The theory-practice relationship: reflective skills and theoretical knowledge as key factors in bridging the gap between theory and practice in initial nursing education

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Aim. This paper is a report of a correlational study of the relations of nursing students’ acquired reflective skills, practical skills and theoretical knowledge on their perception of coherence between theory and practice.

Background. Reflection is considered a key factor in bridging the gap between theory and practice. However, it is not evident whether reflective skills are primarily generic in nature or whether they develop from a theoretical knowledge base or the acquisition of practical skills.

Method. This study is a secondary analysis of existing data. The data are part of a student survey that was conducted among third-year nursing students in Norway during the spring of 2007. A total of 446 nursing students participated in this study and the response rate was 71%. Structural equation modelling analyses were performed.

Findings. The results indicate that students’ perception of coherence between theory and practice during initial nursing education is directly influenced by reflective skills and theoretical knowledge. The results also reveal that reflective skills have mediating effects and that practical skills have a fully mediated and theoretical knowledge a partially mediated influence on students’ perception of coherence.

Conclusion. The findings imply that helping students perceive coherence between theory and practice in nursing education, developing students’ reflective skills and strengthening the theoretical components of the initial nursing education programme might be beneficial. The results suggest that reflective thinking is not merely a generic skill but rather a skill that depends on the acquisition of relevant professional knowledge and experience.

Keywords: initial nursing education, nursing students, practical skills, reflective thinking, structural equation modelling, theoretical knowledge, theory-practice gap
Introduction

The gap between theory and practice is widely documented and referred to in the literature about professional nursing education and practice. Newly qualified nurses experience a transition shock (Duchscher 2009) and encounter a gap between knowledge acquired in initial nursing education and knowledge demands in occupational practice (Smey & Vågan 2008). They describe their first year as professional nurses as not only a tough experience but also one of growth and development (Wangensteen et al. 2008).

To better understand how initial nursing education could be improved so as to minimize the gap between theory and practice experienced by students, it is important to explore how students’ perception of coherence between the theoretical and practical parts of their initial education is affected by different kinds of learning outcomes acquired during education. How these different kinds of learning outcomes relate to each other is another area of interest.

Background

Transferring theoretical knowledge that has been acquired in an education programme to a workplace setting might be considered a difficult undertaking because of differences in context, culture and modes of learning (Eraut 2004). Perceiving coherence between the theoretical and practical components of initial nursing education can be considered a vital step in bridging the gap between theory and practice. It is, therefore, of essential value and represents an important learning outcome for nursing students. Coherence in nursing education implies that students perceive a connection between study subjects and practical nursing tasks (i.e. training in practice builds on already acquired theoretical knowledge and practical nursing experience provides a better understanding of the theoretical content of the education programme).

Developing students’ reflective skills could help students perceive coherence between the theoretical and practical components of their education programme. Reflection, critical thinking, reflective practice and other related concepts are widely used in the nursing literature and have been proposed as methods of bridging the gap between theory and practice and of developing and articulating tacit knowledge (Clarke 1986, Johns & Joiner 2002, Benner et al. 2009). Nursing students have reported using reflection as a method to bridge the gap between theory and practice (Severinson 1998). Reflection is proposed as a tool to promote registered nurses’ professional development, thereby implying better care for patients (Gustafsson & Fagerberg 2004). In addition, reflective practice interventions can provide a bridge between abstract family theory and the particulars of unique family situations in paediatric critical care (Peden-McAlpine et al. 2005). The results from these studies implied that developing students’ reflective skills might be essential in helping them experience coherence between the theoretical and practical components of their education, which in turn is vital in developing professional expertise. Hence, the acquisition of reflective skills by students during their initial education is expected to have a considerable impact on their perception of coherence between the theoretical and practical parts of their education (hypothesis 1). As a consequence of this assumption, understanding the nature of, and ways of developing, reflective skills, might be important in improving initial nursing education. Reflective skills might be categorized as context-independent generic skills that are applicable to different subjects and fields of practice or as connected to a specific set of professional competencies. A certain amount of acquired theoretical knowledge and a number of practical skills might be viewed as prerequisites for developing reflective skills. Different theoretical perspectives on learning vary in the interpretation of the gap between theory and practice and in the way to equip students with sufficient professional knowledge (Greeno et al. 1996, Tuomi-Gröhn & Engström 2003). Consequently, the emphasis on theoretical abstract knowledge and practical nursing skills in reflective skill development and professional competency varies.

