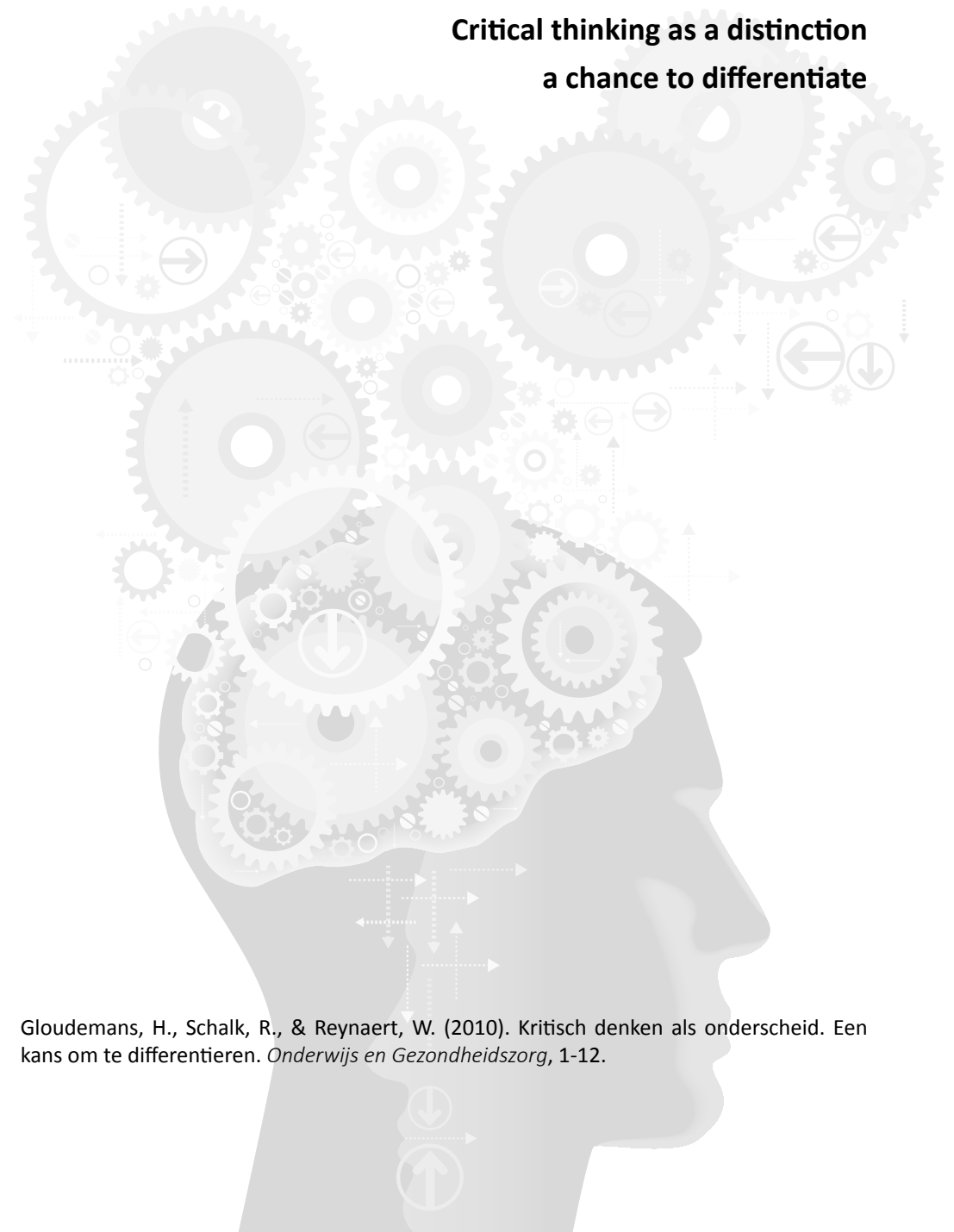
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Chapter 3

**Critical thinking as a distinction
a chance to differentiate**



Gludemans, H., Schalk, R., & Reynaert, W. (2010). Kritisch denken als onderscheid. Een kans om te differentiëren. *Onderwijs en Gezondheidszorg*, 1-12.

INTRODUCTION

In the discussion on the exact difference between the professional and intellectual abilities of Dutch nurses trained at the intermediate professional education level (MBO) and those trained at a higher professional education level (HBO), you often hear phrases such as “analysing, relating, testing, assessing and evaluating”. “HBO-trained nurses apply these skills more often and at a higher level compared to their MBO peers” proved to be the main outcome of a total of three *Focusgroep* meetings, in which the difference between MBO and HBO-trained nurses in the mental healthcare sector was subject of discussion (Focusgroep, 2007). Participants from the professional practice (nurses, workplace trainers and managers) and the educational sector referred to the aforesaid skills as the most characteristic differences between MBO and HBO-trained nurses. In this article, skills such as “analysing” and “assessing” are classed under the domain of “critical thinking”. The key question in all this is whether critical thinking can be seen as an important distinction. If so, it would serve as a tool to differentiate tasks and positions, and education curricula could be better attuned accordingly. The deeper meaning of critical thinking will be discussed here, with an emphasis on cognitive skills. After all, based on the HBO-GGZ (HBO mental healthcare) professional competencies (GGZNederland, Sciencia & HBO Raad, 2004), you would expect a difference between HBO and MBO-trained nurses in terms of their ability to apply cognitive skills. Other factors too may play a(n) (equally) large role here. Finally, the differences between competency profiles in critical thinking as a means of measuring these differences are discussed.

Critical thinking

In the literature study conducted by Moon (2008) into what critical thinking entails, one of the conclusions is that there are many definitions of critical thinking. However, the different definitions do show some similarities:

- regardless of manifestation (including language, writing and action), it concerns a mental activity and forms part of the intellectual process.
- it is a form of learning: it means adapting existing knowledge to generate new knowledge using instruments such as analysis, comprehension, synthesis etc.

Moon (2008) formulates the following as a core activity of critical thinking: “the assessment of what might be called evidence, in order to make a judgment”.

Moon sees critical thinking as a condition to assess the value of evidence in order to come to a well-considered judgment on that basis. Here “evidence” must be read in the widest sense of the word: not only does it concern scientific evidence, but also e.g. patient preferences, information from the context/circumstances and past experiences (see also Rycroft-Malone et al., 2003).

A critical thinker cannot do without cognitive skills here. Wilkinson (2008) defines cognitive skills as: “Intellectual activities which you carry out during complex thought processes such as making critical analyses, solving problems and taking decisions”. In Table 1, Facione and Facione (1996) describe a basic set of cognitive skills needed to come to a judgment and to action, and to monitor their adequacy. Fisher (2001) as well as Simpson and Courtney (2002) come to a similar enumeration of fundamental (cognitive) skills that fall within the critical thinking domain.

Table 1. Cognitive Skills and Sub-Skills. After American Philosophical Association in Facione & Facione (1996)

➤	Interpretation: categorising/decoding/clarifying
➤	Analysis: investigating ideas, identifying arguments, analysis of arguments
➤	Evaluation: testing claims, testing arguments
➤	Conclusion: drawing conclusions, questioning evidence, introducing alternatives
➤	Argumentation: justifying procedures, presenting argumentation, clarifying results
➤	Self-regulation: self-study, self-correction

The above authors mainly imply the possession of knowledge and skills and to a lesser extent emphasise the actual use thereof. Pool (2007) gives critical thinking an additional dimension and states the importance of attitudes: critical thinking also comprises the wish and motivation to apply these skills. Facione and Facione (1996) as well as Spencer (2008) support this view: critical thinking comprises more than a certain series of cognitive (mental) activities. It is a combination of clinical skills, experience, knowledge and attitudes. Other authors believe that affective skills, such as empathy, are also part of the domain of critical thinking (Scheffer & Rubenfeld, 2000; Walthew, 2004).

However, in literature you can detect the dominance of a cognitive-oriented perspective. This is hardly surprising: critical thinking presumes the possession of cognitive abilities. Without these abilities, people are not able to reflect on their own thoughts and actions, for example. The meaning of reflection includes: investigating alternatives, drawing “if... then” conclusions (Wilkinson, 2008). That requires cognitive abilities such as analysing, interrelating and forming opinions.

However, the confusion of ideas remains, partly due to the use of phrases and concepts such as “clinical decision-making” and “clinical reasoning”, which are sometimes used as synonyms of critical thinking. This confusion of ideas hampers research into the nature of critical thinking and its significance for the nursing practice.

Labelling critical thinking as a meta-competency creates clarity in this confusion of ideas. A meta-competency can be regarded as a “competency behind the competencies”. Meta-competencies help one to master “ordinary” competencies and skills (Dries, Vantilborgh,

Pepermans & Venneman, 2008). In the nursing practice and as part of this notion, “clinical decision-making” is a competence and “critical thinking” a meta-competency. The nursing professional uses meta-competencies as a basis and applies this within different contexts and circumstances. The context or task determines which specific competency is deployed. Meta-competencies are not specifically or directly context-bound in that sense (De Moor, 2005). It is a generally applicable competency which ties in well with the diversity of the nursing practice.

Relevance of critical thinking for the professional nursing practice

As the above shows, there is a difference of opinion as to what forms part of the domain of critical thinking. It is therefore no surprise that an unambiguous definition of critical thinking for the professional nursing practice is lacking (Brunt, 2005; Riddell, 2007). Nevertheless, critical thinking is an important subject within the professional nursing practice, regardless of which definition is used.

Within nursing training programmes and within the professional nursing field, there is a strong emphasis on the development of the ability to think critically. One reason for this is that nurses are confronted with rapid changes and complex problems (Vereniging STIP, 2002; Simpson & Courtney, 2002; Edwards, 2003; VBOC, 2006), often involving multiple alternatives to solving problems (Moon, 2008). The ability to handle these continuous changes and increasing complexity effectively requires the ability to reason at a higher level (Simpson & Courtney, 2002).

The perspective of the care user plays an increasingly central role here, as evidenced by the shift from supply-driven care provision to demand-driven care in the last decades. This social tendency means that care providers more and more need to take into account the wishes of the individual person (Vereniging STIP, 2002; VBOC, 2006). Van der Jagt (2003) detects a similar trend: “However, in most sectors of the care and welfare services, the changing attitude of patients/clients is most prominent: they have become more articulate. They no longer accept the authority of the care provider and more often subject the care offered to them to a critical test”. This means that nurses have to substantiate their actions towards care users with convincing arguments.

Another development that appeals to the ability of (trainee) nurses to think critically is the ‘scientification’ of practice: evidence-based practice. Nurses more and more experience a responsibility to explain, justify and defend opinions and decisions (Dowding & Thompson, 2002). Requests to support actions with evidence are becoming increasingly common (De Lange & van Staa, 2004). This requires nurses to possess a number of special abilities, such as assessing the value of research data and science-based knowledge, and the ability to apply this within their own practice (Edwards, 2005).

The fact that critical thinking is vital for the professional nursing practice is evident, given the series of national and international publications that have appeared in the last years. Different authors point out the need to produce reflective nurses within higher healthcare education (Brouns, 2006; Deneire, 2003). The nursing practice has developed strongly in the last few years and that requires competent nurses (Brouns, 2006). Critical thinking has become a key theme within the nursing curricula and work fields (Wilkinson, 2008). Learning strategies strive to develop the ability to think critically. The objective of this is to come to higher quality clinical judgments and other decisions. Critical thinking is thus intertwined with the professional nursing practice.

Distinction between MBO and HBO level

The difference between the nursing levels is often not clear in practice. HBO nurses, for example, are often assigned to MBO positions (Den Boer & Hövels, 2003; Taminiau & den Boer, 2004), and the Dutch Individual Healthcare Professions Act (BIG) does not differentiate between MBO and HBO nurses (VBOC-AVVV, 2006). In addition, there are doubts as to how well the education competencies connect to the professional practice, with some seeing a gap between the two (Van der Most, 2005).

Applying a single nursing title and attaching two qualification levels to it causes confusion (Van Dam, Kraayvanger & Hövels, 2003). Care institutions struggle with the situation, and have trouble positioning levels 4 and 5 with respect to existing positions (VBOC-AVVV, 2006). In practice, the distinction raises a lot of questions, with the difference between levels 4 and 5 being unclear (Beckers & Nijhuis, 2005). There is less discussion about level 3. The distinction among nurses is clearly defined in a number of areas, for instance regarding authorised actions: these are nursing interventions that need to be authorised and which are regulated by law (Commissie Kwalificatiestructuur, 1996).

However, there is a strong need to clearly differentiate between nursing levels 4 and 5 in the practical field. This distinction must be more clear-cut (VBOC-AVVV), and positions need to be created in which the distinctive competencies of HBO nurses are done justice (Van Dam et al., 2003). Job differentiation can be used to create a better alignment with the supply from the new educational system (Wijnen, 2004).

Also from government side, there is a need to clearly differentiate between the different education programmes and care-providing jobs. The tasks need to be divided more efficiently. One of the proposals of Dutch Minister Hoogervorst to the House of Representatives (*Tweede Kamer*) is as follows: “To set up a taskforce that advises on a flowing line (continuum) within nursing education programmes, professions and positions (Dutch Ministry of Health, Welfare and Sport, 2003). The discussion about the content of (new) positions is in full swing, seeing the number of publications. It is remarkable that the emphasis is often put on the rearrangement of duties, such as having medical interventions carried out by nursing

specialists like the Nurse Practitioner and the Physician Assistant (Commissie LeGrand, 2003; VBOC-AVVV, 2006). Relatively little attention is paid to distinguishing between level 4 and 5 nurses (VBOC-AVVV, 2006).

Critical thinking as an instrument to differentiate

When assessing the general HBO exit qualifications and competencies such as the Dublin Descriptors and the HBO qualification, it is striking to note the cognitive undertones of the descriptions. Phrases such as “comprehends”, “considers” and “judges” frequently occur in the domain descriptions. The same type of descriptions can also be found in HBO nursing profiles such as the HBO-GGZ sub-qualifications. Cognitive-oriented phrases also occur in MBO nursing competency profiles (Movisie & Vilans, 2007). However, the emphasis is stronger in the HBO profiles. All professional HBO nursing roles (care provider, manager, coach, designer and practitioner; Pool, 2007) contain the aforesaid characterisations. The high frequency of these cognitive-oriented phrases suggests a possible distinction in the level of cognitive ability and its application. In this article this is classed under the denominator of “critical thinking”. With a view to the different emphases in the cognitive domain between the MBO and HBO nursing profiles, a logical conclusion would be that the HBO-trained nurse is a better critical thinker. The HBO-trained nurse is higher developed in the meta-competency of critical thinking. This should manifest itself in the professional nursing practice. For example, HBO-trained nurses are better positioned to make well-considered decisions on which interventions are based. After all, HBO nursing curricula pay more attention to reflection and evidence-based practice (Focusgroep, 2007).

To date, if and how HBO-trained nurses set themselves apart from their MBO counterparts in the professional practice has not been established scientifically. The difference in practice itself is often not recognised and/or acknowledged. An effective instrument or method to identify the differences is lacking. Critical thinking as a distinction may prove useful here. The nursing domain is extremely diverse with different levels of complexity. A higher level of complexity in particular requires a higher level of critical thinking. This applies to all professional nursing roles, both for the role of care provider and designer. Different roles and situations do of course require different competencies. The “care provider” must be able to act adequately in acute situations. The “designer” must be able to think through the long-term consequences of his plans. However, the point is that the meta-competency of critical thinking is a contributing factor to the successful execution of all nursing roles and tasks. Determining the level of critical thinking can hence serve as a means to determine the professional and intellectual ability: MBO or HBO level.

Investigating which variables affect the level of critical thinking is relevant. An obvious question is whether education is decisive for the level of critical thinking. If so, education institutes can pay more deliberate attention to the development of critical thinking.

Education can incorporate this, for instance by confronting HBO students with complex practical situations. Challenging students and appealing to their HBO-level roles and tasks can be intensified. The same applies to internships: particular attention is paid to the roles of care provider and manager. This is in itself not surprising, as these form an important domain within the profession. However, appealing to other competencies ultimately leads to a better critical thinker. This will at same time enhance the quality of care.

It is clear that education institutes have a role to play in the development of the professional and intellectual abilities of students and nurses. However, it is not the only and all-decisive factor. Many factors contribute to the development of professional and intellectual abilities. Example include: years of work experience, diversity of the work, workplace culture and age. Circumstances are contributory to how a person develops. It is a complex interaction of internal and external factors, forming something of a black box. In this black box we can see input and output, but without knowing exactly the inner workings of the individual. Critical thinking as a result criterion in the form of output is measurable. This is possible within both nursing training programmes and within the nursing work field. Critical thinking thus provides a means to differentiate...

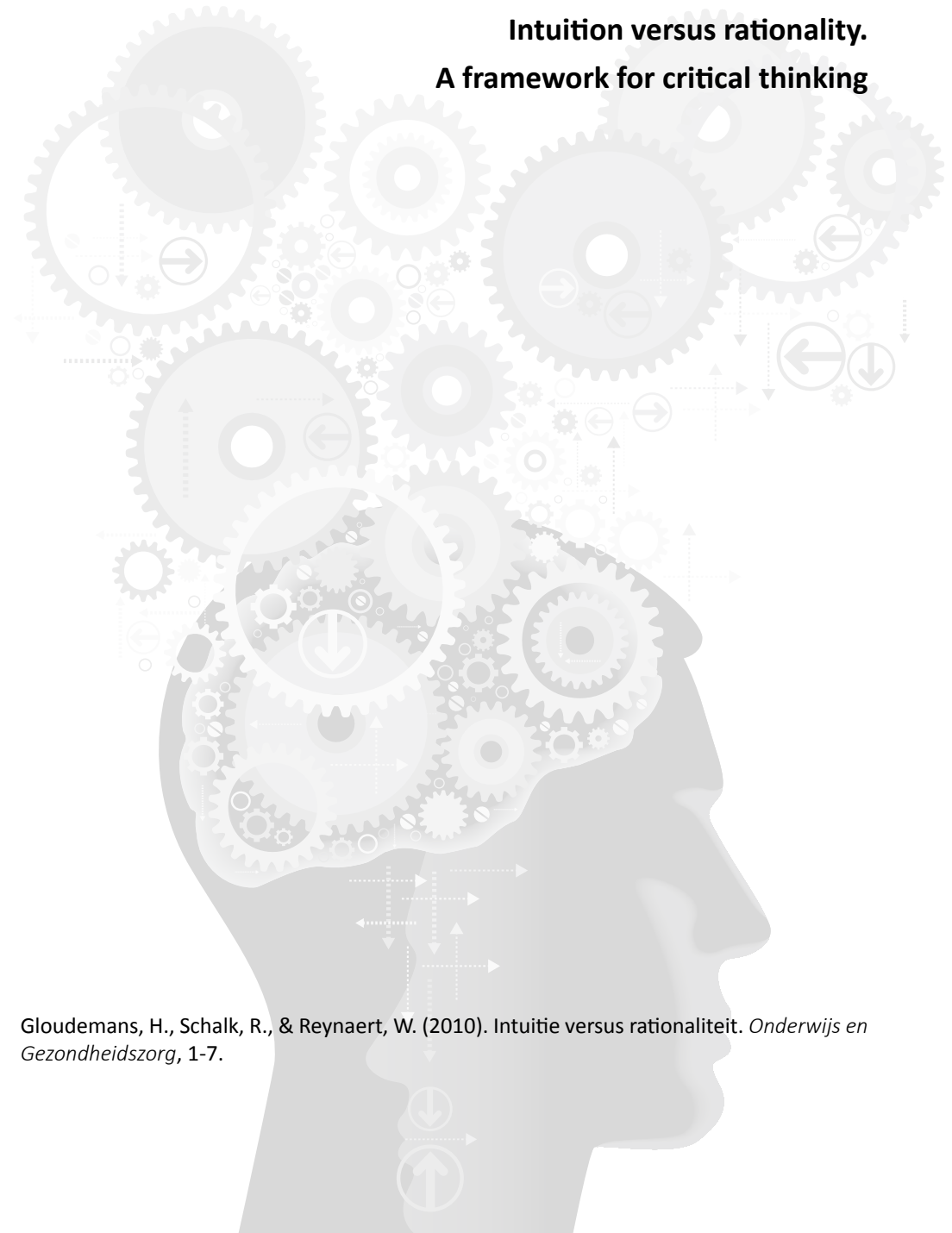
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Chapter 4

Intuition versus rationality. A framework for critical thinking



Gludemans, H., Schalk, R., & Reynaert, W. (2010). Intuïtie versus rationaliteit. *Onderwijs en Gezondheidszorg*, 1-7.

