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Identifying reasoning skills for the selection of undergraduate nursing students: a focus group study

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Abstract

Background: Reasoning is a cognitive skill crucial to making solid decisions. The assessment of reasoning skills in nursing student selection is studied scarcely.

Aim: To identify which reasoning skills should be assessed when selecting undergraduate nursing applicants.

Design: A qualitative descriptive design.

Methods: Four focus group interviews (n=25) were undertaken with nursing students (n=16) and experts (n=9). The Clinical Reasoning Model was used as a deductive framework for the main categories. Subcategories were formed inductively.

Results: All eight steps of the clinical reasoning process were deductively identified including 15 subcategories and representing reasoning skills in the selection phase: *Consider the situation, Collect cues and information, Process information, Identify the problem, Establish goals, Take action, Evaluate outcomes and Reflect on the process of action and new learning.* The beginning of the clinical reasoning process was emphasised most.

Conclusion: The assessment of applicants' reasoning skills should focus on the information processing skills.

Impact statement: This study identifies reasoning skills which should be considered in the assessment of nursing applicants.

Keywords: *focus group, undergraduate nursing students, reasoning, skills, student selection*

Introduction

Nursing student selection is a topic of much importance internationally, affecting many nursing applicants and higher education institutions on a yearly basis (MacDuff, Stephen & Taylor, 2016). Approximately 40 million new healthcare workers will be needed by 2030 (World Health Organization [WHO], 2016), but the nursing turnover rate is anticipated to rise simultaneously (WHO, 2013). New graduates face high stress and high demands on their capability for nursing practice, making adequate professional skills critical (Kuokkanen et al., 2016; Wu et al., 2012). These factors, as well as concerns about quality of care delivery (MacDuff et al., 2016) and academic failure (Dante et al., 2016), exert pressure on higher education institutions with fewer resources, to justify their student selection practices (Harner, 2014; MacDuff et al., 2016). Nursing schools have a responsibility to use valid and reliable admission tools in selecting the most suitable applicants. Currently, there are a variety of selection methods, but there is a lack of evidence about the relevant skills to be assessed. (Perkins, Burton, Dray & Elcock, 2013; Schmidt & MacWilliams, 2011.)

Thousands of applicants apply for a study place in nursing education each year (Talman, Hupli, Puukka, Leino-Kilpi & Haavisto, 2018). In Finland, there were 27 778 applicants for nursing education in 2018 (Vipunen – Education Statistics Finland, 2019). Nursing schools seek applicants capable of fulfilling competence requirements during their studies (WHO, 2009). However, nursing studies are complex (Harner, 2014), and undergraduate nursing students are required to become proficient in a relatively short time frame; three to four years of formal education. Therefore, learning skills (e.g. cognitive, academic or generic skills) which reflect the applicant's academic intelligence and cognitive readiness are needed in order to succeed both in theoretical (McNelis et al., 2010) and clinical (Timer & Clauson, 2011) studies. The language, communication and mathematical skills of nursing applicants have frequently comprised the learning skills assessed in admission processes (Herrera, 2012), whereas

reasoning skills have attracted less attention (Pitt, Powis, Levett-Jones & Hunter, 2015). However, admission processes should be able to select applicants with a wide scope of both academic and clinical aptitude (Talman et al., 2018; Timer & Clauson, 2011). More evidence is needed to identify the relevant reasoning skills of undergraduate nursing applicants.

Background

Reasoning is defined as a cognitive process directed toward forming conclusions, judgments or inferences from facts or premises (Webster's Dictionary, 1989). Several concepts have been used synonymously with reasoning to describe thinking skills, such as decision-making, problem-solving, clinical judgment and critical thinking. All these concepts include elements of both the thinking process and its outcome. However, reasoning specifically focuses on the thinking process preceding judgement, decision, problem-solving or action. In nursing, clinical reasoning refers to thinking strategies that professionals use in patient care. (Simmons, 2010.) Clinical reasoning is a complex cognitive process, facilitated by critical thinking (Alfaro-LeFevre, 2013), which uses formal and informal thinking strategies to gather and analyse (patient) information, evaluate the significance of this information and weigh alternative actions (Levett-Jones et al., 2010; Simmons, 2010).