The acquisition of practical experience and practical skills has been highlighted as a critical feature of, and as a requisite for, the development of professional expertise (Benner 1984, Eraut 2004, Benner et al. 2009). Nurses who had successfully overcome a critical situation reported a higher level of tacit knowledge than those who had not (Herbig et al. 2001). The concept of novice-to-expert development in nursing put forth by Benner (1984) and by Benner et al. (2009) almost entirely emphasizes learning from experience, which makes tacit knowledge and intuition critical features of professional expertise. Benner and Sutphen (2007) pointed out that critical thinking, learning about science and possessing procedural knowledge or technical know-how in general situations are essential but not sufficient for ‘cumulative improvement, or acting in the world. For that, engaged practical inquiry and action are needed in relation to a practice tradition’ (Benner & Sutphen 2007, p. 106). According to this view, acquiring practical skills is the most important nursing competency and practical skills is a key component in developing students’ reflective skills (the first part of hypothesis 2) and their ability to perceive coherence between the theoretical and practical components of education (hypothesis 3).
Theoretical research-based knowledge and reflective skills can provide new perspectives on practical issues and can be argued as necessities for research utilization behaviour in nursing practice. Two systematic reviews on research utilization behaviour in nursing practice have identified a positive relationship between attitudes towards research and research utilization (Estabrooks et al. 2003, Milner et al. 2006). Milner et al. (2006) suggested that ‘not all clinical nurse educators have the necessary critical appraisal skills and research knowledge to use research effectively in practice’ (p. 639). Knowledge might also have a binding role in professional learning. Jensen and Lahn (2005) reported that nursing students experienced a shift in perspective from viewing nursing theory as ‘dry, irrelevant and boring and something they could do well without’ at the beginning of their initial nursing education to reporting nursing theory ‘as not only useful, but as enjoyable and inspiring to read’ (p. 313) in their last year of study. Bonis (2009) stated that ‘knowing in nursing refers to a uniquely personal type of knowledge constructed of objective knowledge interfaced with the individual’s subjective perspective on personal experience’ (p. 1328). Knowing can be considered a dynamic process that is tied to reflection; its ‘consequences are understanding, finding meaning and transformation’ (p. 1328). Guile and Young (2002) drew attention to the fact that a strict apprenticeship model of learning in professional education does not take into account the need for theoretical knowledge that can exceed practical experience. Young (2008) pointed out the importance of teaching scientific context-independent theoretical knowledge, which is conceptual knowledge that is not tied to particular cases. This type of knowledge provides a reliable basis for moving beyond these particulars and has an explanatory power and a capacity for generalization. In addition, developing a professional identity can be viewed as being tied to the acquisition of theoretical knowledge (O’Connor 2007). In line with this view, theoretical knowledge might be seen as a necessity in developing a sense of professional identity and as a prerequisite for reflecting and for perceiving coherence between the theoretical and practical components of education. It is therefore logical to propose that acquired theoretical knowledge has a considerable impact on both the acquisition of reflective skills (the first part of hypothesis 4) and the perception of coherence in their initial education (hypothesis 5).

However, a position that considers the importance of both theoretical knowledge and practical skills has also been advocated. Evans and Donnelly (2006) accounted for the non-static interrelationship involving knowledge, judgement and skills, which implies that reflective skills, theoretical knowledge and practical skills influence each other substantially. According to this view, the acquisition of reflective skills, practical skills and theoretical knowledge by students is highly correlated (hypothesis 6).