INTRODUCTION

The nursing fields of education and work are subject to a continuous discussion on the differences in level between MBO and HBO-trained nurses. The difference in cognitive abilities, classed under the denominator of critical thinking in a previous article, can serve as a possible differentiation tool.

This article introduces three models that will help place critical thinking and the associated cognitive skills within a framework. This allows us to identify the corresponding differences in competency levels. The cognitive basis of nurses' interventions will be discussed. Although the models of Benner, Hammond and Eraut discussed in this article differ, they help to explain and categorise the basis of nursing interventions. The models do not exclude but complement each other. However, it is assumed here that the models of Hammond and Eraut provide more comprehensive coverage of the HBO nursing domain than Benner's model.

Intuition versus rationality

Critical thinking assumes a methodical and analytical thought and intervention process. These are rational processes: they are applied consciously. However, the question is to what extent nurses, consciously or otherwise, use these processes. How do nurses judge, and on what basis do they make decisions and interventions? In other words, what cognitive mode (manner, method) do nurses apply? This is a widely pursued research field (Standing, 2008; Goransson et al., 2007; Cader et al., 2004) in which phrases such as clinical decision-making, clinical judgment and clinical reasoning are used indiscriminately (Thompson, 1999). Within this framework, the models of Benner (1984), Hammond et al. (1997) and Eraut (2000) are relevant. The aforesaid authors give different explanations for the basis on which decisions and interventions are made. Benner emphasises the level of expertise of the individual nurse. She outlines a development of rule-based intervention to intuitive intervention. Hammond et al., on the other hand, focus on the task properties of a task. These are seen as decisive for the use of the cognitive mode: an intuitive or more analytical approach. Eraut emphasises the context within which the task is carried out and states that the time factor is most decisive in the application of the cognitive mode. The models are explained further below.

Benner: from beginner to expert

A number of studies demonstrate that nurses frequently use their intuition in assessing situations and making intervention choices (Benner, 1984; Benner et al., 1998; Gobet & Chassy, 2008). Experience gained in similar situations in the past contributes to the development of intuition. Intuition is often confused with acting "on instinct". However,

intuition certainly also involves a cognitive basis. The automatic character of intuition makes it seem as if the intervention is made without prior thought. Yet we should remember that past experiences have been processed through unconscious reflection and that intuition is a result of this processing. Perhaps the definitions below clarify this. Intuition is (Thompson, 1999):

- comprehension without rationality
- instant knowledge of something with the conscious use of reasoning
- awareness of possibilities, meanings and relations through insight
- a process in which the nurse has knowledge of the patient that cannot be expressed, is difficult to formulate or of which the knowledge source cannot be established.

The common factor in the above definitions is the fact that intuition, and with that intuitive intervention, is based on implicit learning processes. Implicit learning has been defined by Reber (2003) as: “the acquisition of knowledge independently of conscious attempts to learn and the lack of explicit knowledge regarding what has been learned”. Implicit learning occurs through personal experiences in which these experiences are not consciously processed prior to being stored in the memory (Eraut, 2004; Reber, 2003). Nurses are therefore not (fully) aware of the knowledge source and the motives for their interventions. As long as experiences are not made explicit, they will form part of what is referred to in English literature as tacit knowledge. Tacit knowledge is the result of implicit learning referred to above and has an influence on the decisions and behaviours of professionals (Eraut, 2000). Practice will often be a mixture of, on the one hand, implicit knowledge and, on the other, explicit knowledge.

Nurses are often confronted with situations where not all information is available to enable a well-considered decision, or which require immediate intervention. In this type of situation the nurse mainly acts intuitively. Obviously, experience and knowledge gained previously will play a role here (Benner, 1984, Schön, 1988). An intuitive approach can be seen among experienced nurses: experienced nurses immediately recognise situations and react practically automatically; they know what to do without giving it much thought.

Benner (1984) therefore relates an intuitive approach primarily to the level of expertise of the nurse. The higher the level of expertise, the greater the use of intuition. Young and newly-graduated nurses have little intuition. According to Benner, they are unable to oversee the entire situation and act accordingly. Therefore, the development from an analytical to an intuitive approach of practical situations is central to her model (see Table 1). New nurses break down situations to analyse the components by means of fixed procedures and rules. This gives them support in the assessment of situations and gives direction to the intervention. However, nursing experts approach situations as a whole and intuitively recognise which interventions need to be made and/or have priority. Practical experience is a condition in all of this to achieve their level of expertise. According to Benner, during their

development from novice to expert, nurses learn to set priorities and approach practical situations as a whole. This process takes a number of years. Building on past experiences in various situations helps the nurse to understand situations intuitively and to act accordingly.

Table 1: from beginner to expert (after Benner, 1984)

Level	Characterisation
The beginner	Behaviour is rule-driven
The advanced beginner	Frequently recognises the aspects of certain situations
The competent nurse	Consciously acts on the basis of predefined plans; feels in control of situations
The fully-qualified nurse	Approaches situations as a whole; interventions are principle-driven
The nursing expert	Has an intuitive understanding of every situation and focuses attention on the correct problem area; pays little attention to superfluous, alternative solutions in the process

Hammond: the cognitive continuum theory

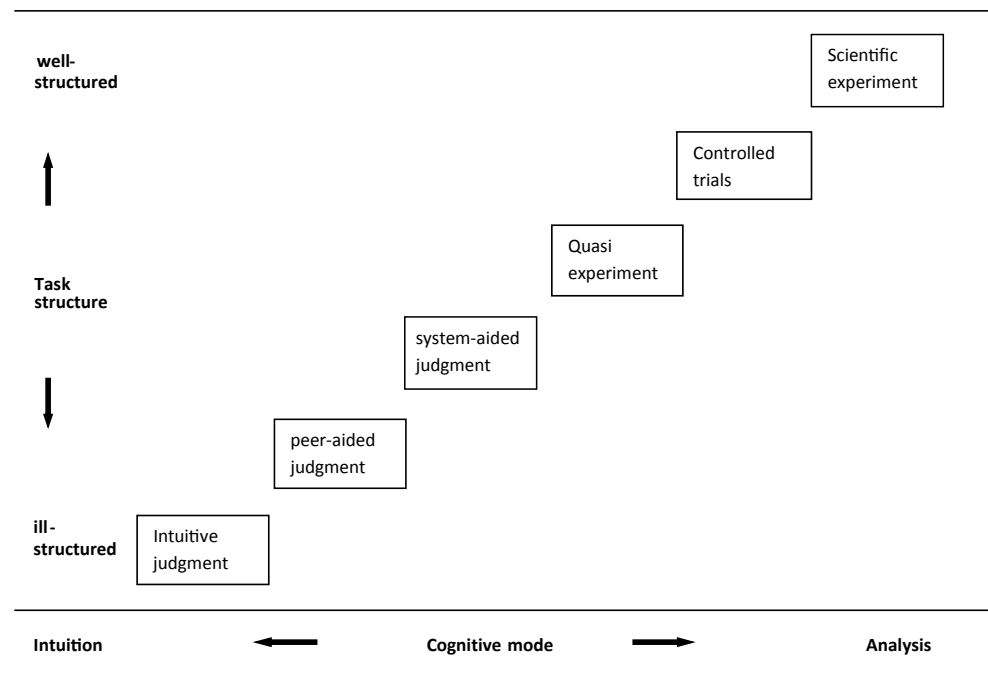
Hammond applies a different perspective than Benner. With the development of the cognitive continuum theory, he illustrates how situations and/or tasks which require assessment are related to cognition (Cader et al., 2004). This theory centres on two continuums: the cognitive continuum and the judgment-task continuum. The cognitive continuum runs from intuitive/experience-based to analytical/rational. The judgment-task continuum runs from poorly structured to well-structured (Standing, 2008). The theory assumes six cognitive modes: intuitive judgment, peer-aided judgment, system-aided judgment, quasi experiment, controlled trials and scientific experiment (see Figure 2). Here intuitive judgment is regarded as the mode in which the approach is least analytical. Approaching tasks as a scientific experiment sits on the other end of the spectrum. Here the approach is highly analytical with work performed on the basis of predefined procedures and protocols. The task/assignment is therefore very well structured. The intervening modes show a build-up in both the structure of the tasks and the level at which analytical skills are used.

The ascending cognitive modes in Figure 2 thus represent different approaches used to reach judgments and making interventions. The properties of a task are the largest factor therein: they decide the use of the cognitive mode (Hamm, 1988, Hammond et al., 1997, Cader et al., 2004). The better a task is structured, the more an analytical mode is used. One example is an intervention protocol. Its structured character causes the nurse to apply an analytical approach: do I interpret the symptoms correctly? Which intervention is most suitable in this situation?

On the other hand, Hammond states that the less a task is structured, the more an intuitive mode will be used. The time aspect plays a significant role here: acute situations require rapid action. This includes situations in which newly admitted psychiatric patients experience

a crisis, without a treatment plan in place as yet. In situations with a lot of uncertainty (information missing, unfamiliarity with the patient) or situations that are new for the professional, intervention will sooner be made on the basis of intuition.

Figure 2: Cognitive Modes. After Hammond et al. (1997).



Eraut: the time factor

Where Hammond et al. emphasise the task characteristics and Benner et al. the level of expertise of the professional, Eraut (2000) focuses on elements of the context. In his model, elements of Benner and Hammond can clearly be recognised. However, he states that in certain situations the available time and pressure are particularly decisive for the choice of a cognitive mode. If there is a shortage of time at the workplace, people will not take time to reflect on actions. Instead, intuitive responses will dominate (Eraut, 2006). The more time there is to reflect on decisions, the more an analytical approach will be applied. This can be seen in the nursing practice in e.g. projects aimed at improving quality. Based on a thorough analysis, a methodical method is used to reach a proposal for improvement: interventions and actions are well-considered and tested for effectiveness and feasibility. The available time and, to a lesser extent, the task properties and/or the level of expertise, are decisive for the method to be followed (Eraut, 2004). This can sometimes be an intuitive mode, and a deliberate/analytical mode at other times (see Figure 3).

Figure 3. Interaction between Time, Cognitive Mode and Thoughts/Actions. After Eraut (2000).

Thought/action	Cognitive mode		
	<i>Instant/reflex-driven</i>	<i>Fast/intuitive</i>	<i>Deliberate/analytical</i>
“Reading” the situation	Pattern recognition	Fast interpretation	Assessment based on discussion and/or analysis
Decisions	Instant response	Intuitive	Well-considered with some analysis or discussion
Open action	Routine action	Routines accentuated by fast decisions	Planned action with periodic progress assessment
Meta-cognitive processes	Situational awareness	Implicit monitoring Short reactive reflections	Deliberate monitoring of thoughts and interventions Self-management Evaluation

DISCUSSION

The models described above do not exclude but complement each other. The task properties, the individual level of expertise and the context within which the work is performed are decisive for the use of the cognitive mode.

Within this context, it is important to examine the HBO professional nursing competencies. In this field, the nursing domains of care, profession and organisation are distinguished, which are translated further into professional roles (GGZ Nederland et al., 2004; Pool, 2007). These professional roles are: care provider, manager, designer, coach and practitioner.

Particularly the roles that differentiate the HBO from the MBO level (designer, coach and practitioner) require a conscious consideration and deployment of interventions. For example, HBO-trained nurses are expected to make improvements in care activities and to pursue their professionalism. This requires a systematic approach in which problems, alternative solutions and possible consequences of actions must be investigated. Intuitive intervention would not be appropriate: a deliberate/analytical mode would be. The models by Hammond and Eraut offer a possibility to describe the nursing competencies at a different level than Brenner’s model does. Brenner’s model mainly offers insight into the development of the role of the care provider. It outlines the development that new nurses go through before reaching expert level and in which intuitive intervention is labelled as expert behaviour. Experienced nurses will recognise their own development as care provider therein. However, in order to establish the difference between MBO and HBO-trained nurses within the healthcare sector, this model offers insufficient reference points. It is too strongly based on the role of care provider. This does not do justice to the HBO competency profiles and does not (or no longer) fit in with the nursing practice. In addition, the models of Hammond and Eraut do not exclude intuition. On the contrary, intuition plays a prominent role in the whole.

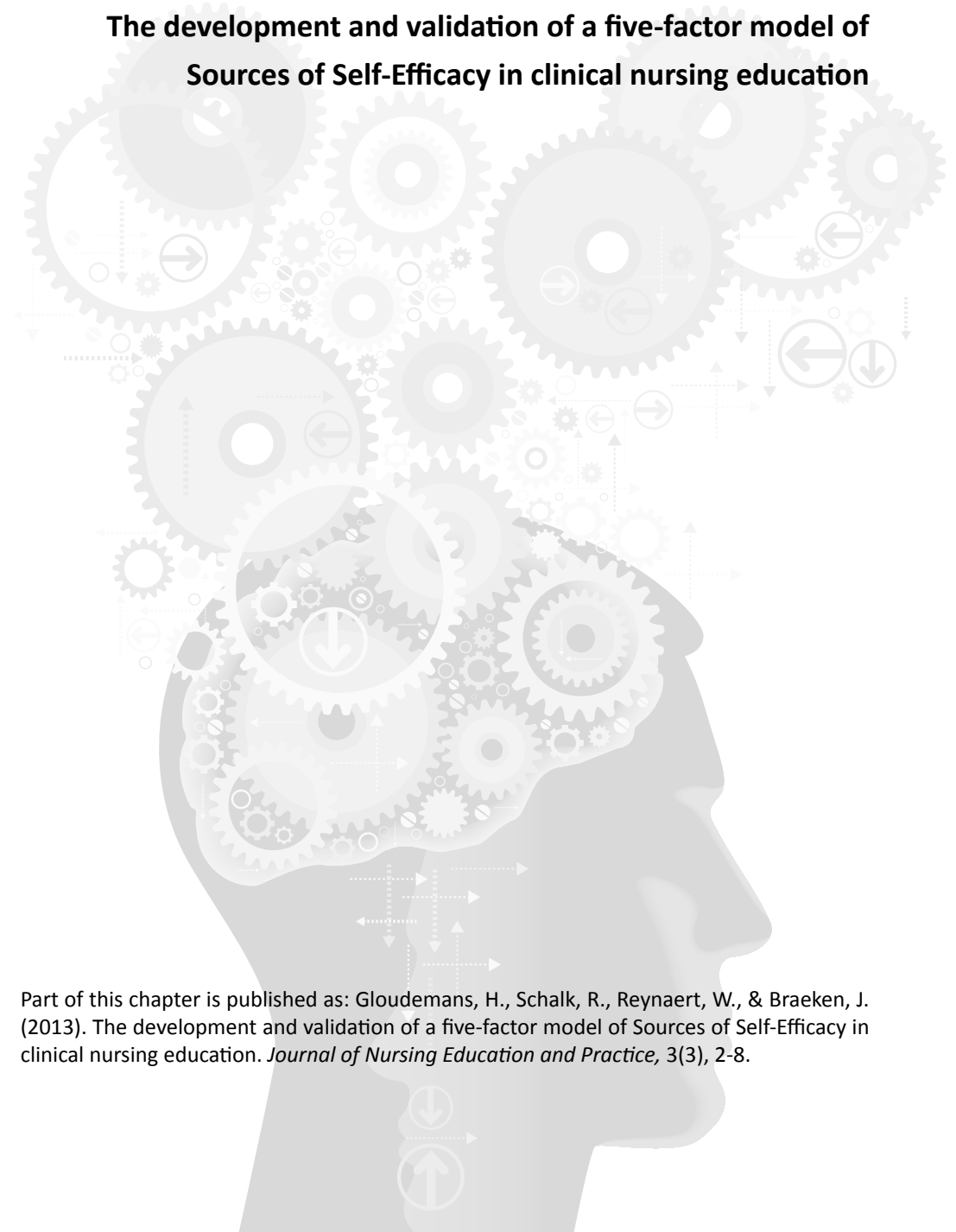
Using the above frameworks provides insight when seeking to clarify and understand the basis for nursing reasoning and intervention. The question in all of this is whether HBO-trained nurses generally use different cognitive modes than their MBO counterparts. This would be an obvious expectation on the basis of the training qualifications and competencies. Therefore, a difference in the ability to think critically should be present and detectable. It is essential to acknowledge that in many practical situations, intuition is the only and appropriate basis on which nurses can act. Therefore, for part of the nursing tasks there will be no detectable difference in terms of the ability to think critically. However, the nursing domain is diverse and extensive (see the professional competencies and roles mentioned above). Establishing the level of critical thinking required for the execution of a particular task offers the possibility to differentiate between tasks. Competencies can be linked to this. Here, the models of Hammond and Eraut offer more comprehensive frameworks for both the nursing practice and education.

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Chapter 5

The development and validation of a five-factor model of Sources of Self-Efficacy in clinical nursing education



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INTRODUCTION

In nursing education, clinical experience has become an important part of performance assessments. These assessments are used to evaluate educational programs, or to assess students' self-efficacy beliefs (Clark, Owen & Tholcke, 2004; Schlegel, Woermann, Shaha, Rethans & van der Vleuten, 2012). The relevance of self-efficacy beliefs in nursing and nursing education has been demonstrated by several authors. For example, Peterson (2003) relates self-efficacy to predicting academic success in Bachelor degree nursing programs. Pisanti, Lombardo, Lucidi, Lazzari and Bertini (2008) relate self-efficacy to nurses' coping ability in stressful situations.

Although the concept of self-efficacy is extensively studied, the sources underlying self-efficacy beliefs are poorly investigated (Pajares & Urdan, 2006; Usher & Pajares, 2009; Klassen, Tze, Betz & Gordon, 2011). We suggest that more insight into how nursing students form self-efficacy beliefs will help build more powerful clinical learning environments. The aims of this study are (1) to validate a newly developed nurses' self-efficacy sources inventory, and (2) to identify the most important sources of self-efficacy. We test the validity of a five-dimensional model of sources of self-efficacy, which we contrast with the traditional four-dimensional model based on Bandura's theoretical concepts (Bandura, 1997). We hypothesize that a further differentiation in sources of self-efficacy will reflect more accurately how nursing students form self-efficacy beliefs. Furthermore, we investigate whether sources are differentially related to self-efficacy beliefs, or whether there is one main specific source on which self-efficacy beliefs are built.

Background

Definition of self-efficacy

Self-efficacy is defined by Bandura [8] as *"the belief in one's competence to tackle difficult or novel tasks and to cope with adversity in specific demanding situations. It reflects the belief in one's capabilities to organize and execute the courses of action required to produce given attainments"* Self-efficacy makes a difference in how people feel, think, and act. Those with high self-efficacy beliefs want to overcome difficult situations instead of avoiding them (Anderson & Betz, 2001; Steyn & Mynhardt, 2006). Increasing self-efficacy enhances the sense of self-control and helps one to perform at a higher level (Van Dinther, Dochy & Segeres, 2010).

Sources of self-efficacy

Bandura's idea that self-efficacy is based on the interpretation of information from four sources is widely accepted (Anderson & Betz, 2001; Steyn & Mynhardt, 2006; Van Dinther et al., 2010). These sources are mastery experiences, vicarious experience, verbal/social

persuasion and physiological/affective states (Bandura, 1997; Van Dinther et al., 2010; Hodges & Murphy, 2009). Mastery experiences are seen as the most powerful source of information in the formation of self-efficacy beliefs (Bandura, 1997). Students gain evidence that is authentic, which feeds a strong sense of self-efficacy in performing and succeeding at particular tasks (Palmer, 2006).