Healthcare settings, characterised by enhanced use of technology and patients with multiple health problems, require from nurses not only psychomotor and affective skills, but also cognitive skills such as clinical reasoning (Levett-Jones et al., 2010; Simmons, 2010). The development of nursing students' clinical reasoning skills is a major goal of nursing education (Jessee & Tanner, 2016), and cognitive ability has been identified as one of the central competence areas among nursing students (Kajander-Unkuri, Salminen, Saarikoski, Suhonen & Leino-Kilpi, 2013). Clinical reasoning skills are important from the beginning of nursing studies, as students must engage in complex clinical decision-making in cognitively-demanding

environments (Finnish Institute of Occupational Health [FIOH], 2018; Levett-Jones et al., 2010). The assessment of cognitive skills at the student selection phase is essential for academic progress and the attainment of further qualifications (Perkins et al., 2013). Reasoning skills should take under consideration in the assessment of nursing applicants (Haavisto et al., 2019). Nursing applicants' reasoning skills have been measured in the student selection phase, with the attributes of critical thinking (measured by the Health Sciences Reasoning Test) indicating future success in theoretical studies (Pitt et al., 2015). Nursing schools use a variety of selection methods and admission criteria, such as previous academic achievement (measured by grade point average), standardised tests and other onsite selection methods such as interviews (MacDuff et al., 2016; Schmidt and MacWilliams, 2011). Many of these methods may be able to predict future academic success (often measured as nursing school grade point average) to some extent. However, the use of multiple methods creates inconsistency in the assessed skills, and the question of what exactly to assess remains. (Schmidt & MacWilliams, 2011; Taylor, MacDuff and Stephen, 2014.) Consequently, it is important to identify more specifically the relevant reasoning skills to be assessed in the selection of undergraduate nursing students in order to select applicants who will, with training, be capable of promoting safe health care.

Purpose and aim of the study

The purpose of this study is to identify which reasoning skills should be assessed in the selection of undergraduate (bachelor's-level) nursing students. The study aims to generate new evidence for the purpose of developing undergraduate nursing student selection practices.

Methods

Research design

A qualitative, descriptive study design using focus group interviews (Doody, Slevin & Taggart, 2013b) was applied in this study. The focus group interview was considered a suitable method to gather information about this relatively abstract and scarcely-studied topic.

Data collection

The data for this study was collected from four unstructured focus group interviews (n = 25); two with graduating (final year), bachelor-level nursing students (n = 16) and two with nursing experts (nurse educators, managers and researchers) (n = 9) in Finland (Doody et al., 2013b). The interviews were conducted in December 2017 and January 2018 to identify applicants' reasoning skills relevant to the student selection process. The informants were purposefully sampled. Contact persons from two universities of applied sciences gathered voluntary informants from graduating nursing groups. The expert groups comprised voluntary informants recruited from two organisations. The selected experts were assumed to provide relevant insight into the topic based on their expertise. The informants received an invitation to participate which included the relevant information about the purpose and aim of the study. The interview guide (Vaughn, Schumm & Sinagub, 1996) was piloted with suitable volunteers (i.e. students and professionals) to ensure the successful implementation of the interview (Table 1 near here). The pilot only tested the interview structure and the clarity of the interview question, thus the pilot interview results were not included in the final data. The interviews were conducted by one moderator (JV) in a meeting room at a convenient time for the informants (Doody et al., 2013b). The interview proceeded according to the interview guide. The moderator made notes and applied reflective listening during the interviews to ensure valid and rich data (Doody et al., 2013b). The interviews ranged from 60 to 75 minutes. All interviews were audio-taped and transcribed verbatim.

Data analysis

To analyse the data, the Clinical Reasoning Model by Levett-Jones et al. (2010) was used as a deductive framework to identify the main categories. Subcategories were formed inductively. A deductive approach is used when the structure of analysis is operationalised based on previous knowledge (Elo & Kyngäs, 2008). The Clinical Reasoning Model represents the clinical reasoning process as a progressive cycle wherein nurses collect cues, process the information, come to an understanding of a patient's problems, plan and implement interventions, evaluate outcomes and reflect and learn from the process. The Clinical Reasoning Model was chosen for the deductive analysis because it describes the reasoning process in a detailed manner creating a clear structure for the analysis. The model is a well-known framework and used in earlier studies (Theobald & Ramsbotham, 2019). Originally, the model was developed for educational purposes to enhance nursing students' ability to identify and manage clinically 'at-risk' patients (Levett-Jones et al., 2010). Although this is clearly not something to expect of undergraduate nursing applicants, their readiness and generic skills related to the clinical reasoning process may be measurable at the students' entry phase. Therefore, deductive content analysis with the chosen model was deemed a suitable approach to support the identification of relevant reasoning skills.