Nevertheless, it is not a given that some of the hypotheses are mutually exclusive. Kember et al. (2001) offered a synthesized, multifaceted definition of reflection, which states that ‘the subject matter of reflection is an ill-defined problem’ and that it ‘might be triggered by an unusual case or deliberately stimulated’ (p. 27–28). Kember et al. (2001) emphasized that reflection implies ‘a careful re-examination and evaluation of experience, beliefs and knowledge’ and that it often ‘involves looking back or reviewing past actions’ (p. 28). Furthermore, ‘reflection leads to new perspectives’ and ‘operates at a number of levels’, and the ability to engage in reflective thinking is a result of ‘developmental processes that are linked to the development of appropriate conceptions of knowledge’ (p. 28). Kember et al. (2001) argued in favour of integrating theory and practice by developing reflective practice during initial education and emphasized the development of appropriate conceptions of knowledge and reflective judgement in the theoretically oriented components of the education programme, and the ability to be reflective in the practical components of their courses. According to this view, students’ reflective skills are highly influenced by the acquisition of both practical skills and theoretical knowledge and that reflective skills act as a mediator between practical skills and the perception of coherence, between the theoretical and practical parts of the education (hypothesis 2) and between theoretical knowledge and the perception of coherence (hypothesis 4).

In short, developing nursing students’ reflective skills is widely viewed as a key component in helping them perceive coherence between theory and practice. Reflective skills are primarily viewed as either a generic skill or a skill that is associated with specific professional content. Both practical skills and theoretical knowledge can be viewed as prerequisites for developing reflective skills. They might also directly influence the ability to perceive coherence between theory and practice. Thus, investigating how students’ acquired reflective skills influence their perception of coherence between the theoretical and practical components of nursing education and how students’ acquired practical skills and theoretical knowledge affect their reflective skills and perceived coherence would be interesting.

The following six hypotheses were formulated, taking into account the various theoretical perspective presented in this paper:

Hypothesis 1: Students’ acquired reflective skills have a direct impact on their perceptions of coherence.
Hypothesis 2: Students’ acquired practical skills have an impact on their reflective skills and reflective skills have mediating effects on the relationship between practical skills and perception of coherence.

Hypothesis 3: Students’ acquired practical skills have a direct impact on their perceptions of coherence.

Hypothesis 4: Students’ acquired theoretical knowledge has an impact on their reflective skills, and reflective skills have mediating effects on the relationship between theoretical knowledge and perception of coherence.

Hypothesis 5: Students’ acquired theoretical knowledge has a direct impact on their perceptions of coherence.

Hypothesis 6: Students’ acquired practical skills, theoretical knowledge and reflective skills are correlated with one another.

The study

Aim

The aim of this study was to examine the relations of nursing students’ acquired reflective skills, practical skills and theoretical knowledge on their perception of coherence between theory and practice (see Figure 1).

Design/methodology

This study has a cross-sectional, correlational design and is a secondary analysis of existing data.

Sample/participants

In 2007, a total of 446 nursing students at the end of their third year of training (which corresponds to the end of their professional training) at two university colleges in Norway participated in this study. The response rate was 71% of the target population of 628 students.

Data collection

Data used in this study were derived from a database for the Studies of Recruitment and Qualification in the Professions in Norway (StudData). Data were collected from pencil-and-paper questionnaires that had been filled out during a lesson in the spring of 2007. The questionnaire had a total of 231 items and seven items were used in this study.

The participants were asked to identify to what extent they have acquired each item during their initial nursing education. Theoretical knowledge, practical skills, reflective skills and coherence were measured on a Likert-type scale, ranging from 1 (not at all) to 5 (to a large extent). Theoretical knowledge and practical skills were each measured by only one item with the same wording as the constructs. Two items on the questionnaire measured the latent variable, reflective skills: ‘Ability to reflect on and assess one’s own work critically’ and ‘Ethical valuation ability’. The latent variable, coherence, was measured with three items: ‘It is not difficult to see the connection between the study subjects and the concrete practical work’, ‘The training in practice continued what I had already learned in other parts of the formal education’ and ‘The experience gained from the practical periods has been important in my further study’.