The second source of self-efficacy beliefs is vicarious experience: obtaining information through observational experiences to assess one's own capabilities and performance (Bandura, 1997, Van Dinther et al., 2010). Comparing performance, especially to that of peers, can increase or decrease self-efficacy beliefs. Research indicates that students differentiate between the vicarious experience sources (Lent, Lopez, Brown & Gore, 1996; Usher & Pajares, 2006). They make different comparisons with regard to the experiences of peers and experienced colleagues which they see as experts. For example, evaluating performances of experienced colleagues can lead to a decline in self-efficacy beliefs: one might think that he or she will never achieve a comparable level of performance. Several authors report that information based on vicarious experience especially enhances self-efficacy beliefs if the experience or knowledge is of a similar level (Bandura, 1997; Margolis, 2005).

The third source as identified by Bandura (1997) is verbal persuasion. This pertains to the influence of persuasive communication by significant others (Van Dinther et al., 2010). Evaluative information and feedback is most powerful when provided by people who are perceived by students as knowledgeable and reliable (Bong & Skaalvik, 2003).

Physiological symptoms such as increased heart rate and transpiration and emotions or feelings such as excitement are the fourth source of self-efficacy beliefs (Bandura, 1997, Van Dinther et al., 2010).

Sources of self-efficacy and clinical nursing education

To date it is not clear, however, how nursing students use these sources and how they relate to the formation of self-efficacy beliefs.

Insight into how these sources influence self-efficacy beliefs has implications for nursing education. It can contribute to the design of learning environments in clinical practice. For example, Baeten, Kyndt, Struyven and Dochy (2010) looked at factors that stimulate deep approaches to learning. They found that self-confidence and self-efficacy are important factors in students' adoption of a deep approach to learning. Self-confidence and self-efficacy can be enhanced in (clinical) learning environments. Hence, further insight into how self-efficacy sources influence self-efficacy beliefs can help improve the professional development of nursing students and nurses.

Clinical learning environments tend to have an informal character (Eraut, 2004). Often, there is no formal structure to guide or define what learning should take place. Furthermore, as the

focus is generally on treatment and care, less attention is paid to learning and professional growth (Berntsen & Björk, 2010). This does not mean, however, that no learning takes place. Tynjälä (2008) reviewed the different perspectives on learning at the workplace. One of the research questions was how people learn at the workplace. She found that people learn by doing the job itself, by interacting with colleagues, and by reflection on and evaluation of one's performance. The need for tailored supervision was underlined by the results of a study by Warne, Johansson, Papastavrou, Tichelaar, Tomietto, Van den Bossche, Moreno and Saarikoski (2010). They found that individually tailored mentorship helps nursing students in their professional development. They argue that mentoring in combination with working with patients are the two core elements of professional development in nursing.

This is in line with Bandura's (1997) theory that, by learning, people gather information on which they form self-efficacy beliefs. Examining the role of self-efficacy sources and making these sources explicit opens up means of enhancing self-efficacy beliefs, which will stimulate the professional development of individuals.

OPERATIONALIZATION AND METHODS

Sources of Self-Efficacy

Since, to our knowledge, there are no validated instruments to assess sources of self-efficacy in nursing, we developed a new instrument. We used the Sources of Self-Efficacy Inventory (SOSI) developed by Kieffer and Henson (2002) as a basis to develop an instrument for the nursing context. The SOSI is a 35-item inventory developed to assess teacher self-efficacy. The items are divided into four subscales based on the work of Bandura [8]. The reliability coefficient of these subscales ranges from .47 to .78 (Kieffer & Henson, 2002). Mohamadi, Asadzadeh, Ahadi and Jomehri (2011) examined the construct validity of the SOSI using confirmatory factor analysis. After translation and some adjustments, they found an acceptable fit for a four-factors model (RMSEA .043, CFI .96), which is in line with Bandura's theory.

To build an initial item pool, we adapted the items from the teacher context to the specific nursing context. Items were written as first-person statements. For the vicarious experiences source we included both peer-based and expert-based experiences. This means that the vicarious experience source is divided into two factors, leading to a five-sources model. We used a 5-point self-rating scale, ranging from 1 to 5.

Content and face validity of the initial item pool was evaluated through two feedback channels, one consisting of experts and one based on feedback from members of the target population. For the expert channel we organized a focus group session for lecturers in nursing (n =18), with the aim of critically examining the validity of the items and the fit in the five-sources model. Usher and Pajares (2009) state that many instruments used to

rate self-efficacy beliefs contain items that are inconsistent with Bandura’s sources of self-efficacy. The lecturers were asked to evaluate the following issues: (i) fit of the items with the sources, (ii) formulation of the items, (iii) uniqueness of each item, and (iv) the content validity of the instrument as a whole. In addition, a small group of students (n = 16) was invited to complete the questionnaire and to provide feedback on item wording, clarity and fit with the theoretical model. All students had completed at least one period of clinical learning (22 weeks per period), enabling them to reflect on the content of the instrument. Based on these two feedback channels, items were then reformulated. Of the initial 35 items in the questionnaire, 13 items were eliminated because they had factor loadings lower than .40 on the target factor. An overview of the final item pool of 22 items is given in Table 1. The five sources in this blueprint are Mastery Experiences (ME), Vicarious Learning Experts (VLE), Vicarious Learning Peers (VLP), Verbal Persuasion (VP) and Physiological Symptoms (PS). Each source is operationalized by a set of 4 to 5 items.

Table 1. Conceptual blueprint of the item pool for the Sources of Self-Efficacy Inventory.

Source	Items	Example
1. ME: mastery experiences	5	“Providing good care gave me a sense of personal success”.
2. VLE: expert-based vicarious experiences	4	“I have learned a lot by watching registered nurses in action”.
3. VLP: peer-based vicarious experiences	4	“I often compared my actions with actions performed by peers”.
4. VP: verbal/social persuasion	4	“Feedback gave me a sense of self-confidence”.
5. PS: physiological affective states	5	“When making mistakes, I felt that my heart was beating faster and louder”.
Total	22	

Self-Efficacy

To operationalize the self-efficacy construct, the Dutch version of the General Self-Efficacy scale (GSE) (Schwarzer & Jerusalem, 1995) was used. The GSE is an established self-efficacy measure and a review of its use in 25 countries (Scholz, Gutiérrez-Doña & Schwarzer, 2002) found Cronbach’s alpha’s ranging from .75 to .91. Given the differentiation in learning environment characteristics, this instrument was chosen. The GSE is applicable regardless of context. Generalized self-efficacy represents an individual’s perception of the ability to perform across a variety of situations Judge, Erez & Bono, 1998). The GSE is applied in numerous studies including nursing educational research, for example to measure self-efficacy as a predictor of well-being of nursing students (Gibbons, Dempster & Moutray, 2011).

Participants

A total of 230 Dutch Bachelor degree nursing students participated in the study. The nursing students (mean age 23.7, sd = 7.0) had prior clinical workplace experience of one period (n = 80), two periods (n = 86) or three periods (n = 64). Each period consists of 22 weeks. Based on these two feedback channels, items were then reformulated. Participants were approached by e-mail. All participants completed the newly developed sources of self-efficacy inventory (digitally assessed). Participation was voluntary and written informed consent was obtained prior to the study.

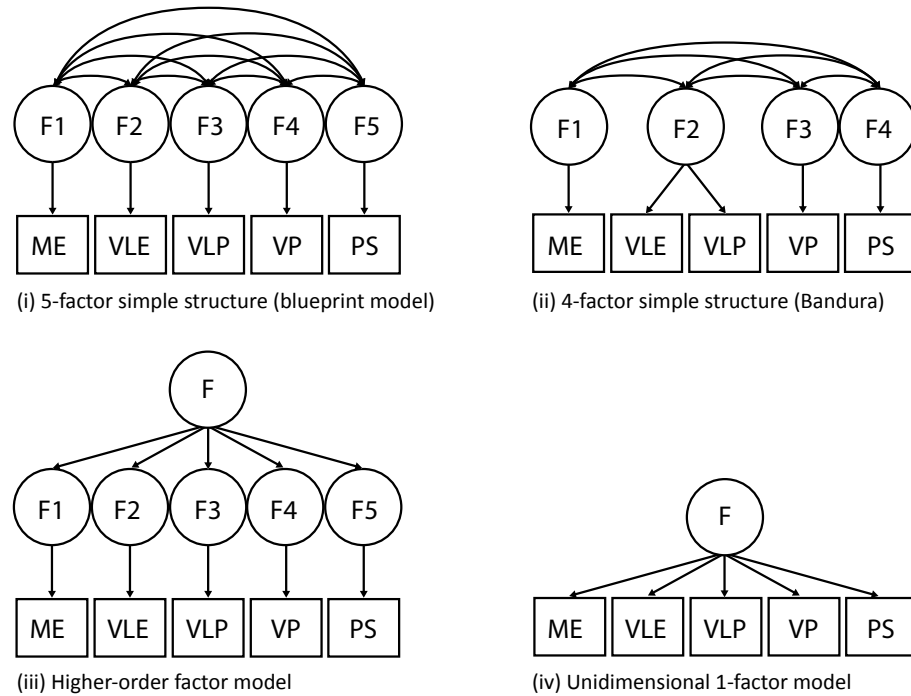
Analysis

In a first stage, the alternative theoretical conceptualizations of sources of self-efficacy were formalized in a series of measurement models. This series of measurement models was compared by means of confirmatory factor analysis (CFA) with respect to their fit to the data gathered using the newly developed SOSI (sources of self-efficacy inventory). The following four rival measurement models were considered (figure 1): (i) a 5-factor simple structure CFA corresponding to the inventory blueprint in Table 1, (ii) the traditional 4-factor simple structure CFA in which the two types of vicarious experiences (VLE and VLP) are seen as a single source, instead of as two different factors, (iii) a hierarchical alternative to the previously mentioned 5-factor CFA, with one common second-order factor on top to represent an overarching source construct, and (iv) a simple one-factor model.

Whereas the first two models emphasize the differentiation among sources of self-efficacy, the latter two models stress their common denominator. In a second stage, the construct validity of the established general self-efficacy scale (GSE) was verified by means of confirmatory factor analysis. In a third stage, the best measurement model for sources of self-efficacy was linked to the measurement model for GSE by means of structural equation modeling. The latent regression type of model allowed us to explore the differential contribution of the sources of self-efficacy as measured by our measurement instrument, to self-efficacy as measured by GSE.

All models were specified starting from the covariance matrix and were fitted using maximum likelihood. Model fit was evaluated based upon commonly recommended goodness-of-fit indices (Hu & Bentler, 1999), including the χ^2 of the model fit, the Root Mean Square Error of approximation (RMSEA), the Tucker-Lewis Index (TLI), the Standardized Root Mean Square Residual (SRMR), and the Bayesian Information Criterion (BIC).

Figure 1. Alternative theoretical conceptualizations for sources of self-efficacy.



Note. Circles represent latent factors and squares manifest variables. Each set of items is represented by only one square and error terms are omitted to allow for a parsimonious representation.

RESULTS

Measurement model of the sources of self-efficacy survey

The correlation matrix and descriptive statistics of the 22 indicators used to operationalize sources of self-efficacy are presented in Table 2. Within-source subset correlations are relatively large and positive. Between-source subset correlations are small and negative for source 5 (physiological symptoms; PS), though some larger positive correlations occur among source 1 (mastery experiences: ME), 2 (vicarious learning experts: VLE), and 4 (verbal persuasion: VP) indicators.

Table 2. Correlation Matrix and Descriptive Statistics of the Sources of Self-Efficacy indicators.

X	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1	1																						
2	.52	1																					
3	.32	.40	1																				
4	.31	.19	.29	1																			
5	.54	.41	.48	.47	1																		
6	.12	.18	.34	.12	.28	1																	
7	.15	.26	.42	.29	.40	.63	1																
8	.17	.30	.51	.30	.39	.46	.52	1															
9	.18	.20	.39	.38	.38	.51	.53	.45	1														
10	-.10	-.08	-.08	.05	-.11	.07	.08	-.05	.05	1													
11	.00	.05	.04	.13	.00	.12	.06	.05	.14	.57	1												
12	-.02	.00	.06	.15	.01	.17	.20	.07	.19	.43	.49	1											
13	-.10	.03	.08	.02	-.09	.23	.22	.05	.24	.32	.32	.38	1										
14	.19	.21	.31	.29	.30	.17	.33	.19	.23	.07	.09	.17	.06	1									
15	.18	.20	.33	.30	.35	.29	.41	.36	.35	-.05	-.02	.06	.07	.43	1								
16	.15	.08	.19	.23	.17	.29	.29	.21	.18	.18	.32	.26	.31	.19	.18	1							
17	.23	.13	.36	.32	.34	.17	.32	.34	.12	.11	.09	.08	-.04	.23	.31	.18	1						
18	-.14	-.07	-.03	.04	-.05	.10	.06	-.05	.09	.17	.09	-.01	.30	.17	.07	.05	-.14	1					
19	-.24	-.15	-.08	-.12	-.15	.11	.00	-.09	.07	.12	.09	.02	.34	.05	.05	.14	-.20	.45	1				
20	-.21	-.13	-.09	-.07	-.19	.00	-.09	-.20	.05	.09	.04	-.06	.30	.01	-.03	.10	-.25	.51	.49	1			
21	-.12	-.11	.01	.12	.01	.16	.11	.05	.19	.22	.23	.11	.30	.10	.09	.17	.02	.53	.40	.45	1		
22	-.21	-.16	-.12	-.03	-.15	.07	.02	-.11	.11	.15	.15	.06	.32	-.01	-.03	.11	-.04	.47	.47	.46	.63	1	
M	4.53	4.08	4.30	4.40	4.30	3.85	4.09	3.96	4.17	2.98	3.56	3.42	3.39	3.93	4.21	3.76	3.89	3.19	2.25	2.70	3.35	2.68	
SD	.65	.94	.82	.68	.71	.90	.76	1.06	.86	1.02	.96	.98	1.11	.69	.66	.90	.81	1.10	1.10	1.23	1.07	1.21	

Note. Indicators 1 to 5 reflect source1 (ME), indicators 6 to 9 reflect source2 (VLE), indicators 10 to 13 reflect source3 (VLP), indicators 14 to 17 reflect source4 (VP), and indicators 18 to 22 reflect source5 (PS).

Table 3 offers a summary of the model comparison results. The $\Delta\chi^2$ likelihood ratio test for model comparison and other model fit statistics all point to the five-factor model as the preferred measurement model for the sources of self-efficacy inventory. The BIC is the lowest of the series of rival models, RMSEA and SRMR are below or near the rule of thumb of .08, and the $\Delta\chi^2$ likelihood ratio test of equal fit with the slightly less complex alternative models is rejected each time. Notice that the TLI is below the .90 criterion, although it should be kept in mind that the TLI depends on the average size of the correlations in the data, as it compares the model against a null model. Given a low average correlation among indicators of .16, the TLI will by definition be lower than the recommended threshold.

Table 3. Model Comparison for Rival Measurement Models of the Sources of Self-Efficacy inventory.

Model	χ^2	df	TLI	RMSEA	SRMR	BIC	$\Delta\chi^2$
5-factor unrestricted	450	199	.82	.07	.09	12163	.
4-factor Bandura	645	203	.69	.10	.11	12336	195**
1-factor	1139	209	.37	.14	.15	12798	689**
5-factor with second-order factor	484	204	.81	.08	.10	12170	34**

Note. ** $p < .0001$; $\Delta\chi^2$ likelihood ratio test against the unrestricted 5-factor model.

These model comparison results imply that the proposed 5-source differentiation is favored over the 4-source alternative, providing evidence for the further differentiation of the vicarious experiences into peer-based and expert-based factors for the developed inventory. As expected, the one-dimensional model clearly does not fit the data well, which is consistent with a differential view on sources of self-efficacy instead of a simple unitary perspective. The hierarchical model alternative shows an acceptable fit following the RMSEA and SRMR, yet following the $\Delta\chi^2$ and BIC it does not show an equally good fit with the data as the unrestricted 5-factor model. The relatively good fit of the hierarchical alternative does point to the fact that some source factors, though not all, have relatively high intercorrelations.

The factor loadings and interfactor correlations for the chosen unrestricted 5-factor model for the sources of self-efficacy inventory are shown in Table 4. The good fit of this CFA model also shows in the substantial factor loadings of the indicators that are all equal to or above .40. The source factors 1(ME), 2(VLE), and 4 (VP) show moderately strong positive correlations among each other, whereas source 5(PS) is relatively independent of the other source factors.

Table 4. Five-Factor Measurement Model of the Sources of Self-Efficacy Inventory.

Factor loadings β					
Indicator	Source1ME	Source2 VLE	Source3VLP	Source4 VP	Source5 PS
X1	.63				
X2	.56				
X3	.64				
X4	.53				
X5	.80				
X6		.73			
X7		.83			
X8		.65			
X9		.68			
X10			.71		
X11			.74		
X12			.65		
X13			.51		
X14				.55	
X15				.63	
X16				.40	
X17				.49	
X18					.69
X19					.63
X20					.65
X21					.76
X22					.76
Factor Intercorrelations ρ					
Source1:ME	1	.62**	-.02**	.73**	-.20**
Source2:VLE		1	.22**	.72**	.08**
Source3:VLP			1	.23**	.30**
Source4:VP				1	.06**
Source5:PS					1

Note. * $p < .05$; ** $p < .001$;

Average correlation among indicators of different factors: .11;

Average correlation among indicators of the same factor: .39, .52, .42, .26, and .49, for the five sources respectively.

Measurement model of the general self-efficacy scale

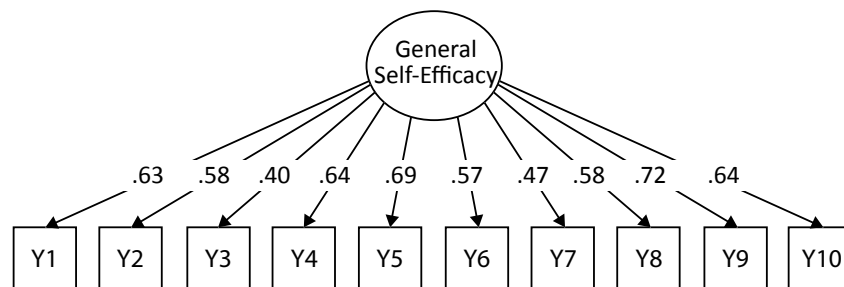
The correlation matrix and descriptive statistics of the 10 indicators used to operationalize self-efficacy are presented in Table 5.

Table 5. Correlation Matrix and Descriptive Statistics of the General Self-Efficacy indicators.

Y	1	2	3	4	5	6	7	8	9	10
1	1									
2	.41	1								
3	.33	.29	1							
4	.39	.27	.29	1						
5	.41	.33	.24	.52	1					
6	.51	.34	.18	.31	.41	1				
7	.21	.30	.10	.31	.40	.22	1			
8	.35	.34	.23	.35	.40	.29	.39	1		
9	.40	.39	.25	.50	.51	.37	.33	.46	1	
10	.42	.48	.28	.40	.37	.37	.23	.31	.51	1
M	3.77	3.07	3.48	3.77	3.65	4.11	3.62	3.43	3.53	3.71
SD	.79	.84	.96	.79	.75	.58	.85	.80	.76	.84

One can observe a series of positive correlations which is consistent with the theoretical one-factor model. The average correlation between indicators is .35. Figure 2 provides a graphical representation of the one-factor CFA model results. As expected, given that it is an established scale, model fit results are good, with substantive factor loadings of .40 or larger for all indicators, and RMSEA and SRMR below common rules of thumb of .08 and .10, and TLI above .90.

Figure 2. Standardized Path Diagram for the Confirmatory Factor Analysis of the General Self Efficacy scale.