The analysis proceeded in three main phases. Firstly, one researcher (JV) read the transcripts to make sense of the data as a whole, conducting an initial open coding of the significant contents by writing notes and headings in the text while reading it (Elo & Kyngäs, 2008). Secondly, a structured categorisation matrix was created based on the deductive framework. The eight main steps (*Consider the situation, Collect cues and information, Process information, Identify the problem, Establish goals, Take action, Evaluate outcomes and Reflect on the process of action and new learning*) of the clinical reasoning process created the main categories of the categorisation matrix. Thirdly, original phrases were collected from the four interviews' data in the categorisation matrix, and these were condensed and coded more

precisely (modified, added or deleted) to correspond with the main categories and to create non-overlapping yet descriptive codes (Elo & Kyngäs, 2008). Finally, the codes were further synthesised into subcategories inductively. The subcategories were compared to the original descriptors of the clinical reasoning process (Levett-Jones et al., 2010) to ensure the categorisation of relevant skills under the appropriate main categories. The entire research group critically appraised the final analysis, and changes were made by consensus. The original interviews and analysis were conducted in Finnish. Data saturation was achieved (Doody et al., 2013b).

Ethics

Ethical approval was obtained from the Ethics Committee of the Higher Education Institution (11.9.2017). All four organisations involved gave their written permission for the study including the purposive participant selection. Signed, informed consent was obtained from each participant. Anonymity of the informants was ensured by storing the data carefully and deleting personal or identifying details from the transcripts and the study report.

Findings

Description of the informants

The study informants (graduating nursing students [n = 16] and nursing experts [n = 9]) completed a short questionnaire (Table 1) to provide their background information and self-assessed capability in the study topic. The students were 21–50 years old and mostly female (n = 15/16). Thirteen students self-assessed their capability in reasoning as ‘good’; one self-assessed as ‘moderate’ and for two, the information was not applicable. The nursing experts were mostly female (n = 8/9) and 35–58 years old. Each of the experts had over 10 years of experience in healthcare and most of them (n = 5) had participated in the organising and assessment of nursing student selection during the previous five years.

Main findings

All eight steps of the clinical reasoning process were deductively identified, resulting in the following main categories: *Consider the situation, Collect cues and information, Process information, Identify the problem, Establish goals, Take action, Evaluate outcomes and Reflect on the process of action and new learning* (Figure 1 near here). In addition, 15 subcategories were identified from the data inductively (Figure 1).

Step 1: Consider the situation

The clinical reasoning process starts with considering a situation by describing facts and context (Levett-Jones et al., 2010). In this study, the informants highlighted the importance of nursing applicants' readiness for clinical scenarios. Two subcategories were identified: *Defining the situation* and *Considering the whole situation* (Figure 1). *Defining the situation* was described as the ability to perceive a situation quickly and to understand what is happening.

'I would like to select those applicants who are able to look at things comprehensively. Those who are fast thinkers and who are ready for the situations, those that say "Hey, let's go."'
(E112)

Considering the whole situation includes an ability to perceive a situation from a comprehensive perspective.

'... that you could see the wood for the trees ... kind of the ability to perceive the situation as a whole...' (E111)

'... the ability to see the entities and how to handle them....' (S212)

Step 2: Collect cues and information

The second step of the clinical reasoning process involves information collection by reviewing current (patient) information, gathering new information and recalling knowledge. In addition

to collecting written information, assessing the patient and collecting cues is undertaken (Levett-Jones et al., 2010). The study informants found it important that nursing applicants be able to collect appropriate information by *gathering information* and by *gathering cues* (Figure 1). *Gathering information* includes the ability to gather written information from different sources.

'...that you are able to gather the information from many sources in many ways....' (E111)

Gathering cues includes the nursing applicants' ability to find and identify both visual and auditory cues besides the written cues.

'Nowadays, nursing applicants, often young, are surrounded by all kinds of visual materials. They should be able to gather the cues from the visual world as well. It is not only the written text, but also the visual cues....' (E211)

Step 3: Process information

Information processing is a crucial phase in clinical reasoning preceding decision-making. In this step, the collected information is analysed by interpreting, discriminating, relating and by making inferences (Levett-Jones et al., 2010). In this study, information processing skills formed the most-discussed of the main categories. Informants (n = 16/25) from all four focus groups recommended the evaluation of these skills in nursing student selection. Based on the interview data, four subcategories were identified (Figure 1).