Ethical considerations

The data for the present study were derived from a database for the Studies of Recruitment and Qualification in the Professions in Norway (StudData), which contains results from surveys conducted in the first and third years of initial education and at 3 and 6 years after graduation for several study programmes. The surveys were conducted in accordance with the Personal Data Act and with the legal and ethical guidelines regulating research developed by the Norwegian Social Science Data Services and were approved by the privacy ombudsman for research in Norway (http://www.nsd.uib.no/personvern/om/english.html). The participants gave their informed consent for participation in this survey in the sense that they voluntarily participated in the survey after having been given all relevant information about the survey in advance. One week before data gathering, the participants received written information about the survey. The students were informed about the right not to participate, the possibility not to answer every question in the questionnaire and the option to withdraw from the survey without any further justification. The data for this study are anonymous in the sense that the participants are not directly identifiable.
valid and that the collected data do not contain sensitive information about the participants. Because of the longitudinal design of the database, the participants were given an identification number, but the researcher does not have access to the list of the participants.

Validity and reliability/rigour

Students’ self-reported perceptions of acquired knowledge and skills and their perceptions of coherence at the end of their initial nursing education programme are presented in this study. However, objective measurements of students’ learning outcomes are not. The items in this study were part of a student survey that had been developed by researchers on professional studies to map students’ evaluations of their professional training during their initial education programme at several university colleges. The items used in this analysis were therefore not developed specifically to measure the concepts presented in this study and are not part of well-established measurement instruments; however, the construct validity should have been sufficient. The items that measured each latent variable were chosen because they represented central components of the theoretical constructs. Theoretical knowledge and practical skills were each measured by only one item (with the same wording as the constructs), which indicates sufficient construct validity. Previous research indicates that single-item scales can be reliable and are highly correlated with multiple-item measures (Zimmermann et al. 2006). Some researchers have argued that single-item measures are almost as effective as multiple-item measures; for example, single-item measures have been used effectively to assess different areas like self-esteem (Robins et al. 2001), personality (Woods &amp; Hampson 2005), quality of life (Zimmermann et al. 2006) and health status (Desalvo et al. 2006). Nevertheless, using a single indicator is considered a disadvantage because a measurement error cannot be estimated, which, in this case, implies that theoretical and practical skills are sufficient but are not perfectly valid and reliable (Kline 2005).

The correlations between the variables measuring different concepts were moderate, which suggests discriminate validity. The factor loadings of each latent variable were relatively high (range 0.52–0.83), with the exception of one that was moderate (0.33), thus indicating sufficient convergent validity (see Table 1). Cronbach’s alpha reliability coefficients were 0.54 for reflective skills and 0.57 for coherence. Although these values are not ideal, they are not considered critical because relatively few items were used to measure the latent variables and the inter-item correlation is close to Briggs and Cheek’s (1986) recommendation of an optimal range of 0.2–0.4. The inter-item correlation for reflective skills was 0.37 and ranged from 0.17 to 0.50 for coherence, indicating moderate internal consistency in the latent variables. However, the inadequacy of the psychometric properties ought to be taken into consideration in the interpretation of the results of this study.

Data analysis

The data were analysed with SPSS (version 17; IBM Corporation, Armonk, NY, USA) and Mplus (version 5; Muthen &amp; Muthen, Los Angeles, CA, USA). Univariate normality was evaluated by checking the marginal distribution of each variable. Table 2 shows that the univariate distribution is in the range of normality (between –1 and 1 for both skewness and kurtosis) for all the observed variables, with the exception of one variable. However, the skewness and kurtosis of this item are not excessive enough to threaten the maximum likelihood estimation. Table 2 shows n for each item. The missing data in this study are missing completely at random (MCAR) (SPSS Little’s MCAR test: χ² = 75.5, d.f. = 76, P = 0.494). In Mplus, the full information maximum likelihood estimation is used to deal with missing data.