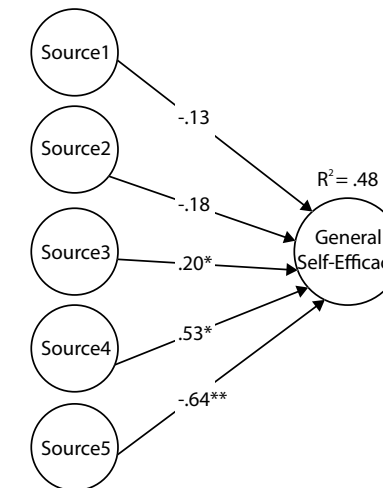


Note. Model fit: $\chi^2(35) = 78.62$; TLI = .92; RMSEA = .07; SRMR = .05; Average correlation among indicators: .35; For reasons of clarity, error terms of the 10 indicators are omitted in the graphical representation

Structural model linking the sources of self-efficacy to general self-efficacy

Given that sources of self-efficacy are assumed to naturally and directly connect to self-efficacy, the full structural equation model (SEM) that we investigated connected the two measurement models by letting the 5 latent source factors predict the GSE-factor. Figure 3 summarizes this structural latent regression part of the SEM. This type of model is sometimes called a MIMIC model, in which (in our case) general self-efficacy is reflected by multiple indicators (MI; i.e. the 10 GSE items) and by multiple causes (MiC; i.e., the 5 latent source factors, which are in turn defined by the item pool of 22 source items).

Figure 3. Standardized Path Diagram connecting the five Sources of Self-Efficacy factors to the General Self-Efficacy factor.



Source	Standardized regression coefficient β	Z	p	Simple Correlation ρ	Z	p
Source1:ME	-.13	-0.70	.484	.28	3.72	<.001
Source2:VLE	-.18	-1.26	.209	.12	1.59	.111
Source3:VLP	.20	2.24	.025	.10	1.29	.199
Source4:VP	.53	2.13	.033	.33	3.85	<.001
Source5:PS	-.64	-5.40	<.001	-.54	-9.06	<.001

General Self-Efficacy: $R^2 = .48$

Note. For reasons of clarity, only the structural relations between the latent factors (cf., circles) are presented, whereas indicators of the latent factors, interfactor correlations and error terms are omitted in the graphical representation. Details on the measurement parts of the full structural equation model can be found in Table 4 and Figure 1.

Simple correlations show that of the 5 source factors, source 1 (ME) and 4 (VP, positive) and source 5 (PS, negative) are significantly correlated to GSE. Furthermore, the regression results indicate that 48% of variance can be explained in GSE by the 5 source factors. This result underlines the importance of the sources in the self-efficacy framework. Source 4 (VP, positive) and source 5 (PS) are the most prominent predictors of GSE. Notice that, given information on the other 4 sources, source 1 (ME) does not contribute anything further to the explanation of GSE. This is a side effect of the large overlap of this source with source 2 (VLE) and source 4 (VP); intercorrelations of .6 and .7 (see Table 4). An opposite story holds for source 3 (vicarious learning peers: VLP), which on its own is not strongly related to GSE, though it can significantly contribute to the explanation of GSE when controlling for the other source factors.

DISCUSSION

The aim of this study was to validate a newly developed nurses' self-efficacy sources inventory and to examine the differential impact of sources of self-efficacy. The newly developed inventory showed a good fit. We found a differentiation between expert-based and peer-based vicarious experiences. Based on the results of this study, a five-source model was favored over the traditional four-source model. We provided evidence that support the idea that nursing students use different vicarious sources in the formation of self-efficacy beliefs. This is in line with earlier research findings (Bong & Skaalvik, 2003; Baeten et al., 2010). Nursing students not only learn by watching experienced colleagues in action: they also learn by watching and evaluating performances of peers.

A limitation of this study is the variety of clinical learning environments in which participants acted. Participants were asked to reflect on sources they use in the formation of self-efficacy beliefs. It is possible that some respondents did not interact with fellow students during clinical placement. Therefore, the clinical learning environment in which they were placed, acted as their frame of reference. Another issue regarding context is the effect of the type of the clinical setting. For example, working in a general hospital or in mental health care might make a difference. We did not investigate possible effects of these contextual factors. A further limitation of this study is that in the development of the sources of self-efficacy inventory, we did not use input of clinical practice nurses. We used a panel of students and experienced lecturers (familiar with clinical learning in nursing practice) to reflect on the items. Using practice nurses who guide nursing students, may have contributed to content validity of the inventory. We suggest that in the further validation process of the newly developed inventory, practice nurses should participate.

Linking the five-source model to the GSE showed that 48% of variance could be explained. Looking into the specific sources showed that verbal persuasion and physiological arousal are

the most prominent predictors of GSE. This is in contrast to Bandura's (1997) suggestion that mastery experiences are the main source of self-efficacy beliefs. It is possible that students use and need verbal persuasion and physiological symptoms to process their experiences (as main feedback channels). In that case, they depend more on these sources in building self-efficacy than they do on mastery experiences. In other words, they need the help of an experienced nurse to reflect on their performance. Note that experiences are inevitable in the forming of self-efficacy beliefs. It may be the case, that students who lack experience will rely more on other sources such as verbal persuasion. This is in line with results of earlier research (Milner, 2002; Tschannen-Moran & Johnson, 2011; Gloudemans, Schalk & Reynaert, 2012). In our experience, guiding the evaluation of nursing students' performance is a major contributing factor in clinical learning environments. Research findings by Gloudemans et al., (2012) show that scores on self-efficacy measurements among Bachelor degree nursing students in powerful clinical learning environments are significantly higher than those of students in regular learning environments. This was especially so during the first period of clinical placement (out of three in total). Further research on how the amount of clinical experience relates to the use of sources of self-efficacy might yield more detailed insight into this matter.

Based on the results of this study, we suggest that nursing students derive their self-efficacy beliefs from five sources. The effect of peer-based vicarious learning on self-efficacy beliefs turned out to be significant. In many clinical learning units, just a few students work and learn together. Increasing the number of students working together is a precondition for them to benefit from a peer-based vicarious experience source. Placing a substantial number of nursing students on one ward, especially when of a comparable level, enhances the utility of peer-based sources. This has implications for the design of clinical learning environments. To date, experienced nurses act as role models for nursing students. This may diminish the self-efficacy beliefs of nursing students, particularly at the beginning of their program. Using fellow students to evaluate one's own performance can strengthen self-efficacy beliefs. Note that information derived from different sources has more impact on the formation of self-efficacy perceptions than just one source. This is known as the summation rule (Bandura, 1997; Steyn & Mynhardt, 2006). Research on sources of teacher self-efficacy has shown that sources reinforce each other (Klassen et al, 2011). As mentioned in the results section, the minor contribution of mastery experiences in explaining GSE is probably due to an overlap of this source with other sources.

Given the variety of clinical environments in which the participants of this study work and learn, a general self-efficacy scale was used. It is stated by Judge, Erez and Bono (1998) that generalized self-efficacy represents individuals' perception of their ability to perform across a variety of situations. Self-efficacy is not only of a task-specific nature, but can also be identified at a more general level of functioning. However, according to some authors

(Lenz & Shortridge-Bagget, 2002; Salanova, Peiró & Schaufeli, 2002) self-efficacy beliefs are strongly related to context, highly task-oriented, and therefore cannot be measured using a general scale. It is stated by Compeau, Gravill, Haggerty and Kelley (2006) that contextual/external factors have an effect on self-efficacy. Taking context into consideration might yield further insight into the relationship between sources of self-efficacy and self-efficacy beliefs. In this study, the aim was to validate a general five-source model for nursing self-efficacy. We therefore did not include specific clinical learning environment characteristics. We suggest that further research can take contextual elements (such as number of staff and students) into consideration.

Future research could achieve a further optimization of the item pool/inventory and/or measurement model. The results of this study suggest that the ME, VLE and VP sources more or less share a common denominator, given the fairly strong correlation between these sources. Further research, for example an intervention design into the key sources of self-efficacy, might result in a more detailed and precise formulation of items.

CONCLUSIONS AND IMPLICATIONS

The results of this study support the idea that there is a differential basis for sources of self-efficacy, in which a five-source model is favored over a traditional four-source model. We showed that differentiation of the vicarious experience sources into a peer- and expert based sources reflects better how nursing students develop self-efficacy beliefs. We suggest that better understanding of how sources of self-efficacy relate to learning in a clinical learning environment has implications for nursing education programs. A better use of sources present in clinical learning environments, especially the use of a peer-based source, can stimulate students' professional development and hence positively influence their performance (Townsend & Scanlan, 2011). This is in line with the finding by Warne et al. (2010), that individually tailored mentorship contributes to nursing students' professional development. They argue that mentoring combined with working with patients are core elements of professional development in nursing. Given our results that students do differentiate in the use of self-efficacy sources, we consider it useful to pay attention to the use of peer-based vicarious learning in nursing programs.

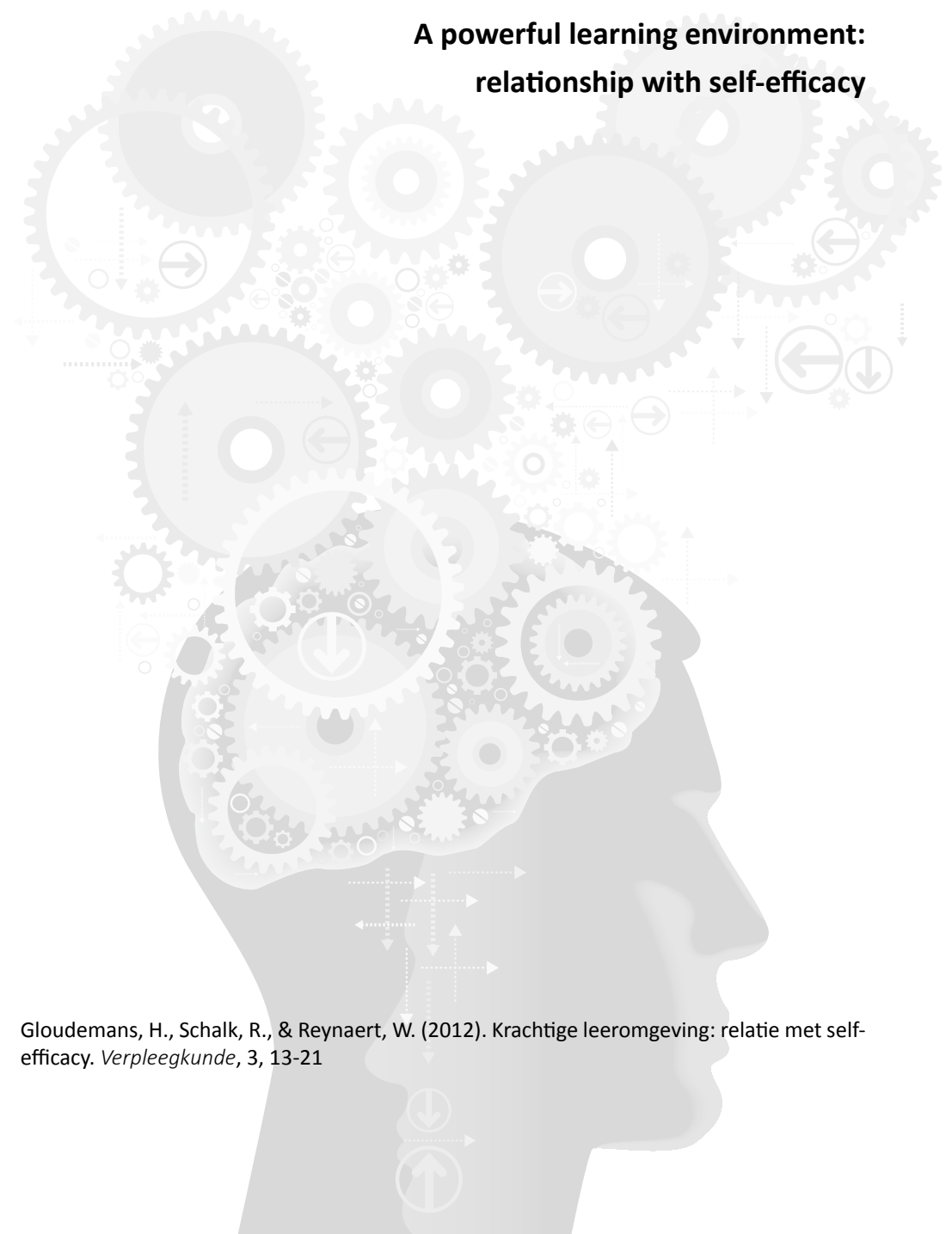
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Chapter 6

A powerful learning environment: relationship with self-efficacy



Gludemans, H., Schalk, R., & Reynaert, W. (2012). Krachtige leeromgeving: relatie met self-efficacy. *Verpleegkunde*, 3, 13-21

INTRODUCTION

Internships account for a considerable part of the curriculum within nursing training programmes. The effectiveness of these internships depends on personal and environmental factors. Personal characteristics have an effect on how a student manifests himself, such as learning style and independence in learning (Vermunt, 1992). The characteristics of the environment are decisive for the possibilities offered to students to develop themselves. During the past years, specific attention has been paid to the development of practice environments in which learning plays a central role, the so-called powerful learning environments. Examples are apprenticeships (Havekes & Drenth, 2005), the learning departments, the nursing workplace (Ritzen, 2007) and the care innovation centre (Hoogwerf, 2011).

This study investigates whether there is a relation between the internship posts in which interns study and work and the effect thereof on their development in terms of self-efficacy. Previous studies have shown that there is a relation between the level of self-efficacy and its effect on learning: results demonstrate that self-efficacy stimulates the motivation to study and promotes the use of cognitive and self-regulating strategies (Van Dinther, Dochy & Segers, 2011; Lent, Brown & Hackett, 2002). Baeten, Kindt Struyven and Dochy (2010), on the basis of a literature review, conclude that students with a high level of self-efficacy apply a more in-depth approach to the subject matter. Van Dinther et al. (2011), Bandura (2006) and Schunk and Pajares (2001) emphasise the mediating role in the acquisition of competencies. This makes it relevant to devote attention to the setup of learning environments that promote the level of self-efficacy.

Self-efficacy

The self-efficacy concept originates from the social-cognitive theory and was developed by Bandura (1997). Self-efficacy beliefs determine how people feel, how they think, motivate themselves and how they behave (1997). The perception of how a person views himself is an essential element in the self-efficacy construct: 'beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments' (1997). The level of self-efficacy determines which activities a person undertakes, the amount of effort a person applies to ensure the activity is successful, and a person's resolve in handling and overcoming difficulties (Bandura, 1997; Zulkosky, 2009).

Powerful learning environment

A learning climate must be present in order to learn in practice (Gobben, Schell & Damoiseux, 2007). This involves facilities and a culture that enable learning in practice (Van Aken & Grotendorst, 2002). Simons (1999) defines learning environments as follows: 'the

interaction of all measures, materials and forms of supervision aimed at facilitating the learning process'. In recent decades, the emphasis has been on establishing what makes a powerful learning environment. See Bolhuis and Simons (2001), Braams and Havekes (2003) and Gobbens et al. (2007). Simons (1999) describes powerful learning environments as environments where students are challenged to actively study with each other. The learning objective is clear and it takes place in a specific and authentic context. The learning process is central to learning environments and requires particular conditions. Braams and Havekes (2003) identify 'bearing responsibility' and 'working in a team' as such conditions. Onstenk (1994) states the need for 'ample information provision' and 'possibilities to reflect'. Simons (1999) summarises a number of quality criteria which a powerful learning environment must meet (see Table 1).

Table 1. Quality Criteria of a Powerful Learning Environment (Simons, 1999)

A powerful learning environment
1. is 'complete', 'rich' and 'realistic'
2. encourages activity
3. transfers the navigation of the learning process to the student, step by step
4. must involve students in all components of the learning process, where possible
5. offers possibilities to practice in a large variety of learning formats and learning activities
6. must encourage students to develop their learning attitude and learning skills in such a way that they are in a better position to adopt various forms of self-study and can combine their experiential learning with reflection and self-study
7. takes account of differences in how students learn and in the development of their learning ability
8. is aimed at the systematic development of students' awareness of their own competency.

Powerful learning environments and self-efficacy

The care innovation centres designed by Fontys School of Nursing together with care institutions meet the described criteria of a powerful learning environment. Care innovation centres have been established within various healthcare domains and although the context is decisive for the nature of the activities to be carried out and learned, care innovation centres share a number of characteristics. The number of interns within departments is considerable: depending on the size of the department, this varies from 4 to 18 interns. In comparison: within regular internship posts this number is often limited to 1 or 2 interns. The ratio of contracted staff to interns varies from 1:1 to 1:3. Each centre is affiliated with a lecturer who spends an average of two days a week at the centre. The work of the lecturer consists of providing vocational education, supervising improvement processes, leading and facilitating peer supervision sessions for students, and coaching staff members. There is a close working relationship with the care institution: developing the learning climate is a joint

effort. The setup of the environment is such that students are continuously made aware of what they may or may not possess in terms of skills and knowledge. The work supervisor acts as a role model, instructor or coach, depending on the intern's level. Reflection on the activities, thoughts and feelings of the intern is continuous and systematic (several times each day). The activities described above also take place within regular internship posts, though less frequently and often less explicitly or systematically. Without wishing to depreciate regular internship posts: learning processes at care innovation centres take a more prominent place compared to regular internship posts.

Bandura (1997) states that there are four information sources on which self-efficacy is based. They are mastery experience, vicarious learning, verbal persuasion and physiological arousal. These sources are explicitly present at care innovation centres. This is illustrated and explained below by a number of examples.

Carrying out various tasks independently, even if they are of a complex nature, is vital to the learning process (Bolhuis, 2003), and is typical for what occurs at care innovation centres. Interns are ready to perform tasks independently sooner than in regular internship posts. Participating in care, in the form of delegating responsibilities within an authentic context, are the principal source and base of self-efficacy: the experience (mastery experience) is regarded as the main factor in determining the level of self-efficacy (Bandura, 1997; Steyn & Mynhardt, 2006). Tasks must be challenging: successes that come too easily do not contribute to a lasting sense of self-efficacy. The application of an effort followed by success convinces the student that he has these capacities in his skill-set. This lowers the threshold to step into new situations (Bandura, 1997).

Seeing others in action (vicarious learning), both fellow interns and care professionals operating at an equal or higher level, is an explicit feature of care innovation centres, thanks to the considerable number of interns present. Reciprocal observations are critically discussed during structured evaluation moments attended by professionals. Students exchange how to handle certain situations, thereby learning from each other. Bolhuis and Simons (2001) note that groups have a positive effect on learning from individual members. For that reason, group learning is central to care innovation centres (Snoeren & Frost, 2011), which contributes to self-efficacy (Margolis, 2005).

Reflection occurs before, during and after the intervention of the student (Dekker & Tenbült, 2011), with the supervisor acting as a critical partner. For this see the work of Schön (1991), who points out the importance of the indicated forms of reflection. In addition to what the student still needs to learn, the focus during evaluation and reflection is on skills already present, which has a positive effect on the development of self-efficacy (verbal persuasion). Students also participate in peer supervision, focusing on one's own thoughts, feelings and interventions, and those of fellow interns. Frequent and structured self-reflection, self-evaluation and the evaluation of fellow interns contribute to a safe atmosphere on

the basis of which students can develop themselves (Van Gennip, Segers & Tillema, 2009). Encouraging reflection is seen as a task of lecturers and workplace trainers (Ritzen, 2007). The presence of lectures and/or workplace trainers at care innovation centres increases the effectiveness of learning, particularly by emphasising reflection on interventions, emotions and thoughts. Reflection takes place via reflection models, achieving more structure and depth (Stultiens, Niessen & Van Ool, 2011).

Students are encouraged and motivated to undertake activities that they find challenging. Confronting challenging and/or new situations arouses some anxiety, expressed in e.g. a higher pulse or perspiration. As students engage repeatedly with stressful situations, these symptoms (of physiological arousal) will diminish. These experiences, too, are a topic of reflection.