Interpreting the information was described as an ability to analyse the collected information (including cues) in order to come to a primary understanding of the situation and the relevant data.

'Well, in the selection phase you cannot require factual-based information when one does not have it yet ... but somehow the readiness to think of the patient's best interest, that you've got the ability to interpret the situation....' (S117)

In *Discriminating the information*, the collected information is either selected or rejected. This subcategory includes the ability to prioritise and distinguish relevant from irrelevant information, the ability to narrow down the information to the most important aspects, the ability to recognise essential information from reliable sources and, finally, to recognise gaps in the information collected.

'... that you do not focus on the unessentials. You move on, so that you will not miss everything else.' (E113)

'... you understand if there is something missing and if you still need some information before you are able to make the decision....' (E215)

Synthesising the information consists of the ability to merge different data and match the information to different contexts and earlier or future situations.

'... that you are able to apply the information, that the information is not only relevant in the particular context, and you are able to apply it in similar scenarios....' (E111)

Making inferences was defined as being able to reason and infer deductively, based on the collected information and cues. The respondents considered it important that nursing applicants be able to consider consequences and to understand the causal relationship between a decision and its outcome.

'... the issues are not only separate issues, but you understand what it all means together....' (E211)

'... and then understanding the cause and the effect. That if I do x, then y is likely to happen.'
(S2I2)

Step 4: Identify the problem

After processing the collected information, clinical reasoning proceeds to decision-making by identifying a problem and making a nursing diagnosis (Levett-Jones et al., 2010). In this study, only one subcategory to this step, *Defining the problem*, was identified, comprising the nursing applicants' ability to make a decision, approach the problem and provide a conclusion.

'I find it important that you are able to deal with the problem. That if you start panicking, like, "Help, I need to make a decision", I would probably say that maybe this is not your field.'
(S1I1)

'The ability to finally make the decision, either good or bad....' (E1I1)

'And you come to a conclusion....' (E2H5)

Step 5: Establish goals

In the Clinical Reasoning Model (Levett-Jones et al., 2010), goals are established (i.e. what you want to happen, the desired outcome and timeframe) before putting the decision into action. Based on the interview data, two subcategories were found (Figure 1): *Planning actions* and *Finding the solution*. *Planning actions* was described as the nursing applicants' ability to set goals.

'... that you are able to set goals during the process, and you need to have a vision of the big picture....' (E1I3)

Finding the solution consists of an ability to consider several alternatives from innovative and different perspectives in problem-solving and finally selecting one, thus arriving at a solution:

'... that you are able to think if this is the only possible solution, or maybe you could consider another solution from a different perspective....' (S2I5)

Step 6: Take action

Taking action means selecting a course of action in practice based on the decision made (Levett-Jones et al., 2010). In this study, one subcategory, *Implementing the solution*, was identified and defined as nursing applicants' readiness to 'take action', especially in situations where time is limited for information-processing and decision-making.

'... you just have to do it. You must get the mindset that it is time to take action.' (S1I2)

Step 7: Evaluate outcomes

Nurses evaluate the effectiveness and outcomes of actions taken based on their decision (Levett-Jones et al., 2010). In this study, *Evaluate Outcomes* was the least-discussed main category. Only one subcategory, *Evaluating the decision*, was identified for this category.

'... that you are able to evaluate the decision....' (E1I4)

Step 8: Reflect on the process of action and new learning

'Reflection' in the Clinical Reasoning Model (Levett-Jones et al., 2010) means undertaking reflective thinking in action. The study informants pointed out two perspectives as regards reflection: *Reflecting on one's actions* is the ability to critically reflect on actions taken, and *Processing the feedback* is readiness to receive constructive feedback.

'It is extremely important to be able to analyse one's own actions and identify the mistakes as well.' (E1I3)

'... that you are able to receive criticism when your solution was not the best one, but you are ready to think of a new one.' (S2I5)

Discussion

Based on the findings of this study, all eight steps of the clinical reasoning process (Levett-Jones et al., 2010) were identified as relevant to the selection phase. The focus of the findings was primarily on the beginning of the clinical reasoning process (Steps 1–5), and particularly on information processing skills (Step 3). This finding suggests that the major focus in the assessment of nursing applicants' reasoning skills should be placed on information processing skills. The study informants emphasised the importance of nursing applicants' ability to not only identify essential information and cues, but also to use them to make decisions. Information processing skills are essential cognitive skills which should be demonstrable by the student selection phase so that they may best be developed in further studies. This finding reflects the increasing cognitive requirements of nursing, as nurses are now surrounded by an increasing amount of visual, written and auditory information and cues (FIOH, 2018).