In the following analysis, the goodness-of-fit indices [the comparative fit index (CFI), the root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR)] are reported in addition to the chi-square test. A model-data fit is considered good if CFI ≥ 0.95, RMSEA ≤ 0.06 and SRMR < 0.08 (Hu &amp; Bentler 1999).

I used a model-generating application of structural equation modelling (SEM) (Kline 2005) to test the six hypotheses. This application of SEM is a blend of confirmatory and exploratory analyses. The hypothesized model (model 1) underwent testing (confirmatory analysis) and when the initial model did not fit the data, the model was modified (exploratory analysis). The altered model (model 2) was then tested with the same data. The goal of the procedure was to develop a model that makes theoretical sense and has a statistical correspondence to the data that is reasonable (Kline 2005, p. 11) (see Table 3). The tested models are partially latent models; that is, the models examine the relationships between two latent variables (reflective skills and coherence) and two observed variables (theoretical knowledge and practical skills). The two items also have the same wording as the two concepts.

Results

The study participants (85% women, 15% men) ranged in age from 22 to 56 years (mean age = 27 years; median age = 25 years).
Table 1 Maximum likelihood parameter estimates for model 2

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Reflective skills → Ability to reflect on and assess one's own work critically</td>
<td>1.000</td>
<td>0.252</td>
<td>E1</td>
<td>0.257</td>
<td>0.047</td>
</tr>
<tr>
<td>Reflective skills → Ethical valuation ability</td>
<td>1.365</td>
<td>0.213</td>
<td>0.719</td>
<td>E2</td>
<td>0.345</td>
</tr>
<tr>
<td>Coherence → It is not difficult to see the connection between the study subjects and the concrete practical work</td>
<td>1.000</td>
<td>0.332</td>
<td>E3</td>
<td>0.949</td>
<td>0.068</td>
</tr>
<tr>
<td>Coherence → The training in practice continued what I had already learned in other parts of the formal education</td>
<td>1.376</td>
<td>0.247</td>
<td>0.604</td>
<td>E4</td>
<td>0.270</td>
</tr>
<tr>
<td>Coherence → The experience gained from the practical periods has been important in my further study</td>
<td>2.231</td>
<td>0.420</td>
<td>0.828</td>
<td>E5</td>
<td>0.388</td>
</tr>
</tbody>
</table>

Direct effects

| Reflective skills → Coherence | 0.330 | 0.096 | 0.427 | D1 | 0.145 | 0.034 | 0.735 |
| Theoretical knowledge → Coherence | 0.060* | 0.027 | 0.152 | D2 | 0.088 | 0.029 | 0.743 |
| Theoretical knowledge → Reflective skills | 0.146 | 0.036 | 0.285 | |
| Practical skills → Reflective skills | 0.170 | 0.037 | 0.344 | |

Mediated effects

| Theoretical knowledge → Reflective skills → Coherence | 0.048** | 0.017 | 0.121 | |
| Practical skills → Reflective skills → Coherence | 0.036** | 0.018 | 0.147 | |

Disturbance variances

| Theoretical knowledge | 0.047 | 0.038 | 0.058 | 0.077 | 0.083 | 0.128 | 0.213 | 0.258*** | 0.285*** | 0.300*** | 0.373*** | 0.280*** | 0.207*** | 0.164*** | 0.271*** | 0.276*** | 0.124* | 0.110* | 0.128** | 0.268*** | 0.176*** | 0.504*** | 0.288*** | 0.693*** | 0.781*** | 0.781*** | 0.880*** | 0.984*** | 0.984*** | 0.984*** | 0.984*** |