Regular internship posts also reflect on the interventions of the students, but at care innovation centres this is pursued more deliberately and explicitly. The sources on which self-efficacy is based do not have a direct effect on the level of self-efficacy: these sources need to be processed cognitively (Van Dinther et al., 2011). Care innovation centres provide an explicit structure offering room to reflect on these experiences. According to Bolhuis (2003), learning by making things explicit, reflecting and sharing knowledge requires a deliberate effort. If this effort is not made, knowledge remains implicit and is not subjected to critical reflection.

Objective and hypothesis

The objective of this study is to examine whether there is a relation between doing an internship at a care innovation centre and self-efficacy among HBO nursing interns. The following hypothesis applies in this study: internships at a care innovation centre lead to a higher development of self-efficacy among HBO nursing interns than regular internships.

METHOD

Design

The research design is quasi-experimental: non-equivalent pre-test/post-test control group design. The experimental intervention consists of offering a powerful learning environment. Interns at care innovation centres form the intervention group, whereas interns in a regular setting represent the control group.

Population

All regular students at Fontys School of Nursing who completed their internships in the period February-July 2011 were contacted to participate in the survey. This concerns interns who completed workplace periods (Wpl) 1, 2, 3 (in the second, third and fourth academic

year respectively) in either a regular setting or at a care innovation centre. Other interns, such as students studying for MBO nursing qualification and interns following a work-study programme (employed by an institution combined with nursing training programme) were excluded; this group has considerably more work experience, which may distort the results. The internship allocation - and hence the allocation to either the intervention or control group - was performed by the internship planning office. The process did not set out to achieve a balanced distribution in terms of academic year, internship experience, age or sex. Students may state their preference for an internship post, but cannot derive any rights from it. The availability of internship posts at care institutions is the primary determinant in the allocation of internship posts to students.

Data collection

The questionnaire is fielded for the first time a few weeks after the start of the internship period (February 2011). The second time is at the end of the internship period (June 2011). In order to secure the highest possible response, the questionnaires are completed during reflection meetings supervised by lecturers. All interns are obliged to participate in these reflection meetings, but participation in the survey was voluntary. The data was processed anonymously, precluding the possibility of linking the data of respondents in measurements 1 and 2. The questionnaires included a written instruction, and the supervising lecturer was instructed by the researchers. The questionnaire consisted of ten items that measure self-efficacy (see Table 2).

Table 2. General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995)

1. I always succeed in solving difficult problems, provided I make the required effort.
2. If someone makes things difficult for me, I will find other ways to get what I want.
3. I find it easy to stick to my plans and achieve my goal.
4. I trust that I can effectively deal with any unexpected events.
5. Thanks to my resourcefulness, I know how to act in unforeseen circumstances.
6. I can solve most problems, provided I make the necessary effort.
7. I remain calm in the face of difficulties, as I trust my ability to solve problems.
8. When confronted with a problem, I often have multiple solutions.
9. When I find myself in a precarious situation, I usually know what to do.
10. Whatever happens, I deal with it.

This list, the General Self-Efficacy scale (GSE), has been developed by Schwarzer and Jerusalem (1995). This instrument was chosen on account of the large diversity of contexts and domains in which internships are done. Specific self-efficacy measuring instruments do not suit this study due to the context-specific nature. The GSE is often used in scientific

research (Luszczynska, Scholz & Schwarzer, 2005; Luszczynska, Gutiérrez-Doña & Schwarzer, 2005). The GSE has been used by Kameg, Clochesy, Mitchell and Suresky (2010) to measure the effect of simulation on self-efficacy within communication skills among nursing students and by Lauder et al., (2008) to measure the relation between self-efficacy and competencies among nursing students. The GSE has been extensively researched and tested in no fewer than 25 countries. The reliability and validity of the instrument are good. Cronbach’s alpha varies between 0.75 and 0.91 (31). Scoring is based on a five-point Likert scale (a score of 1 representing a low level and 5 a high level of self-efficacy), with response categories ranging from ‘not applicable at all’ to ‘fully applicable’. In addition, the following variables were included: age, sex and internship number (students complete three internship periods). This served to determine whether the groups are comparable in terms of composition.

Data analysis

The data was analysed using SPSS version 17.0. The total group of respondents was divided into two groups: regular interns and interns doing their internships at a care innovation centre (referred to as ‘ZIC’ interns). To determine whether the groups are comparable in terms of composition, t-tests (age) and chi-square tests (sex and workplace learning) were carried out. Subsequently, t-tests were carried out to establish the relation between independent variable internship formats and independent variable self-efficacy (measured with the GSE). This was done initially for the total group of respondents, followed by analyses at subgroup level. Here the effect of internship format and internship experience on self-efficacy was determined. The applied significance level for all tests was 0.05.

RESULTS

A total of 62 regular and 47 ZIC interns took part in the first measurement, and 52 and 40 interns in the second measurement, respectively. Percentage-wise this is a reduction in response of 16% (regular) and 15% (ZIC). It is unclear whether this lower response was due to absence when the GSE was conducted or whether the internship was terminated prematurely. No information is available for this. Table 3 demonstrates the group characteristics for measurements 1 and 2. The groups are comparable in terms of age and sex. The average age during measurement 1 is 21.9 (sd: 4.9) for regular interns 21.9 for ZIC interns (sd: 5.1). For measurement 2 this is 21.9 (sd: 3.9) and 22.1 (sd: 5,6) respectively. In terms of internship experience, there is a significant difference between both measurements (p < 0.05).

Table 3. Group Characteristics at Measurement 1 and 2

Measurement 1							
		n	m	SD	min/max	t	p
Age	Regular	62	21.9	4.9	18-47	0.049 ^t	0.961
	ZIC	47	21.9	5.1	18-53		
		n	m/v	χ ²	df	p	
Sex	Regular	62	10/52	0.169*	1	0.681	
	ZIC	47	9/38				
Wpl 1	Reg./ZIC	35/16		6.760*	2	0.034	
Wpl 2	Reg./ZIC	9/15					
Wpl 3	Reg./ZIC	18/16					
Measurement 2							
		n	m	SD	min/max	t	p
Age	Regular	52	21.9	3.9	18-35	-0.159 ^t	0.874
	ZIC	40	22.1	5.6	19-53		
		n	m/v	χ ²	df	p	
Sex	Regular	52	7/45	0.018*	1	0.892	
	ZIC	40	5/35				
Wpl 1	Reg./ZIC	29/12		6.101*	2	0.047	
Wpl 2	Reg./ZIC	11/14					
Wpl 3	Reg./ZIC	12/14					

*Chi square-test, ^tt-test

The results of measurement 1 on GSE scores are shown in Table 4. The total group of regular interns scores significantly higher on three out of ten items compared to the group of ZIC interns. As is clear from the subgroup analysis, regular Wpl 1 interns in measurement 1 score significantly higher on four GSE items compared to the ZIC interns. At Wpl 2 and 3 this is the case for one item.

Table 4. Comparison between regular and ZIC interns according to Wpl (total and 1, 2 and 3) on GSE score measurement 1

WPL total (n = 62/47)					Wpl 1 (n = 35/16)				
Item	M	sd	t	p	M	sd	t	p	
1 reg	3,69	0,80	0,1368	0,174	3,57	0,85	0,930	0,358	
zic	3,48	0,75			3,37	0,62			
2 reg	2,97	0,87	1,916	0,580	2,94	0,91	1,189	0,241	
zic	2,68	0,69			2,69	0,60			
3 reg	3,61	0,82	2,653	0,090	3,69	0,90	2,245	0,033	
zic	3,19	0,82			3,06	0,93			
4 reg	3,47	0,72	1,474	0,144	3,51	0,74	2,506	0,018	
zic	3,26	0,77			2,93	0,77			
5 reg	3,39	0,71	3,420	0,010	3,37	0,69	2,749	0,011	
zic	2,91	0,72			2,75	0,77			
6 reg	3,94	0,70	0,847	0,399	3,77	0,65	0,882	0,383	
zic	3,83	0,60			3,63	0,50			
7 reg	3,45	0,76	2,100	0,038	3,40	0,74	1,366	0,184	
zic	3,13	0,82			3,06	0,85			
8 reg	3,26	0,79	0,735	0,464	3,26	0,92	0,027	0,979	
zic	3,15	0,75			3,25	0,86			
9 reg	3,23	0,66	2,581	0,011	3,17	0,62	2,159	0,041	
zic	2,89	0,67			2,69	0,79			
10 reg	3,63	0,68	0,979	0,330	3,51	0,70	0,493	0,627	
zic	3,49	0,78			3,38	1,02			
Wpl 2 (n = 9/15)					Wpl 3 (n = 18/16)				
Item	M	sd	t	p	M	sd	t	p	
1	3,78	0,83	0,507	0,619	3,89	0,68	1,50	0,144	
	3,60	0,83			3,50	0,82			
2	3,11	0,60	1,622	0,121	2,94	0,94	0,865	0,393	
	2,67	0,72			2,69	0,79			
3	3,78	0,44	2,666	0,014	3,39	0,78	0,051	0,960	
	3,13	0,74			3,38	0,81			
4	3,00	0,50	-1,331	0,197	3,61	0,70	0,453	0,654	
	3,33	0,72			3,50	0,73			
5	3,11	0,60	0,499	0,627	3,56	0,78	1,915	0,065	
	3,00	0,38			3,00	0,89			
6	4,00	0,87	0,000	1,000	4,22	0,65	1,473	0,151	
	4,00	0,53			3,88	0,72			
7	3,44	0,73	1,248	0,229	3,56	0,86	0,992	0,329	
	3,22	0,44			3,28	0,67			
8	3,07	0,70	0,666	0,513	3,25	0,93	0,639	0,528	
	3,07	0,70			3,13	0,72			
9	3,33	0,71	0,948	0,358	3,28	0,75	1,492	0,146	
	3,07	0,59			2,94	0,57			
10	3,44	0,53	-1,028	0,319	3,94	0,64	2,147	0,040	
	3,67	0,49			3,44	0,73			

The total group of respondents shows a significant increase between measurements 1 (n = 109) and 2 (n = 92) in terms of self-efficacy (see table 5). All GSE items show a statistical increase that is significant (p < 0.05)

Table 5. t-test comparison between the results of measurements 1 and 2 for the total group of interns, regular interns and ZIC interns

Total group interns (n = 109/92)					Regular interns (n = 62/52)				Zic interns (n = 47/40)				
Item	t1	m	sd	t	p	m	sd	t	p	m	sd	t	p
item 1	t1	3,60	0,78	-2822	0,006	3,69	0,80	-1,771	0,083	3,49	0,75	-2,331	0,025
	t2	3,90	0,65			3,94	0,70			3,83	0,59		
item 2	t1	2,84	0,80	-3,797	0,000	2,96	0,87	-1,625	0,107	2,68	0,69	-4,313	0,000
	t2	3,27	0,79			3,23	0,85			3,33	0,69		
item 3	t1	3,43	0,84	-3,677	0,000	3,61	0,82	-1,526	0,126	3,19	0,82	-4,120	0,000
	t2	3,86	0,84			3,87	0,92			3,88	0,72		
item 4	t1	3,37	0,74	-4,399	0,000	3,47	0,72	-2,632	0,009	3,26	0,77	-3,813	0,000
	t2	3,82	0,70			3,85	0,80			3,80	0,56		
item 5	t1	3,18	0,75	-4,786	0,000	3,39	0,71	-2,089	0,036	2,91	0,72	-5,121	0,000
	t2	3,70	0,79			3,69	0,83			3,73	0,75		
item 6	t1	3,88	0,66	-2,357	0,019	3,94	0,70	-1,798	0,075	3,83	0,60	-1,543	0,128
	t2	4,11	0,65			4,17	0,71			4,03	0,58		
item 7	t1	3,31	0,80	-4,203	0,000	3,45	0,76	-1,208	0,225	3,13	0,82	-5,324	0,000
	t2	3,78	0,78			3,63	0,84			3,98	0,66		
item 8	t1	3,21	0,77	-2,210	0,028	3,26	0,79	-1,433	0,158	3,15	0,75	-1,713	0,090
	t2	3,45	0,73			3,46	0,73			3,43	0,75		
item 9	t1	3,08	0,68	-4,919	0,000	3,23	0,66	-1,857	0,060	2,89	0,67	-5,922	0,000
	t2	3,60	0,79			3,50	0,87			3,73	0,64		
item 10	t1	3,57	0,72	-3,574	0,000	3,63	0,68	-2,067	0,038	3,49	0,78	-3,072	0,003
	t2	3,95	0,76			3,92	0,81			3,98	0,70		

Regular interns show a significant increase in the GSE score on items 4, 5 and 10. ZIC interns show a significant increase with the exception of items 6 and 8. A further analysis of the period of workplace learning combined with the internship variant (see Table 6) demonstrates that in Wpl 1, ZIC interns show a significant increase for seven out of ten items compared to five out of ten for regular interns. ZIC interns in Wpl 2 show very modest growth: two items score significantly higher. Regular interns do not show significant growth for any of the items. In Wpl 3, ZIC interns score significantly higher on eight out of ten items, compared to three out of ten for regular interns.

Table 6. T-test Comparison Results of Measurements 1 and 2 for Variant and Workplace Period

Wpl 1 regular/ZIC						
		n	m	SD	t	p
Item 1	t1	35/16	3.57/3.38	0.85/0.62	-2.409/-1.198	0.020/0.243
	t2	29/12	3.97/3.67	0.42/0.65		
Item 2	t1	2.94/2.69	0.91/0.60	-1.193/-3.660	0.238/0.001	
	t2		0.86/0.67			
Item 3	t1	3.69/3.06	0.90/0.93	-3.060/-2.620	0.761/0.015	
	t2	3.76/3.92	0.99/0.79			
Item 4	t1	3.51/2.94	0.74/0.77	-2.006/-2.706	0.049/0.012	
	t2	3.90/3.67	0.77/0.65			
Item 5	t1	3.37/2.75	0.69/0.77	-2.017/-2.854	0.048/0.009	
	t2	3.72/3.67	0.70/0.89			
Item 6	t1	3.77/3.63	0.65/0.50	-3.440/-2.138	0.001/0.042	
	t2	4.28/4.00	0.53/0.43			
Item 7	t1	3.40/3.06	0.74/0.85	-1.123/-2.591	0.266/0.016	
	t2	3.62/3.83	0.82/0.72			
Item 8	t1	3.26/3.25	0.92/0.86	-1.381/-0.955	0.173/0.349	
	t2	3.52/3.50	0.57/0.52			
Item 9	t1	3.17/2.69	0.62/0.79	-1.674/-4.423	0.100/0.000	
	t2	3.48/3.83	0.83/0.58			
Item 10	t1	3.51/3.38	0.70/1.02	-2.362/-2.018	0.021/0.055	
	t2	3.93/4.00	0.65/0.92			
Wpl 2 regular/ZIC						
		n	m	SD	t	p
Item 1	t1	9/15	3.78/3.60	0.83/0.83	0.736/-0.453	0.471/0.649
	t2	11/14	3.45/3.71	1.13/0.47		
Item 2	t1	3.11/2.67	0.60/0.72	0.609/-1.603	0.537/0.121	
	t2		0.83/0.86			
Item 3	t1	3.78/3.13	0.44/0.74	0.808/-1.572	0.401/0.128	
	t2	3.55/3.57	0.82/0.76			
Item 4	t1	3.00/3.33	0.50/0.72	-1.284/-1.350	0.219/0.189	
	t2	3.45/3.64	1.04/0.50			
Item 5	t1	3.11/3.00	0.60/0.38	-0.393/-2.220	0.700/0.039	
	t2	3.27/3.50	1.19/0.76			
Item 6	t1	4.00/4.00	0.87/0.53	0.399/0.299	0.694/0.786	
	t2	3.82/3.93	1.17/0.73			

Table 6. (Continued)

Wpl 2 regular/ZIC						
		n	m	SD	t	p
Item 7	t1	3.44/3.07	0.73/0.70	-0.260/-4.449	0.980/0.000	
	t2		1.04/0.39			
Item 8	t1	3.22/3.07	0.44/0.70	0.378/-0.492	0.711/0.627	
	t2	3.09/3.21	1.04/0.89			
Item 9	t1-	3.33/3.06	0.71/0.59	0.070/-1.156	0.945/0.259	
	t2		3.36/3.36			1.21/0.74
Item 10	t1	3.44/3.67	0.53/0.49	-2.490/-0.876	0.807/0.390	
	t2	3.55/3.86	1.21/0.66			
Wpl 3 regular/ZIC						
		n	m	SD	t	p
Item 1	t1	18/16	3.89/3.50	0.68/0.82	-2.081/-2.179	0.047/0.038
	t2	12/14	4.33/4.07	0.49/0.62		
Item 2	t1	2.94/2.69	0.94/0.79	-2.008/-2.550	0.055/0.017	
	t2		3.58/3.29			0.79/0.49
Item 3	t1	3.39/3.38	0.78/0.81	-3.862/-3.108	0.001/0.004	
	t2	4.42/4.14	0.67/0.53			
Item 4	t1	3.61/3.50	0.70/0.73	-2.130/-2.570	0.042/0.016	
	t2	4.08/4.07	0.51/0.47			
Item 5	t1	3.56/3.00	0.78/0.89	-1.751/-3.727	0.091/0.001	
	t2	4.00/4.00	0.60/0.55			
Item 6	t1	4.22/3.88	0.65/0.72	-0.138/-1.167	0.891/0.253	
	t2	4.25/4.14	0.45/0.53			
Item 7	t1	3.56/3.25	0.86/0.93	-0.961/-2.557	0.345/0.016	
	t2	3.83/4.07	0.72/0.83			
Item 8	t1	3.28/3.13	0.67/0.72	-1.585/-1.651	0.126/0.110	
	t2	3.67/3.57	0.65/0.76			
Item 9	t1	3.28/2.94	0.75/0.57	-1.505/-5.981	0.144/0.000	
	t2	3.67/4.00	0.65/0.39			
Item 10	t1	3.94/3.44	0.64/0.73	-1.533/-2.212	0.137/0.036	
	t2	4.25/4.07	0.45/0.83			

CONCLUSION AND DISCUSSION

This study sought to determine whether internships in a care innovation centre contribute more to the development of self-efficacy compared to internships in regular internship environments. The results show a strong increase in self-efficacy among interns doing their internships at a care innovation centre. For eight out of ten GSE items, ZIC interns show significant growth, compared to significant growth for three out of ten items among regular interns. It should be noted here that, at the time the first measurement was conducted, the total group of regular interns achieved a higher average score on the GSE items. They score significantly higher than ZIC interns on four GSE items. At subgroup level, the differences in GSE score in measurement 1 are largest in Wpl 1: regular interns score significantly higher than ZIC interns on four items. In Wpl 2 and 3, regular interns score significantly higher on one item in measurement 1. The results of measurement 2 show the opposite: both for the total group and differentiated according to Wpl 1, 2 and 3, ZIC interns, compared to their regular counterparts, show significant growth for more GSE items. In this study the main focus is on the development of self-efficacy. Although a difference can be seen in GSE scores between both groups in the beginning, the results show that the development of self-efficacy among ZIC interns is stronger. The reduced growth among regular interns can be explained by a ceiling effect. However, measurement 2 scores in this group remain amply below the maximum and therefore this effect does not apply. The strong increase in GSE is an indication that factors within care innovation centres positively contribute to self-efficacy. Some caution should be applied in the interpretation of these results, however, as the intern groups show significant differences between them in terms of internship experience in measurements 1 and 2. The regular interns in Wpl 1 in particular are relatively overrepresented compared to Wpl 1 ZIC interns. It is unclear whether Wpl 2 and 3 interns have completed internships at care innovation centres in the past. Previous internship experiences may distort the results of this study (carry-over effect). In addition, there is a relatively larger dropout among regular Wpl interns. In this group, the difference in GSE score was considerable: regular interns show significant growth for three items, whereas ZIC interns do so for eight items. The limited growth of both regular and ZIC interns in Wpl 2 is remarkable. Regular interns do not show significant growth for any item, with ZIC interns showing growth for two. There is no logical explanation for this.