In this study, the end of the clinical reasoning process (Steps 6–8) was less emphasised than the first five steps, which emerged repeatedly in the data. This may be due to the fact that the study informants only focused on the skills most relevant to student selection. In addition, reasoning is a cognitive process which specifically focuses on the thinking process preceding decision-making and action (Simmons, 2010; Webster's Dictionary, 1989). For example, Step 7 (*Evaluate the outcomes*) was not emphasised as important to student selection despite being a crucial phase in clinical scenarios, as nurses evaluate the outcomes of actions based on their decisions to detect whether the situation with the patient has improved (Levett-Jones et al., 2010). Nevertheless, the informants considered it important that nursing applicants be able to consider the consequences of their decisions as early as the information processing phase (Step 3). Regarding the final step of the clinical reasoning process (*Reflect on the process of action and new learning*), findings showed that nursing applicants' reasoning skills should include a readiness to receive constructive feedback. In the original clinical reasoning model, reflection

is focused solely on the learning process (Levett-Jones et al., 2010). Based on the findings of the present study, it is suggested that nursing applicants must have a readiness to build a strong, professional self-esteem and to be prepared to conduct self-assessment. According to established literature, graduating nursing students may overestimate their competence, thus developing self-assessment skills during the education process is important for further professional development (Kajander-Unkuri et al., 2014).

Nursing schools are currently challenged to critically appraise student selection practices (MacDuff et al., 2016). Admission methods should be valid and reliable (Perkins et al., 2013), and the content of assessment must be identified before developing a method. The findings of the present study should be acknowledged when developing admission criteria and selection practices, whatever the method used may be. Recent literature has recommended the assessment of both cognitive and non-cognitive skills in nursing student selection (Talman et al., 2018). Reasoning skills are needed both in theoretical and clinical studies (McNelis et al., 2010; Timer & Clauson, 2011). This supports this study's findings indicating the imperative to assess reasoning skills as part of the nursing student selection process. Furthermore, higher education institutions should have transparent admission policies specifying the student selection process and minimum acceptance criteria (WHO 2009).

For future study purposes, longitudinal designs with outcome measures reflecting students' clinical competence, for example in ethical decision-making, are recommended (Pitt, Powis, Levett-Jones & Hunter, 2014; Pitt et al., 2015). In addition, a more detailed operationalisation of the concepts is needed in order to measure reasoning skills.

Limitations

It was only possible to find nine expert informants. Due to the specific study topic, the amount of experts having knowledge both in clinical reasoning and student selection was limited. The

higher amount of experts may have provided a data more in-depth. However, the experts provided a comprehensive perspective to the study topic, having extensive experience in various fields of health care (research, education, management and clinical work). The use of students introduced non-expert knowledge to the data. Prior to the interview, the recruited students assessed their capability in reasoning as being lower than the highest possible option given. In the interview data, it was clear that the experts provided more in-depth data than the students. However, student input was deemed indispensable to the study, as their recent experience is relevant to the purpose of the research. The student informants were able to generate distinct data through group interaction, a primary goal of the chosen method of research for the study (Doody et al., 2013a). Only one researcher was used to conduct the interviews, leading to the possibility of bias in objectivity. However, the interview guide was developed and the analysis conducted by the entire research group for better balance and impartiality. Finally, the awareness of the original descriptors in the Clinical Reasoning Model (Levett-Jones et al., 2010) may limit the full conformability of the findings in the inductive analysis. Overall, however, the study findings have been deemed trustworthy and generalisable.

Impact of the study

Learning skills of nursing applicants have been assessed earlier but there is a great variation and inconsistency both in selection methods and in the assessed skills. This study identifies reasoning skills from the perspective of undergraduate student selection suggesting that these skills should be considered when assessing nursing applicants. The findings of the study may benefit higher education institutions to develop their current practices to be more evidence-based in selecting future professionals.