Table 2 Input data (correlations), n, mean, standard deviation, skewness and kurtosis for the observed variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical knowledge</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical skills</td>
<td>0.336***</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reflective skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to reflect on and assess one's own work critically</td>
<td>0.280***</td>
<td>0.258***</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethical valuation ability</td>
<td>0.285***</td>
<td>0.300***</td>
<td>0.373***</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coherence</td>
<td>0.142**</td>
<td>0.146**</td>
<td>0.083</td>
<td>0.179***</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is not difficult to see the connection between the study subjects and the concrete practical work</td>
<td>0.280***</td>
<td>0.207***</td>
<td>0.164**</td>
<td>0.271***</td>
<td>0.276***</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>The training in practice continued what I had already learned in other parts of the formal education</td>
<td>0.124*</td>
<td>0.110*</td>
<td>0.128**</td>
<td>0.268***</td>
<td>0.176***</td>
<td>0.504***</td>
<td>–</td>
</tr>
<tr>
<td>The experience gained from the practical periods has been important in my further study</td>
<td>423</td>
<td>424</td>
<td>427</td>
<td>425</td>
<td>434</td>
<td>428</td>
<td>432</td>
</tr>
<tr>
<td>Mean</td>
<td>3.72</td>
<td>3.85</td>
<td>3.99</td>
<td>3.96</td>
<td>3.69</td>
<td>3.86</td>
<td>4.45</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.867</td>
<td>0.899</td>
<td>0.851</td>
<td>0.843</td>
<td>1.034</td>
<td>0.929</td>
<td>0.781</td>
</tr>
<tr>
<td>Skewness</td>
<td>–0.363</td>
<td>–0.599</td>
<td>–0.688</td>
<td>–0.640</td>
<td>–0.438</td>
<td>–0.433</td>
<td>–1.693</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>–0.060</td>
<td>0.150</td>
<td>–0.457</td>
<td>0.326</td>
<td>–0.365</td>
<td>–0.288</td>
<td>3.278</td>
</tr>
</tbody>
</table>

*P < 0.05, **P < 0.01, ***P < 0.001 level (2-tailed).
Table 3 Results of the structural equation models

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Unst. Estimate</th>
<th>se</th>
<th>Std. Estimate</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical knowledge → Reflective skills</td>
<td>0.146</td>
<td>0.036</td>
<td>0.285</td>
<td>***</td>
</tr>
<tr>
<td>Practical skills → Reflective skills</td>
<td>0.168</td>
<td>0.038</td>
<td>0.340</td>
<td>***</td>
</tr>
<tr>
<td>Reflective skills → Coherence</td>
<td>0.094</td>
<td>0.031</td>
<td>0.340</td>
<td>***</td>
</tr>
<tr>
<td>Theoretical knowledge → Coherence</td>
<td>0.027</td>
<td>0.015</td>
<td>0.027</td>
<td>***</td>
</tr>
<tr>
<td>Practical skills → Coherence</td>
<td>0.026</td>
<td>0.015</td>
<td>0.027</td>
<td>***</td>
</tr>
<tr>
<td>Practical skills ↔ Theoretical knowledge</td>
<td>0.263</td>
<td>0.040</td>
<td>0.336</td>
<td>***</td>
</tr>
</tbody>
</table>

Fit indices: $\chi^2 = 14.3$, d.f. = 10 and $P = 0.159$; CFI = 0.988; RMSEA = 0.031 (90% CI, 0.000–0.065); SRMR = 0.025

<table>
<thead>
<tr>
<th>Model 2</th>
<th>Unst. Estimate</th>
<th>se</th>
<th>Std. Estimate</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical knowledge → Reflective skills</td>
<td>0.146</td>
<td>0.036</td>
<td>0.285</td>
<td>***</td>
</tr>
<tr>
<td>Practical skills → Reflective skills</td>
<td>0.170</td>
<td>0.037</td>
<td>0.344</td>
<td>***</td>
</tr>
<tr>
<td>Reflective skills → Coherence</td>
<td>0.096</td>
<td>0.037</td>
<td>0.344</td>
<td>***</td>
</tr>
<tr>
<td>Theoretical knowledge → Coherence</td>
<td>0.027</td>
<td>0.015</td>
<td>0.028</td>
<td>***</td>
</tr>
<tr>
<td>Practical skills ↔ Theoretical knowledge</td>
<td>0.262</td>
<td>0.040</td>
<td>0.336</td>
<td>***</td>
</tr>
</tbody>
</table>

Fit indices: $\chi^2 = 14.4$, d.f. = 11 and $P = 0.213$; CFI = 0.990; RMSEA = 0.026 (90% CI, 0.000–0.060); SRMR = 0.025

***$P < 0.001$, $n = 446$. Unst. Estimate, unstandardized estimate; se, standard error; Std. Estimate, standardized estimate; d.f., degrees of freedom; CFI, comparative fit index; RMSEA, root mean square error of approximation; CI, confidence interval; SRMR, standardized root mean square residual.