We can see a significant increase in scores on all GSE items for the total group of interns. Regardless of the learning environment, self-efficacy increases. This effect is to be expected. During internships, the focus is on performing work as part of the work processes (Reinalda, 2011), leading to participation in the workplace routine. This generates a sense of satisfaction and boosts confidence in personal ability.

Examining the contents of the items and the scores achieved (total and at subgroup level), it may be concluded that there is no clear pattern. Based on the results, it cannot be concluded that one group of interns are better problem-solvers or that they have more intervention alternatives available. This probably has to do with the strong internal coherence of the GSE items.

One shortcoming of this study is that the data have been collected anonymously. Consequently, it was not possible to determine the development between measurements 1 and 2 at an individual level, and there are no data on internship dropout rates and/or absence when the measurements were conducted. The availability of these data would likely produce a more detailed picture. Another shortcoming concerns the design of this study. It is unclear whether Wpl 2 and 3 interns performed previous internships in care innovation centres. This variable might affect self-efficacy results. The effect of previous internship experiences on the results cannot be demonstrated now. Selection bias might play a role here, as students could state their preference for an internship. A design in which a group of interns having completed three internship periods within a regular settings is compared to a group of interns having completed three internship periods within a ZIC internship would lead to reduced bias and a less polluted result.

Despite the fact that the groups of interns were not entirely comparable in terms of internship experience, the results do lead to a conservative conclusion that the care innovation centres contain factors that contribute to a stronger development of self-efficacy. Exactly how the sources of self-efficacy relate to a powerful learning environment has not been the focus of this study, and this would require further research. It may be assumed that information sources of self-efficacy are more explicitly present at care innovation centres. There are plenty of opportunities for gaining authentic experiences, supervision is provided, and there is systematic reflection on one's own performance and that of (fellow) interns.

It may be assumed that the presence of a lecturer at the care innovation centres would contribute positively to the development of self-efficacy among interns. Although this relation has not been explicitly investigated in this study, an effect of direct interaction between lecturer and student is assumed. Lecturers at care innovation centres supervise peer supervision sessions of interns, they coach staff members, and they are actively involved in the design of individual learning processes and the learning climate as a whole. Lecturers are both vocationally and didactically competent. Spouse (2001) sees direct supervision provided by experts as the most powerful factor for the professional development of students. Gruber, Harteis and Rehr (2008) point out that that processing practical experiences by means of theoretical reflection leads to more meaningful learning. This facilitates the application or transfer of knowledge to other areas of competence. In this study this emerges as a stronger development of self-efficacy.

An important implication of the research results is that self-efficacy as outcome measure

contributes to determining the effect of workplace learning within the nursing practice. This complements currently available instruments such as competency descriptions (Gobbens et al., 2007) and checklists for the learning climate (Havekes & Drenth, 2005). Furthermore, this study gives direction to the design of powerful learning environments, particularly where it involves the effective use of the sources of self-efficacy. Explicating these sources is in itself not sufficient, however. As Bandura (1994) correctly notes, (learning) situations should be created in which the chances of success are greater than the risk of failure. This may be understood as an operationalization of the criteria which a powerful learning environment must meet, as set out by Simons (1999).

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Chapter 7

The relationship between critical thinking skills and self-efficacy beliefs in mental health nurses

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

INTRODUCTION

Background of the study

This article examines the effect of cognitive abilities, here defined as critical thinking skills. The aims of this study are to investigate whether Bachelor degree nurses in mental healthcare in the Netherlands possess higher critical thinking skills than diploma nurses do, and to examine whether these skills are positively related to self-efficacy and perceived performance. If the latter is the case, then this would provide additional outcomes that can be used to assess (Bachelor degree) nursing competences, to develop ways of supporting the development of these competences, and to help position Bachelor degree and diploma nurses in mental health nursing. In the last decade, the positioning of these nursing levels is subject to debate in the Netherlands (Beckers & Nijhuis, 2005; VBOC, 2006; V&VN, 2012). Earlier research results from Den Boer and Hövels (2003) as well as Taminiau and Den Boer (2004) showed that too many Bachelor degree nurses operate at a diploma nursing level. Although in recent years, no new research has been published on this topic, opinions did not change (V&VN, 2012). Differentiation of nursing levels in practice is still poor, even though Bachelor degree nursing programmes differ considerably from diploma nurse programmes. This is based on the assumption that Bachelor degree nurses are better critical thinkers. Howenstein, Bilodeau, Brogna and Good (1996) provided evidence for this assumption: they found that the relationship between educational level and critical thinking skills was significant.

To date, it is known that critical thinking is essential to nursing education (Redding, 2001; American Association of Colleges of Nursing, 2005; McMullen & McMullen, 2009; Romeo, 2010) as well as nursing practice (Facione & Facione, 1996; Kuiper et al., 2010). Critical thinking skills are essential because of the increasing complexity of care demands for nurses in general healthcare (GGZ Nederland, 2010; Kaddoura, 2010). To deal with these demands nurses need to feel confident (Kaddoura, 2010). They have to evaluate their performance as a means of assessing their competencies. Evaluating oneself as being capable of fulfilling tasks in accordance with professional standards requires critical thinking skills such as reflective and analytical skills. This process is known as self-evaluation: the forming of perceptions and feelings about self-worth or competences (Judge, Bono & Locke, 2000; Steyn & Mynhardt, 2006). Bandura (1997) introduced the self-efficacy concept, which encompasses self-evaluation. Bandura states that an individual forms self-efficacy beliefs based on information derived from different sources (1989; 1997). The better an individual's thinking skills, the better this person can evaluate himself, which is expected to positively influence self-efficacy. This has implications for (continuing) education in nursing practice and staff development. Nurses need to learn how to apply critical thinking skills to assess their own competences. Research often focuses on the relationship between critical thinking

skills and clinical decision making. Focusing on the relationship between critical thinking skills and self-efficacy beliefs will help give direction to the professional development of (newly graduated) diploma degree and Bachelor degree nurses.

Critical Thinking

There are various definitions of critical thinking (Brunt, 2005; Moon 2008; Romeo, 2010). The dominant perspective in literature is on the cognitive component. Several authors (Facione & Facione, 1996; Fisher, 2001; Simpson & Courtney, 2002; Wilkinson 2008; Cormier, Pickett-Hauber & Whyte, 2010) state that a fundamental set of cognitive abilities is indispensable to critical thinking. For example, Wilkinson (2008 p53) defines cognitive abilities as: *“intellectual activities executed within complex processes of thinking such as conducting critical analysis, solving problems and making decisions”*. This is in line with Moon’s (2008 p33) definition of critical thinking : *“the assessment of what might be called evidence, in order to make a judgment”*.

In international literature about nursing and nursing education, there is a lot of interest in the concept of critical thinking (Kuiper & Pesut, 2004). Several studies have been conducted to identify critical thinking as a factor in nursing. For example, Stewart and Dempsey (2005) investigated the relationship between critical thinking and nursing diagnoses, and Lee, Chan and Philips (2006) reviewed literature on the subject. A number of studies investigating critical thinking in nursing have been conducted in the context of nursing education (Fero, Witsberger, Wesmiller, Zullo, & Hoffman, 2009). However, Romeo (2010) states that there is a lack of quantitative studies that use critical thinking skills as an independent variable. Other studies have been conducted using samples of registered nurses, but research on graduate critical thinking skills of nurses is less extensive and fairly dated. For example, Howenstein et al. (1996) assessed nurses’ critical thinking skills and found age and experience as not being significant, but educational level as being significant. Worldwide, health care institutions and educational institutions are familiar with the concept of critical thinking. Nursing education programmes recognize the importance of developing critical thinking skills (Brunt, 2005; McMullen & McMullen, 2009; Cormier et al., 2010). It is therefore a frequently measured outcome, widely used for several purposes (Redding, 2001). In this study, the focus is on the mediating role of critical thinking skills in evaluating one’s performance.

Self-efficacy and perceived performance

Self-efficacy is the belief in one’s competence to tackle difficult or novel tasks and to cope with adversity in specific demanding situations. Self-efficacy makes a difference in how people feel, think, and act. People with high levels of self-efficacy choose to perform more challenging tasks. They set themselves higher goals and stick to them (Zulkosky, 2009). Bandura (1997) stated that self-efficacy is the belief in one’s capabilities to organize and

execute the courses of action required to produce given attainments. Those with high self-efficacy beliefs want to overcome difficult situations instead of avoiding them (McLaughlin, Moutray & Muldoon, 2008). Increasing self-efficacy enhances the sense of self-control and helps one to perform at a higher level (Bandura & Locke, 2003).

According to Bandura (1997), there are four sources of information that serve as the basis for assessing one’s level of self-efficacy: performance accomplishments, vicarious experiences, verbal persuasion and emotional and physiological arousal. It is common practice in nursing (education) practice to use the above mentioned sources to enhance self-efficacy. For example the use of verbal persuasion: Providing feedback and support (convincing the other that he is capable of fulfilling a certain task) at an individual level in learning situations (McConville & Lane, 2006).

Self-efficacy beliefs relates highly to performance (Dunlap, 2005; Kuiper, Murdock & Grant, 2010): an increase in self-efficacy beliefs leads to an improvement of performances. Hence, performances can be considered as a (partially) result of self-efficacy beliefs. This result or outcome measure, more specific, how one evaluates and rates its own performance, is known as perceived performance. Perceived performance is often used as a self-reported measure of competence or performance. Brady Germain and Cummings (2010) for example, used perceived performance as a measure to illustrate nurses’ self-ratings.

The relationship between critical thinking and self-efficacy

Positive correlations between the level of critical thinking and the level of self-efficacy are expected. In order to evaluate one’s own level of self-efficacy, one has to use cognitive skills such as analytical and reflective skills (Kuiper et al., 2010). The better the cognitive ability, the more accurate the judgement of one’s ability to accomplish tasks will be (Chen et al., 2001; Cormier et al., 2010). According to Bandura (1989), one of the core competences of self-efficacy is being able to predict occurrences and to decide how to deal with them. He sees this as a major function of thinking. Truxillo, Seitz and Bauer (2008) define cognitive ability as the ability to process complex information, which is an important factor in assessing one’s performance.

The information that is processed comes from the sources mentioned above (Bandura, 1997). The summation rule, a so-called integration rule (Steyn & Mynhardt, 2006) can be applied here. When using the summation rule one uses more than one source. The underlying idea is that using information coming from two sources, for example, will have a greater influence on the formation of self-efficacy perceptions than just one.

Hence, integrating information from various sources is crucial in the formation of self-efficacy beliefs. One would expect that the better an individual succeeds in integrating the information coming from various sources, the better this person is able to define his or her level of self-efficacy. For example, Truxillo et al. (2008) found a positive relationship between

the self-assessment on test performances and the level of meta-cognitive skills: the higher these skills, the more accurate the judgement of own performance. McLaughlin et al. (2008) also found a positive relationship between self-efficacy and academic performance. However, the question is if solely the level of cognitive ability skills, i.e. critical thinking skills, is positively related to self-efficacy levels. Based on Bandura's rule of performance accomplishments, one might expect experienced nurses to show higher levels of self-efficacy beliefs. This should be so especially if they have spent a substantial period of time working in the same work environment. Benner's theoretical concepts would support this. According to Benner (1984), a nurse at the expert level knows intuitively what to do when confronted with certain situations. It is likely that experience in the field of nursing leads to a higher level of self-efficacy. However, nurses with a Bachelor's degree are believed to use higher levels of cognitive skills: in higher education nursing programmes students for example learn how to analyse situations, reflect on their performance, evaluate interventions and make clinical judgements. In other words, they learn how to develop meta-cognitive skills known as critical thinking skills. This helps them cope with difficult, more complex and unexpected situations. They show initiative in learning how to deal with these kinds of situations, and thereby increase their level of self-efficacy. As McLaughlin et al. (2008) stated: they make an effort to overcome difficult situations.

Figure 1. Model relationship educational level, critical thinking and self efficacy.

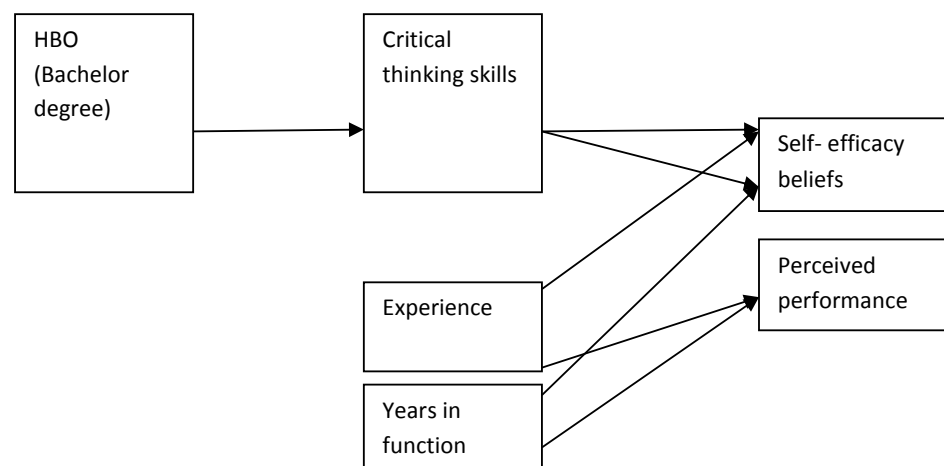


Figure 1 illustrates the theoretical model. Higher level critical thinking skills are expected to occur among Bachelor degree nurses. Based on Bandura's theory of the formation of self-efficacy beliefs (1997) and the role of cognitive ability in this process (Chen et al, 2001, McLaughlin et al., 2008; Truxillo et al., 2008; Cormier et al., 2010), these cognitive abilities

will function as a mediating variable and will show positive correlations with self-efficacy beliefs and perceived performance. In the model it is also expected that years of experience in the field and years in function positively correlate with self-efficacy beliefs and perceived performance (Lenz & Shortridge-Bagget, 2002; Marshburn, Engelk, & Swanson, 2009). However, higher critical thinking skills combined with experience and years in function as a staff nurse are expected to lead to higher self-efficacy beliefs and higher scores on perceived performance.

THE AIMS OF THE RESEARCH

The aim of this study is to investigate whether Bachelor degree nurses show higher critical thinking skills than diploma nurses and whether there is a positive relationship between these skills and levels of self-efficacy and perceived performance. This leads to the following hypotheses:

- 1) nurses with a Bachelor degree show higher scores on critical thinking abilities than diploma nurses do;
- 2) critical thinking skills mediate the relationship between levels of education and self-efficacy beliefs.

METHODS

Recruitment of participants

Management staff members (department heads) were asked to provide access to nursing staff. A total of 300 nurses were approached to participate in this study. Ethical approval was obtained via heads of department. No patients or patient information was involved in this study. Participation was voluntarily and based on informed consent. The inclusion criteria were: participants are registered nurses (diploma nurses or Bachelor degree nurses), and are employed as a staff nurse in a mental health care institution in a clinical setting in the Netherlands. Mental health organisations in different parts of the Netherlands were approached and head of departments and wards were asked if their entire nursing staff could participate. This was done to avoid over- or underrepresentation of Bachelor degree or diploma nurses. A questionnaire survey design was adopted.

Data collection

Data collection took place in group sessions between September 2009 and May 2010. An introductory talk explained the purpose of the research, followed by verbal instructions. Every part of the questionnaire contained a written instruction. The researcher was present during the planned 1.5 hour sessions and was available to answer questions about the

procedure. The questionnaires were collected at the end of the sessions, but if respondents were unable to finish during the group session, they were asked to return their questionnaire by regular mail. Anonymity was guaranteed: respondents were not asked to fill in their name.

Instruments

Critical thinking skills were measured using the Dutch version of the Watson Glaser Critical Thinking Appraisal (WGCTA). The WGCTA is a commonly used instrument to measure critical thinking skills (Worrel & Profetto-McGrath, 2007). The Dutch version was first released in 1999 and revised in 2006 (Harcourt, 2007). The internal consistency of this revised and translated version (KR20: .81, split-half reliability: .71) appears to be good (Harcourt, 2007). The WGCTA is divided into five subscales: assumptions, deductions, interpretations, evaluations and conclusions. In each subscale, short cases are presented along with 12 hypotheses. On the scales of assumptions, deductions and interpretations, answers are “yes” or “no”. Evaluations are scored giving an opinion on the strength of the arguments: “strong” or “weak”. Conclusions are scored on a 5-item Likert type scale, ranging from “true” to “not true”. The maximum score on the WGCTA is 60 (12 items per scale) and the minimum is 0. To provide detailed insight into relations between the variables, scores on the WGCTA as well as scores on its subscales are reported.

Self-efficacy was measured using a general self-efficacy scale and a perceived performance scale. Both scales were developed especially for this study. Reliability of the Self-Efficacy and the Perceived Performance scales was respectively Cronbach’s Alpha’s 0.605 and 0.730. The self-efficacy scale consists of four items which are derived from the Generalized Self-Efficacy Scale (Schwarzer & Jerusalem, 1995). The items are as follows: 1, “Whatever happens at work, I can usually handle it”; 2, “When I am confronted with a problem at work, I can usually find several different solutions”; 3, “I can remain calm when confronted with difficulties in my job because I can rely on my skills”; 4, “I can perform without making mistakes”. Perceived Performance was measured using five items. Respondents were asked how well they performed as follows: “In the past week, how well would you say that you: 1, made decisions; 2, made efforts; 3, achieved your goals; 4, showed initiative; 5, assumed responsibility.

All items were scored on a 5-point Likert-scale (1=strongly disagree, 5=strongly agree).

Participants were also asked to fill in the following items: highest level of education, age, years of experience as a nurse, and years in present position. The latter item was included because a relatively new job or position might influence self-efficacy beliefs. For example, a nurse can be an expert in providing critical care for the elderly; a transition to a different field of nursing, for example child care, could then imply a lower level of mastery and hence influence his or her self-efficacy beliefs.

Data analysis

The data were analysed using SPSS version 17.0. First, ANOVA was performed to test whether the two groups were comparable with respect to work experience. T-tests were conducted to investigate relationships between the two nursing levels and self-efficacy, perceived performance and critical thinking skills. Next, Pearson’s correlations between all the variables of the study were calculated. To test the model as illustrated in Figure 1, structural equation modelling using AMOS was applied.

RESULTS

A total of 95 participants (29 male, 66 female) completed a set of tests and questionnaires. Their mean age was 36.78 (sd= 11.97), ranging from 21 years to 59 years. Their mean years of experience in the field of nursing was 12.66 (sd= 10.88), ranging from 1 year to 39 years. Sixty-two nurses had completed a nursing course at the intermediate vocational level (MBO) while 33 nurses held a Bachelor degree in nursing (HBO). A power analysis was performed which showed that the sample was higher than the minimal number required. We performed ANOVA to compare the Bachelor degree nurses group with the diploma nurses group. Table 1 shows that there is no significant difference between the two groups regarding years of experience, years in function and date of diploma.

Table 1. Anova, Means and Significance Between and Within Groups (n =95)

		Sum of squares	df	Mean Square	F	Sig.
Years of Experience	Between Groups	94.907	1	94.907	0.799	0.374
	Within Groups	11042.225	93	118.734		
	Total	11137.132	94			
Years in Function	Between Groups	65.020	1	65.020	0.978	0.325
	Within Groups	6182.506	93	66.479		
	Total	6247.526	94			
Date of Diploma	Between Groups	88806.040	1	88806.040	1.161	0.284
	Within Groups	7116492.845	93	76521.428		
	Total	7205298.884	94			

Table 2 lists the mean scores, standard deviations and t-values of the two groups included in the study (diploma and Bachelor degree nurses) on critical thinking, self-efficacy and perceived performance.

Table 2. Group Statistics and t-values for Scores on Critical Thinking (Watson Glaser subscales and overall), Self-efficacy and Perceived Performance.