Conclusion

The findings of the current study support the assessment of reasoning skills as generic cognitive skills in the selection of undergraduate nursing students; such skills do not require any health care-related experience. All the steps of the clinical reasoning process were identified as relevant to the selection phase of admission to a nursing program. However, it is suggested that the assessment of nursing applicants' reasoning skills should focus on the beginning of the clinical reasoning process, namely the skills involving information processing. Future research should focus on the outcome measures of reasoning skills, both in theoretical and clinical settings. The research should target evidence, equality and cost-effectiveness in forming the best student selection practices.

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Table 1. Interview guide (Vaughn et al., 1996).

1. Introduction (including study purpose and aim)

2. Signing the informed consent

3. Filling the short background information questionnaire:

Students: age, estimated time of graduation, earlier education and self-assessed capability in reasoning.

Experts: age, working experience, education, professional field and participation to organising/assessment/development of nursing student selection.

4. A warm-up and clarification of the terms

5. Main question:

What reasoning skills should be assessed in nursing student selection?

6. A wrap-up and closing statements

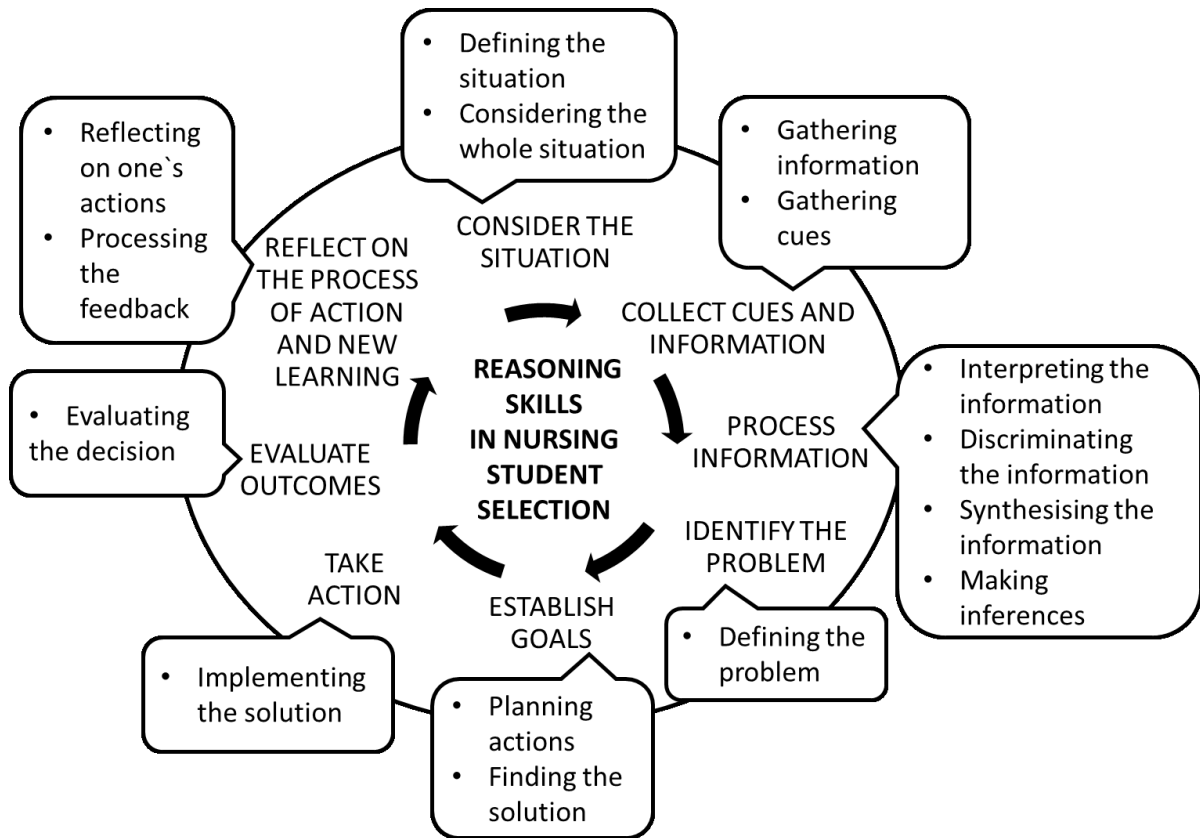


Figure 1. Identified reasoning skills in nursing student selection: Inductively-formed subcategories and deductively-formed main categories according to the Clinical Reasoning Model by Levett-Jones et al. (2010).