For all the observed items representing both professional competence and coherence between theory and practice, the mean values are at the upper end of the scale. On average, the students stated (with responses ranging from ‘a small extent’ to ‘a large extent’) that they acquired theoretical knowledge, practical skills and reflective skills during their initial nurses’ training and experienced coherence between the theoretical and practical components of their education. Only one statistically significant difference between men and women was detected in the mean scores for the observed variables. Women scored significantly ($P < 0.05$) higher than men on the ‘Ability to reflect on and assess one’s own work critically’ variable (means for females = 4.03 and for males = 3.78).

As shown in Table 2, statistically significant correlations exist between almost every observed variable. Based on the theoretical model, it is interesting to examine how reflective skills affect coherence, how theoretical knowledge and practical skills affect reflective skills and how theoretical knowledge and practical skills affect coherence.

In model 1 (see Figure 1 and Table 3), the latent variable, reflective skills, is hypothesized to have a direct effect (line with single arrowhead in Figure 1) on coherence (hypothesis 1) and to be affected by both practical skills (the first part of hypothesis 2) and theoretical knowledge (the first part of hypothesis 4), which imply that reflective skills act as a mediator between practical skills and theoretical knowledge on the one hand and coherence on the other (the latter parts of hypotheses 2 and 4). In addition, the model examines whether practical skills (hypothesis 3) and theoretical knowledge (hypothesis 5) directly affect coherence and whether a correlation exists between theoretical knowledge and practical skills (curved lines with two arrowheads in Figure 1).

The SEM analysis of model 1 shows that one of the estimates is not statistically significant and that, although the fit indices are good, model 1 has to be modified. Alternate models have been tested and only when the reflective skills variable is removed from the analysis does the regression between practical skills and coherence become statistically significant. This result indicates that practical skills might have an effect on coherence that is fully mediated through reflective skills. In model 2, the regression from practical skills to coherence in model 1 is removed.

Model 2 has good fit indices and all the estimated relationships are statistically significant, which gives support to hypotheses 1, 2, 4, 5 and 6, whereas hypothesis 3 is rejected. Figure 2 shows the standardized estimates of model 2. The explained variance in model 2 is 26% for both the reflective skills and coherence variables. The reflective skills variable is significantly affected by both the theoretical knowledge and practical skills variables. A level of theoretical knowledge that is one full standard deviation above the mean predicts a level of reflective skills at 0.29 above the mean, and a level of practical skills that is one full standard deviation above the mean predicts a level of reflective skills at 0.34 above the mean.

The results indicate that the reflective skills variable directly affects the coherence variable and acts as a mediator between both the practical skills and theoretical knowledge variables on the one hand and the coherence variable on the other.
A level of reflective skills that is one full standard deviation above the mean predicts a level of coherence at 0.43 above the mean. The theoretical knowledge variable has both a direct effect (0.15) and a mediated effect (0.12) on the coherence variable; therefore, a level of theoretical knowledge that is one full standard deviation above the mean predicts a level of coherence at 0.27 above the mean. The standardized mediated effect of practical skills on coherence through reflective skills is 0.15 standard deviations above the mean for every increase in practical skills that is one full standard deviation above the mean.