		N	Range	Mean	SD	Std. Error Mean	t	p
WG Assumptions	MBO*	62	4-12	7.92	2.098	0.266	-4.893	0.000
	HBO**	33	5-12	9.76	1.521	0.265		
WG Deductions	MBO	62	5-12	8.55	2.038	0.259	-2.398	0,019
	HBO	33	6-12	9.48	1.679	0.292		
WG Interpretations	MBO	62	3-12	8.97	1.679	0.213	-1.910	0,060
	HBO	33	7-12	9.61	1.478	0.257		
WG Evaluations	MBO	62	2-12	8.79	2.219	0.282	0.715	0,477
	HBO	33	6-12	9.09	1.792	0.312		
WG Conclusions	MBO	62	2-12	5.92	2.106	0.267	-2,531	0,014
	HBO	33	4-11	7.09	2.170	0.378		
WG Overall	MBO	62	25-60	40.15	6.412	0.814	-3,770	0,000
	HBO	33	36-56	45.03	5.791	1.008		
Self-Efficacy	MBO	62	3.25-4.75	3.9839	.41209	0.05234	-1,287	0,204
	HBO	33	3.25-4.75	4.1212	.53444	0.09303		
Perc. Performance	MBO	62	3.2-5.0	4.1968	.41842	0.05314	-1,062	0,292
	HBO	33	3.2-4.8	4.2970	.44755	0.07791		

*MBO=group diploma nurses, **HBO=group bachelor degree nurses

Table 3 illustrates Pearson’s correlations between the variables included in this study. We examined relationships between educational level, years of experience, years in function, critical thinking, self-efficacy and perceived performance. The correlation between level of education (MBO/HBO) and overall scores on the WGCTA is significant ($r = .354; p = .000$), as are the correlations between level of education and scores on the following WGCTA subscales: “Assumptions” ($r = .419; p = .000$), “Deductions” ($r = .228, p = .026$) and “Conclusions” ($r = .256; p = .012$). Correlations between level of education and scores on the WGCTA subscales “Interpretations” ($r = .187; p = .069$) and “Evaluations” ($r = .069; p = .504$) turned out to not be significant.

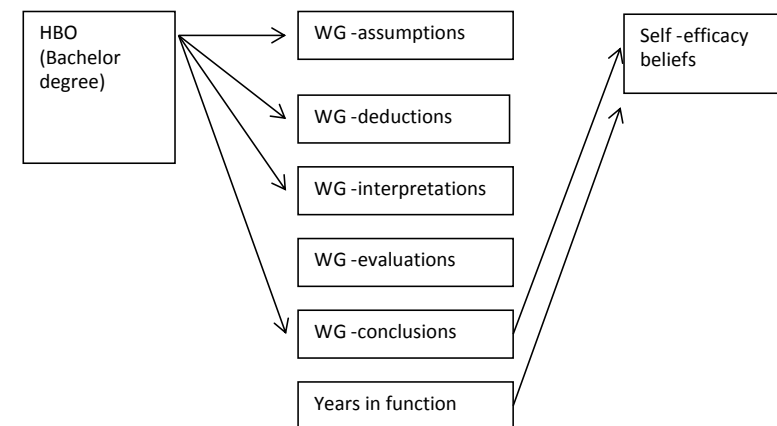
A significant relationship between level of critical thinking and scores on self-efficacy only was found at the WGCTA subscale “conclusions” ($r = .232; p = .023$). The variables of years of experience and years in function are positively correlated to scores on the Self-Efficacy scale (respectively $r = .277; p = .007$ and $r = .297; p = .003$). As Table 3 shows, results do not entirely fit the model as presented in Figure 1 .Structural equation modelling, using AMOS, showed that the model as a whole (with correlated errors) had a good fit with the data (Chi Square = 9.44; df = 41; $p = .80$; Goodness of Fit = .98; Adjusted Goodness of Fit = .93; Root Mean Square Error of Estimation = .00). Figure 2 shows the significant relationships between education and critical thinking abilities and the factors that are associated with self-efficacy.

Table 3. Pearson correlations of the study variables (n = 95)

	1	2	3	4	5	6	7	8	9	10
1.Years of experience										
Pearson’s correlation										
2. Years in function	0.617**									
Pearson’s correlation										
3. MBO/HBO (educ. level)	-0.092	-0.102								
Pearson’s correlation										
4. WG Assumptions	-0.010	0.001	0.419**							
Pearson’s correlation										
5. WG Deductions	0.056	-0.052	0.228*	0.332**						
Pearson’s correlation										
6. WG Interpretations	0.099	-0.017	0.187	0.217*	0.333**					
Pearson’s correlation										
7. WG Evaluations	0.044	-0.074	0.069	0.277**	0.341**	0.238*				
Pearson’s correlation										
8.WG Conclusions	0.161	0.035	0.256*	0.318**	0.331**	0.405**	0.183			
Pearson’s correlation										
9. WG Overall	0.106	-0.031	0.354**	0.664**	0.703**	0.625**	0.624**	0.690**		
Pearson’s correlation										
10. Self-Efficacy	0.277**	0.297**	0.143	0.119	0.128	0.020	-0.041	0.232*	0.145	
Pearson’s correlation										
11. Perceived Performance	0.136	0.064	0.112	0.129	-0.003	-0.006	-0.061	0.107	0.055	0.321**
Pearson’s correlation										

**P < 0.01; *P < 0.05; Pearson Correlations are reported at the diagonal

Figure 2. Significant relationships educational level, critical thinking and self efficacy



DISCUSSION

This study sought to examine the hypothesis stating that nurses with a Bachelor degree show higher scores on critical thinking abilities and that these abilities mediate levels of self-efficacy. More precisely, Bachelor degree nurses are expected to be more accurate in evaluating information on which levels of self-efficacy are based. Hence, it is expected that they undertake targeted action to become more competent when they fail and that they gain confidence when they succeed. It is expected that this will lead to higher levels of self-efficacy beliefs, as presented in our theoretical model (Figure 1). The results of this study provide evidence for the hypothesis that Bachelor degree nurses have higher critical thinking abilities. This study did not provide evidence for the hypothesis that higher critical thinking abilities are positively related to self-efficacy beliefs. As illustrated in Figure 2, only the WGCTA subscale “conclusions” relate positively to self-efficacy. It is not clear why other subscales do not show a positive relationship. Further testing of the model shows that there is no significant difference in scores on self-efficacy and perceived performance between Bachelor degree and diploma nurses. Other variables, such as years in function, seem to have greater influence on self-efficacy beliefs than solely critical thinking abilities do. We expected that the combination of higher critical thinking skills and years of experience/years in function would show positive correlations with self-efficacy beliefs. However, no significant differences were found between the two groups in mean years of experience and years in function. Although all respondents were staff nurses, differences in for example workplace culture could bias the results of this study. White (2009) conducted a concept analysis on self-confidence. She states that the building of confidence also relies on collegial support or self-encouragement. Hence, contextual and personal characteristics could act as factors in the formation of self-efficacy beliefs. This study did not include a detailed description of work place characteristics.

As mentioned above, results of this study show higher critical thinking skills among Bachelor degree nurses. This is consistent with earlier research findings (Beeken, 1997; Howenstein et al., 1996). Research focusing on the development of critical thinking skills after graduation could provide more detailed insight into the relationship between educational levels and scores on critical thinking. Specific strategies to help develop and evaluate essential critical thinking skills are necessary (Fero et al., 2009).

An issue in this study is whether participants might over- or underestimate their capabilities, based on their beliefs. Can individuals estimate accurately what it takes to fulfil a certain task to professional standards? Truxillo et al. (2008) found that those with higher thinking skills showed a more accurate estimate of their performance. According to Facione (1990), ideal critical thinking characteristics are for example fair-mindedness in evaluations, diligence in seeking relevant information, and reasonableness in the selection of criteria. It

might be possible that those with higher (critical) thinking skills set higher standards or are more demanding. Hence, those with higher critical thinking skills might underestimate their capabilities based on their self-efficacy beliefs. Conversely, it might be so that those with lower thinking skills overestimate their capabilities based on their self-efficacy beliefs. Dunn, Elsom and Cross (2007) refer to evidence supporting this kind of relationship. Another issue is the complexity of tasks. The more complex a task is, the greater the demand on behaviour and information processing will be (Chen et al., 2001). The question is whether nurses with a Bachelor degree generally attend to more multidimensional and complex tasks than diploma nurses do. In mental health care in the Netherlands, it is known that the allocation of duties to Bachelor degree nurses and diploma nurses is poorly differentiated (Van der Windt, Calsbeek, Talma, & Hingstman, 2003; VBOC, 2006; V&VN, 2012). In many cases, it is not made explicit how educational levels should relate to domains and tasks of nursing. It is therefore quite possible that a Bachelor degree nurse does the same as a diploma nurse and vice versa. This could explain the weak relationship between level of education and scores on self-efficacy beliefs.

The relatively low response rate could be due to circumstances: nurses work different shifts, participation was time consuming, and it did not always suit their busy schedules. A number of participants did not manage to complete the questionnaire within the time of the meeting. They could return their questionnaire by regular mail. Unfortunately, not all respondents returned their questionnaire.

Although some authors (e.g. Kuiper & Pesut, 2004) claim that there is no evidence that critical thinking outcomes can be explained solely by scores on standardised test such as the WGCTA, it is one of the few validated and tested instruments available in the Netherlands to measure critical thinking abilities.

CONCLUSIONS

The present study shows that there is a positive relationship between educational level and the level of critical thinking. This corroborates previous findings that higher nursing educational programmes contribute to the development of critical thinking abilities and therefore can be learned. Our findings show that self-efficacy beliefs are related to work experience rather than to educational level. Further research should be performed to determine the role of critical thinking skills in the formation of self-efficacy beliefs. It should specifically be investigated how higher critical thinking skills, combined with experience, can lead to higher self-efficacy beliefs.

We believe that insight into the relationship between critical thinking skills and self-efficacy beliefs supports staff development. This has implications for professional development in nursing. To date, critical thinking skills are often linked to clinical decision making. Learning

how to apply these skills to determine self-efficacy can yield vital information. It is helpful to know how nurses rate their performance, and on what grounds. If such evaluations are made accurately, they can provide a solid basis for career competence. Training programmes can then be developed and applied to guide individual and professional development, facilitating the development of competences and the differentiation of tasks. This can contribute significantly to positioning diploma and Bachelor degree nurses in the Netherlands and elsewhere.

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Chapter 8

General discussion



INTRODUCTION

The aim of this study was to explore the roles of critical thinking skills and self-efficacy beliefs in nursing education and practice. The research questions derived from this aim were:

- What is the effect of educational programmes and strategies on the development of critical thinking skills in nursing education?
- How can critical thinking contribute to the differentiation between nursing levels?
- How do nursing students form self-efficacy beliefs?
- What are the effects of learning environments on the formation of self-efficacy beliefs?
- Is there a relationship between critical thinking skills and self-efficacy beliefs?

In this final chapter, the main results and conclusions are presented and methodological issues are addressed. Following this, implications for practice are discussed and suggestions for further research are proposed.

RESULTS OF THE STUDY

What is the effect of educational programmes and strategies on the development of critical thinking skills in nursing education?

In order to investigate the effect of educational programmes and strategies on critical thinking skills in nursing education, we conducted a literature review. The findings from this review are mixed. In examining 14 studies on educational programmes, we found that evidence is inconclusive: both increases and declines in scores on critical thinking skills are reported and the results do not conclusively support the idea that educational nursing programmes can lead to higher scores on critical thinking assessments. This is in line with research conducted during the last decade (Adams, 1999; Staib, 2003; Banning, 2006; Spelic et al., 2001; Zygmunt & Schaefer, 2006). We suggest that although all the studies we included are of a quantitative nature and use standardised instruments, differences in design may explain the variation in results. Many of the studies used relatively small sample sizes and lack a detailed description of the research population. Variables such as entry level, prior experience, cultural factors and age are also reported to affect critical thinking skills. Further to this, the timeframe over which some studies took place was relatively short. This is recognised and reported by the authors. Based on our literature review, we suggest that the following variables can affect the scores for critical thinking assessments: the time needed to develop critical thinking skills, prior experience, age, entry level and cultural factors.

In reviewing educational strategies, we only found relatively conclusive evidence for problembased learning (PBL) positively affecting critical thinking. In four out of five studies examined, the use of PBL led to an increase in the scores on critical thinking skills. In the

fifth study, mixed results were found (both increases and declines after comparing teaching strategies).

How can critical thinking contribute to the differentiation between nursing levels?

In Chapter 3 of this study, we presented various definitions of critical thinking skills and showed that despite the wide variation, the cognitive perspective on critical thinking is the dominant one. We showed that there is an emphasis on the development of critical thinking in nursing education. This is outlined by discussing the effects of developments within society and nursing practice, and the relevance of critical thinking skills in the fields of nursing education and practice. When examining professional and educational nursing profiles, it is apparent that critical thinking skills are an integral part of them. This is especially so in Bachelor degree nursing educational profiles (Focusgroep, 2007). However, in reviewing literature on the distinction between Bachelor degree and diploma degree nursing levels, we found that there is a lack of sound scientific evidence on the subject. We have suggested critical thinking as a factor offering an opportunity to differentiate between the two nursing levels. We suggest that critical thinking can be considered as a meta-competency. We argue that Bachelor degree nurses are better critical thinkers than diploma nurses are, and that they possess the competences needed to address present and future issues and developments in nursing.

In Chapter 4, we built on the results and suggestions presented in Chapter 3. In this theoretical chapter, we introduced frameworks that are helpful in explaining and understanding the use of critical thinking skills. We presented different orientations on how critical thinking skills are addressed and we showed that Bachelor degree nursing profiles rely on different cognitive modes. In designing new nursing programmes and interventions, an analytical mode rather than an intuitive one is applied. These types of roles and competences reflect the distinction made in educational and professional nursing profiles. We argue therefore that the model developed by Benner (1984) does not cover the entire field of nursing at the Bachelor degree level. Hammond (1997) and Eraut (2000) provide models to describe Bachelor degree competences on another level. At this level, critical thinking skills are made explicit. We conclude that the models of Benner, Hammond and Eraut are complementary.

How do nursing students form self-efficacy beliefs?

In Chapter 5, we showed that Bachelor degree nursing students differ in the use of sources in forming self-efficacy beliefs. Bandura's concept of self-efficacy (1997) has been extensively researched and functions as a basis for studying the formation of self-efficacy beliefs. More specifically, we examined the four sources identified by Bandura (1997) as those on which self-efficacy beliefs are built. Based on research and suggestions by several authors (Lent et al., 1996; Palmer, 2006) we investigated whether Bachelor degree nursing students use

a peerbased vicarious source in addition to the traditional four sources. In the validation process, we first converted an existing "teacher sources of self-efficacy" instrument into one dealing with student nurses, making it context-specific. Secondly, content and face validity were tested using feedback from a panel of nursing students and a panel of experienced nurse educators. All the nursing students reflecting on the items had prior clinical experience (work-based learning). Next, confirmative factor analysis was conducted, which resulted in a fivefactor, 22item "sources of self-efficacy" inventory, with factor loadings all equal to or above 0.40. Finally, further testing showed that the fivefactor model was favoured over the traditional fourfactor model. This finding supports evidence that Bachelor degree nursing students differentiate between peer-based and expert-based vicarious experiences. We suggest that this newlydeveloped model can be helpful in the construction of learning environments. Making sources of self-efficacy explicit in practice offers nursing students opportunities to build solid self-efficacy beliefs. It would be of interest to examine the extent to which the number of peers present in clinical learning environments affects the use of sources of self-efficacy beliefs. However, the influence of the context in which nursing students learn during clinical practice (such as the presence of peers) was not part of this study.

What are the effects of learning environments on the formation of self-efficacy beliefs?

In addressing this research question, we compared the effect of nursing internships in regular clinical workplaces with internships in powerful clinical learning environments. We described and illustrated the elements of powerful learning environments and showed how they differ from regular clinical learning environments. Despite the contextual differences between powerful learning environments, they show common characteristics and we used the criteria as described by Simons (1999) to illustrate these. To investigate the effects of the different learning environments, we conducted an experiment with a pre-test post-test design. We showed that both powerful and regular learning environments contribute to the development of self-efficacy beliefs. However, comparing outcomes on the General Self-Efficacy Scale (Schwarzer & Jerusalem, 1999) at pre-test and post-test within groups reveals that interns in a powerful learning environment scored significantly better on more items of the GSE than those in a regular environment. We also found that the effect of a powerful learning environment on scores on the General Self-Efficacy Scale was greatest in the group of interns who were in their first clinical learning period (out of three periods during the entire programme). We suggest that presence of sources for self-efficacy as described by Bandura (1997) and the presence of peers within powerful clinical learning environments contribute to the findings.

Is there a relationship between critical thinking skills and self-efficacy beliefs?

As discussed in Chapter 1 of this study, a positive and reciprocal relationship between the level of critical thinking and self-efficacy beliefs is expected, as critical thinking skills are thought to be helpful in the formation of self-efficacy beliefs (Bandura, 1997). The better a person's critical thinking skills, such as analysing and reasoning, the better their judgement of their performance. Hence, better use of the sources of self-efficacy is expected (Bandura, 1997). With regard to the reciprocity, self-efficacy beliefs enhance cognitive abilities (Bandura, 1993; Zulkosky, 2009). We have shown that Bachelor degree nurses are better at critical thinking than diploma degree nurses. This survey was conducted among mental health nurses working in six different care institutions in the Netherlands. As a group, Bachelor degree nurses scored significantly higher on the Watson Glaser Critical Thinking Assessment tool ($p > 0.05$). Investigating whether these higher scores are positively related to scores for self-efficacy produced a non-significant result. Age and experience, however, were positively related to self-efficacy outcomes. Earlier research (Benner, 1984) has shown that experience is intrinsic to forming self-efficacy beliefs.

Methodological considerations and limitations of the study

In this study, we used standardised tests to assess critical thinking skills and their development. In reviewing the literature on factors influencing critical thinking skills, we only included studies that used three standardised tests (the WGCTA, CCTST and CCTDI). In assessing critical thinking skills among mental health nurses, the WGCTA was used. However, there is some criticism of the use of such standardised tests. Brunt (2005) states that these types of tests do not entirely reflect critical thinking in professional nursing practice. Others have pointed out that critical thinking is context-dependent and therefore cannot be measured using contextindependent instruments (Kuiper & Pesut, 2004). Stone et al. recognise that critical thinking skills are "a facility that generalises across disciplines" (Stone et al., 2001, p. 66). They found that the skills and traits underlying the framework for the general CCTST and CCTDI measurements are relevant for nursing practice. They also conclude that as well as being a general facility, critical thinking may have a subject matter specific component. Ten Dam and Volman (2004) acknowledge that general principles of critical thinking transcend specific subjects and are therefore more widely applicable. We understand the call for a nursingspecific critical thinking assessment tool and note that the use of general instruments is criticised in particular because critical thinking is regarded as a means to delivering good patient care. It is often confused with clinical decision making or clinical judgement. In defining critical thinking, we propose that it can be seen as a meta-competence. A meta-competence enables the use of other, lower order competences (Dries et al., 2008). Within this cognitive perspective, specific nursing competences applied in practice are controlled by meta-competences. From this point of view, we believe that

contextindependent assessment tools such as the WGCTA are applicable when assessing critical thinking skills in nursing.

To date, however, there is no worldwide, generally applicable and validated nursingspecific assessment tool that encompasses generalised factors as well as content specific components. There are nursingspecific assessment tools to hand, but these are not frequently applied. Further to this, there are various reports of studies using qualitative measurements of critical thinking skills. However, in conducting our review on studies concerning the development of critical thinking skills, the results are hard to interpret due to the variation in designs and the failure to describe the measurements used. This is in line with earlier research findings (Staib, 2003). In assessing the critical thinking skills of mental health nurses in the Netherlands, the only validated and standardised test available in the Dutch language was the WGCTA.

We have contributed to the discussion on the distinction between nursing levels in the Netherlands. Addressing this issue, we have introduced critical thinking as a means to differentiate between the two levels and have contributed theoretical frameworks. We do not provide empirical evidence for the possible uses and applications. Based on earlier research we have discussed the possibilities, but this has been limited to theoretical discussion.

In our research on how Bachelor degree nursing students form self-efficacy beliefs, we were unable to identify all the contextual factors that might influence the results. The clinical learning environments in which participants worked and learned are numerous and diverse. Participants fulfilled internships in over seventy health care organisations, in various wards and units. We can say in general that students differ in terms of the sources they use in forming self-efficacy beliefs. However, we do not know the exact impact of contextual factors on the formation of these beliefs.

In comparing the development of self-efficacy beliefs of nursing students in regular clinical learning environments to that of nursing students in powerful clinical learning environments, we did not assess the prior experience of individual participants. It is known that self-efficacy beliefs build over time (Bandura, 1997). We could not precisely assess factors that might have influenced scores on the General Self Efficacy Scale, as some factors, such as prior education or summer or part-time jobs in healthcare, were not part of this study. Another shortcoming of the study is that we were unable to perform paired t-tests. This would have yielded more detailed information.

CONCLUSIONS

This study shows that critical thinking and self-efficacy, in general, are useful concepts in nursing. The following conclusions are drawn:

- Critical thinking is a core element of nursing and nursing education.
- Based on a literature review, we found that results of studies investigating the effect of teaching strategies and educational programmes on the development of critical thinking skills are mixed. In general, we found that evidence on this subject is inconclusive. In addition, factors such as age and experience contribute to the development of critical thinking skills.
- We have provided evidence that Bachelor degree nurses are better critical thinkers than diploma degree nurses. The study was conducted among mental health nurses and therefore caution is dictated regarding the generalisation of these results.
- The newlydeveloped instrument for measuring self-efficacy in nursing education proved to be reliable and valid. Based on Bandura's theory on the sources of self-efficacy, we have presented sound evidence for a differentiation of the vicarious source into expertbased and peerbased sources. This may contribute to a better use of the sources of self-efficacy and may be helpful in the construction of (clinical) learning environments.
- The exact relationship between self-efficacy and critical thinking skills remains unclear. Our study does not support the idea that there is a positive relationship between scores on self-efficacy and critical thinking scores. Age and experience are, however, factors that are positively related to self-efficacy results.

Implications for practice

In this study, we suggest that critical thinking can be understood as a meta-competence: critical thinking acts as an enabling condition (Dries et al., 2008). From this viewpoint, critical thinking skills are essential to the processes of (clinical) reasoning and decision making, which have become core elements in nursing practice and education (Edwards, 2007; Marchigiano et al., 2011). Attention has to be paid to teaching strategies and methods that enhance critical thinking skills. In the screening of nursing curricula, criteria must be applied that reflect critical thinking skills. Based on the results of this study, methods based on problembased learning are preferable.

We have provided further evidence that Bachelor degree nurses have better critical thinking skills than diploma nurses do, and this must be taken into consideration when considering the differentiation of tasks. Greater complexity of care requires higher critical thinking skills (Van der Velden et al., 2011). To date, tasks in nursing are poorly differentiated in the Netherlands (VenVN, 2012). Healthcare institutions are confronted with an increase in complexity of care (Van der Velden et al., 2011), which makes the need to differentiate more

prominent. Furthermore, when defining tasks in nursing based on the level of required critical thinking skills, nursing qualification levels are better addressed (Den Boer & Hövels, 2003; Taminiau & Den Boer, 2004). In our study, we suggest that different cognitive modes are applied in nursing practice, related to for instance tasks and the availability of time (Cader, Campbell & Watson, 2005; Eraut, 2000). When tasks are made more explicit, by describing the necessary cognitive modes and required critical thinking skills, these can be linked to nursing levels, doing justice to Bachelor degree nursing competencies (Van Dam, Kraayvanger & Hövels, 2003). This is helpful for career development of (newly) graduated nurses. Managers in healthcare settings can use these job descriptions and requirements in the coaching process of nursing staff.

This study offers a new perspective on the application of sources of self-efficacy in (clinical) nursing education. The newlydeveloped measurement can be used to evaluate clinical learning environments with regard to the presence and quality of sources of self-efficacy, and results can be used for the (further) development of clinical learning environments. In particular, the distinction between expert and peerbased vicarious sources has implications for clinical learning workplaces: there must be opportunities to work and learn together with peers. To date, a substantial number of clinical learning workplaces do not meet this criterion. The application of sources explicitly in educational settings stimulates self-regulated learning and therefore might lead to better clinical performance by nursing students. In addition, self-efficacy beliefs are also relevant to the career development of graduated nurses.

Recommendations for further research

We suggest that research on the development of critical thinking skills in nursing education should begin with a clear definition of the concept of critical thinking. In our literature review, we came across varied and numerous definitions, and concepts such as clinical reasoning and clinical decision making are frequently used as synonyms for critical thinking skills. Further operationalisation of critical thinking skills offers opportunities to compare and evaluate research findings on this topic. We found that the cognitive perspective on critical thinking is dominant, and within this perspective there is reasonable consensus on the core elements of critical thinking. At the same time, however, we observed an ongoing discussion as to whether critical thinking in nursing can only be addressed from a cognitive point of view. Other perspectives include affective and/or emotional components. Consensus on the definition of critical thinking in nursing offers opportunities to develop a measurement that reflects its nature, as comments on frequentlyused measurements for assessing critical thinking suggest that they do not fully reflect the nursing domain (Adams, 1999; Simpson & Courtney, 2002; Brunt, 2005; Worrel & Profetto-McGrath, 2006; Romeo, 2010).

In determining whether critical thinking skills can be enhanced by educational strategies and programmes, we suggest the application of experimental designs of a longitudinal nature. We found that a considerable number of studies on this subject took place over a relatively short period of time, yet it is suggested that it takes time to develop critical thinking skills (Daly, 2001; Brown et al., 2001; Profetto-McGrath, 2003).

Regarding self-efficacy, it would be worthwhile to further validate the newly developed “sources of self-efficacy scale” in nursing education. In this study, a relatively small sample size was used and replication of the study using a large sample size would contribute to the validity of the instrument.

Furthermore, we suggest research on how the explicit use of sources of self-efficacy in (clinical) learning environments contributes to students’ performance outcomes. We can now measure self-efficacy, but it would be interesting to investigate how this relates to, for example, test results and clinical performances. Self-efficacy is by nature measured using self-assessment instruments: one assesses oneself. It would be worthwhile investigating how these self-assessments relate to objective outcomes. This would provide insight in how self-efficacy can be applied in nursing education.

In this study, we did not find a positive relationship between self-efficacy beliefs and scores on critical thinking skills. We found that age and experience are positively related to self-efficacy beliefs and that educational level is positively related to critical thinking. Further research on the relationship between critical thinking skills and self-efficacy beliefs could provide more insight into how these concepts are related. In relevant literature, a reciprocal relationship is suggested (Edwards, 2003).

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Dankwoord
Curriculum Vitae
Summary (in Dutch)

DANKWOORD

Wanneer ik met collega-promovendi over de voortgang van onze promotietrajecten sprak, kwam vaak naar voren dat promoveren een solistische en soms zelf een eenzame aangelegenheid is. Deels is dit waar: als promovendus ben jij diegene die produceert, feedback ontvangt, aanpast en weer voorlegt, om moet leren gaan met afwijzing, opkrabbelt en weer doorgaat. Voor het overgrote deel overheerste het gevoel dat ik er niet alleen voor stond. Ik prijs me gelukkig dat ik mensen om heen had die ieder vanuit hun eigen kwaliteiten en kracht een bijdrage hebben geleverd aan mijn ontwikkeling. Deze mensen wil ik in dit dankwoord bedanken.

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Henk

CURRICULUM VITAE

Henk Gloudemans was born in St-Oedenrode, The Netherlands, on the 3th of May 1965. After obtaining his bachelor's degree in nursing in 1988 at Fontys University of Applied Sciences in Eindhoven, he started working at a mental health care institution (GGzE). In this period, he combined working as a nurse with studying pedagogy at Fontys University of Applied Sciences in Tilburg. Later on, he also trained and guided nursing students at GGzE. Since 1999 he educates nursing students at Fontys University of Applied Sciences. In 2004, he obtained his Master's degree in Mental Health Science at Maastricht University. After this, he started to combine educating at school as well as in practice, in so called care innovation centres. In this period, he gained interest in integrating theory and practice. More specific, how nursing students develop knowledge and skills in practice. This curiosity lead to his PhD. Currently, he is manager at Fontys University of Applied Sciences Tilburg, School of Nursing. In 1995, he married Marielle Habraken.

SAMENVATTING (SUMMARY IN DUTCH)

In dit proefschrift wordt verslag gedaan van een studie naar betekenisvolle concepten voor de verpleegkundige praktijk en opleidingen: kritisch denken en self-efficacy. Het onderzoek heeft plaats gevonden onder gediplomeerde verpleegkundigen en onder studenten/stagiaires van een Hbo verpleegkundige opleiding in het zuiden van het land.

Hoofdstuk 1 introduceert het onderwerp van deze studie, startend met een korte schets van de recente geschiedenis van de verpleegkundige kwalificatieniveaus in Nederland: het Mbo en Hbo niveau. Er wordt ingegaan op de verschillen tussen beide niveaus en de moeilijkheden die vanuit de verpleegkundige praktijk aangegeven worden bij het positioneren van deze twee verschillend gekwalificeerde professionals. Vervolgens wordt ingegaan op de concepten kritisch denken en self-efficacy. Na een uiteenzetting van deze concepten, komt de (mogelijke) betekenis voor de verpleegkundige (opleidings-) praktijk komen. Hierbij wordt eerder verricht nationaal als internationaal onderzoek gepresenteerd. Ook wordt ingegaan op hoe deze concepten onderling samenhangen en welke verbanden vanuit eerder onderzoek verwacht worden. Vervolgens worden de doelstellingen en onderzoeksvragen die in deze studie centraal staan gepresenteerd.

De centrale vraag in dit proefschrift is het onderzoeken van de rol van kritisch denken en self-efficacy in de verpleegkunde en verpleegkundige opleidingen. De onderzoeksvragen die in de verschillende hoofdstukken aan bod komen zijn de volgende:

- Wat is het effect van onderwijs programma's en strategieën op kritisch denken vaardigheden in verpleegkundige opleidingen?
- Hoe kan kritisch denken bijdragen tot een differentiatie in verpleegkundige niveaus?
- Hoe vormen verpleegkunde studenten self-efficacy overtuigingen?
- Wat zijn de effecten van leeromgevingen op de vorming van self-efficacy overtuigingen?
- Is er een relatie tussen kritisch denken vaardigheden en self-efficacy overtuigingen?

In hoofdstuk 2 worden de resultaten van een literatuurstudie naar effecten van onderwijsprogramma's en strategieën op kritisch denken gepresenteerd. Vanwege de veelheid aan artikelen en de diversiteit aan gebruikte onderzoeksmethoden daarbinnen, zijn enkel onderzoeksartikelen geïncludeerd waarbij gebruik werd gemaakt van één van de drie wereldwijd meest gebruikte gestandaardiseerde kritisch denken test. Uit de analyse blijkt dat de resultaten wat betreft complete onderwijsprogramma's wisselend zijn. Hierdoor wordt geen sluitend bewijs geleverd wordt dat onderwijsprogramma's tot significante groei in kritisch denken leidt. Bij het analyseren van onderwijsstrategieën (zoals bijvoorbeeld onderwijsmethoden) blijkt dat er enkel voor probleem gestuurd leren als methode overtuigend is aangetoond dat dit tot significante verbetering van kritisch denken leidt. In het hoofdstuk wordt

ingegaan op factoren die van invloed zijn op de ontwikkeling van kritisch denken, zoals de factor tijd, eerder opgedane ervaringen en startniveau. Deze factoren hebben bij de onderzoeken die in dit hoofdstuk gepresenteerd worden, invloed gehad op de resultaten, wat het trekken van eensluidende conclusies in de weg staat. Tenslotte wordt opgemerkt dat er vele definities van kritisch denken gehanteerd worden, wat het meten hiervan bemoeilijkt.

In hoofdstuk 3 en 4 wordt uiteengezet hoe kritisch denken als concept gebruikt kan worden als middel tot differentiatie. Kritisch denken staat volop in de belangstelling binnen verpleegkundige opleidingen, vanwege de toegenomen complexiteit van zorgverlening. Verpleegkundigen worden steeds vaker geconfronteerd met multi-problematiek in de dagelijkse praktijk. Om hier adequaat mee om te kunnen gaan moet een verpleegkundige over hogere denkvaardigheden beschikken zoals analyseren, relateren en oordelen. Deze vaardigheden worden onder de noemer “kritisch denken” geschaard. Verondersteld wordt dat juist Hbo opgeleide verpleegkundigen over hogere denkvaardigheden beschikken. Met de toegenomen complexiteit zou deze dan beter uit de voeten moeten kunnen. Echter, gezien de vele publicaties over het gebrek aan differentiatie tussen niveau 4 en 5 (resp. Mbo- en Hbo-) opgeleide verpleegkundigen, worden kritische denkvaardigheden (te) weinig gerelateerd aan functie en takenpakketten. In hoofdstuk 4 worden drie modellen gepresenteerd die inzicht geven in het gebruik van verschillende (niveaus van) kritische denkvaardigheden. Er wordt ingegaan op hoe de verschillende modellen het verpleegkundig vakgebied representeren. Binnen de verschillende modellen worden andere accenten gelegd. Zo blijkt uit de bespreking van het model van Benner, dat de mate van expertise van de verpleegkundige zeer bepalend is voor de toepassingswijze van denkvaardigheden. Het cognitieve continuüm model daarentegen stelt de taak centraal, waarbij Eraut de beschikbare tijd toevoegt als bepalende factor. Opgemerkt wordt dat de modellen complementair zijn aan elkaar, en dat de taak/situatie en de beschikbare tijd leidend zijn bij het gebruik van denkvaardigheden. Het expliciet inzetten van deze modellen kan helpend zijn bij het differentiëren van taken naar Mbo en Hbo kwalificatieniveau.

Hoe Hbo-verpleegkunde studenten self-efficacy overtuigingen vormen, wordt beschreven in hoofdstuk 5. Het model van Bandura is als uitgangspunt genomen. Dit model beschrijft vier informatiebronnen die gebruikt worden om self-efficacy overtuigingen te vormen: eigen ervaringen, het zien van een bekwame collega in actie, feedback van anderen en lichamelijke sensaties zoals transpireren en versnelde ademhaling. Uit eerder onderzoek is bekend dat studenten ook informatie halen over de eigen competenties via het in actie zien van gelijken (peers). Het doel van deze studie was om te onderzoeken of dat ook van toepassing is op verpleegkunde studenten. Aan deze studie hebben 230 verpleegkunde studenten met stage-ervaring deelgenomen. Analyse van de data via factor analyse leverde inderdaad de

voornoemde vijfde bron op die studenten gebruiken. Het nieuw ontwikkelde instrument bestaat uit 22 items, verdeeld over vijf bronnen (factoren). Vergelijking met andere modellen (zoals het vier factoren model) laat zien dat het nieuw ontwikkelde model het beste past bij de wijze waarop studenten self-efficacy overtuigingen opbouwen.

In hoofdstuk 6 wordt het effect van krachtige leeromgevingen op de ontwikkeling van self-efficacy beschreven. De aanname voor dit onderzoek is dat binnen krachtige leeromgevingen meer factoren aanwezig zijn die kunnen leiden tot een groei in self-efficacy overtuigingen. De omgeving is, meer dan binnen reguliere stage afdelingen, ingericht op het creëren van leermogelijkheden. Scores (voor- en nameting) op self-efficacy van Hbo verpleegkundige stagiaires werkzaam binnen een krachtige leeromgeving (47 studenten) zijn vergeleken met scores van stagiaires binnen reguliere stage omgevingen (62 studenten). Resultaten laten zien dat beide groepen stagiaires hogere scores vertonen, echter, de toename bij stagiaires binnen een krachtige leeromgeving is op meerdere items van de General Self-Efficacy Scale, significant groter. Dit vormt aanwijzingen dat elementen binnen krachtige leeromgevingen aanwezig een positief effect hebben op ontwikkeling van self-efficacy. Opvallend is dat de groei het sterkst aanwezig is binnen de eerste en laatste stageperiode, en dat er een zeer beperkte groei waarneembaar is in de tweede stageperiode. Het is in het onderzoek niet gelukt om deze trend te verklaren.

De relatie tussen kritische denkvaardigheden en self-efficacy overtuigingen wordt in hoofdstuk 7 beschreven. Er wordt ingegaan op variabelen die een rol van betekenis spelen bij het vormen van self-efficacy en kritisch denken van gediplomeerde en praktiserende Mbo en Hbo opgeleide verpleegkundigen in de Geestelijke Gezondheidszorg. Uit de resultaten blijkt dat Hbo opgeleide verpleegkundigen significant hoger scores op kritisch denken. Dat op zichzelf was een te verwachten uitkomst, gezien de vooropleiding van de Hbo opgeleide respondenten. Op basis van gegevens uit internationaal gepubliceerd onderzoek echter, werd verwacht dat deze hogere scores positief samenhangen met scores op self-efficacy. Hoe beter men in staat is om op het eigen handelen te reflecteren en van daaruit bij te sturen, hoe beter men in staat is om bronnen te gebruiken waarmee de eigen competentie vergroot wordt. Dit heeft dan weer een positief effect op de mate van self-efficacy overtuigingen. Dat laatste effect is echter niet aangetoond in dit onderzoek. Variabelen als leeftijd en ervaringsjaren blijken sterker samen te hangen met self-efficacy dan opleidingsniveau. Kanttekening hierbij is dat er mogelijk sprake is van onder- en overschatting door de respondenten van de eigen overtuigingen. Het is en blijft een zelfbeoordeling, waarbij dit gevaar aanwezig is.

In hoofdstuk 8 worden de algemene conclusies weergegeven, en wordt ingegaan op de implicaties voor de praktijk. Ook wordt er verslag gedaan van de methodologische overweging-

gen en worden suggesties gedaan voor verder onderzoek. Belangrijke conclusie is dat kritisch denken een kernbegrip vormt binnen verpleegkundige opleidingen. Er is aangetoond dat Hbo opgeleide verpleegkundigen significant hogere scores vertonen op kritisch denken. Echter, onderzoek naar het effect van onderwijsprogramma's en methoden op de ontwikkeling van kritische denkvaardigheden laten wisselende resultaten zien. Uit literatuurstudie blijkt dat andere factoren, zoals werkervaring en leeftijd, effect hebben op de ontwikkeling van het kritisch denkvermogen. Het inzetten van het concept kritisch denken bij het differentiëren en toebedelen van verpleegkundige taken en functies wordt aanbevolen. Het nieuw ontwikkelde instrument om self-efficacy te meten bleek betrouwbaar en valide te zijn. Er is aangetoond dat studenten differentiëren tussen het in actie zien van experts en peers, en dat ze deze beide bronnen gebruiken om de eigen mate van self-efficacy te bepalen. Dit deelonderzoek poogt bij te dragen aan het inrichten en ontwerpen van leeromgevingen, waardoor leerrendementen naar verwachting groter zullen zijn. De veronderstelde positieve relatie tussen kritische denkvaardigheden en self-efficacy overtuigingen is in dit onderzoek niet aangetoond. Het blijft onduidelijk hoe deze relatie exact is. Uit het onderzoek is wel gebleken dat leeftijd en ervaringsjaren in de beroepspraktijk positief samenhangen met self-efficacy overtuigingen.

De volgende aanbevelingen voor verder onderzoek worden gedaan. Het komen tot consensus over het begrip kritisch denken binnen het domein van verpleegkunde is een belangrijke stap in de ontwikkeling van een valide meetinstrument. Pas dan kunnen wereldwijd onderwijsprogramma's en methoden en het effect hiervan op kritische denkvaardigheden betrouwbaar beoordeeld worden. Verder onderzoek naar het effect van de mate van self-efficacy op prestaties van individuele studenten geeft een beter inzicht in de toepassingsmogelijkheden van self-efficacy binnen verpleegkundige opleidingen.