**Discussion**

The inadequacy of the psychometric properties represents a major limitation of this study. The items used in this study are not part of an already well-established measurement instrument and students’ learning outcomes are measured based only on their self-reported perceptions of acquired knowledge and skills. The concepts of theoretical knowledge and practical skills were each measured with only one item; therefore, measurement error cannot be ruled out. In addition, the results of the SEM analyses do not sufficiently provide evidence of relationships between the variables and should be considered tentative until replicated. Conducting a similar study in which several relevant items are used to represent these concepts would thus be of value.

The correlations between the variables indicate that acquired reflective skills, practical skills and theoretical knowledge in initial nursing education are closely linked (thus, corroborating hypothesis 6) and that all three are directly or indirectly related to perceiving coherence between the theoretical and practical components of the education programme. This finding is in line with Evans and Donnelly’s (2006) account of the non-static relationship between different kinds of professional competencies.

According to the SEM analysis, students’ acquired reflective skills directly affect their perceptions of coherence between the theoretical and practical components of their initial nursing education. In addition, the acquired reflective skills variable is affected by both the acquired practical skills and theoretical knowledge variables and act as a mediator between these variables on the one hand and the coherence variable on the other. These findings thus give support to hypotheses 1, 2 and 4. They also confirm earlier research suggesting that the reflective skills variable is a key factor in bridging the gap between theory and practice (Severinson 1998, Gustafsson & Fagerberg 2004, Peden-McAlpine et al. 2005) and that the development of appropriate conceptions of knowledge and reflective judgement in the theoretically oriented components of education, and the ability to be reflective in the practical components, is important (Kember et al. 2001). When reflection is connected to theoretical knowledge and practical skills, the implication is that nursing students need to acquire relevant theoretical knowledge and practical nursing skills upon which they can draw during nursing situations. Reflective thinking is therefore best understood not merely as a generic skill but rather as a skill that depends on the acquisition of relevant professional knowledge and experience.

Hypothesis 3, which states that acquired practical skills directly affect students’ perceptions of coherence, is not supported, whereas hypothesis 5, which states that acquired theoretical knowledge directly affects students’ perceptions of coherence, is confirmed by the results of the SEM analysis. Two approaches emphasize the importance of different kinds of competencies in professional education: One approach stresses practical experience and practical skill development (Benner 1984, Benner & Sutphen 2007, Benner et al. 2009) and the other highlights the binding role of theoretical knowledge (Jensen & Lahn 2005, Young 2008, Bonis 2009).

Although both approaches are supported by the confirmation of hypotheses 2 and 4, only the approach that highlights the binding role of theoretical knowledge is supported in terms of having a direct impact on perceiving coherence between theory and practice. The results indicate that possessing
practical skills has only a mediated effect on students’
perceptions of coherence, whereas possessing theoretical
knowledge has both significant direct and mediated effects
on students’ perceptions of coherence between theory and
practice.

Whereas earlier research has pointed out the
interdependency between different kinds of professional
competencies, few empirical studies have examined the
level of influence of practical skills and theoretical
knowledge on reflective skills.

What this paper adds

- Nursing students’ perception of acquired reflective skills
  and theoretical knowledge has a substantial impact on
  their perception of coherence between the theoretical
  and practical components of their initial nursing
  education.
- The acquired reflective skills of students are connected
to both acquired practical skills and theoretical
knowledge and act as a mediator between the students’
acquired practical skills and theoretical knowledge on
the one hand, and their perception of coherence on the
other.

Implications for practice and/or policy

- Emphasizing the development of nursing students’
reflective skills and facilitating their theoretical
understanding in initial nursing education might
enhance nursing students’ ability to perceive coherence
between theory and practice.

Conclusions

The findings indicate that reflective skills and theoretical
knowledge are key factors in recognizing coherence between
the theoretical and practical components of initial nursing
education and that the reflective skills variable is closely
connected to both the theoretical knowledge and practical
skills variables. The binding role of theoretical knowledge
and reflection as a way of bridging the gap between theory
and practice is emphasized in this study. The results thus
indicate that helping students develop reflective skills and
strengthening the theoretical parts of the nursing education
programme might be beneficial in promoting coherence
between theory and practice in initial nursing education.

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