

# Current Knowledge Related to Intelligence and Thinking With Implications for the Development and Use of Case Studies

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**PURPOSE.** *This paper reviews current knowledge regarding intelligence and thinking, and relates this knowledge to learning to diagnose human responses and to select health outcomes and nursing interventions.*

**DATA SOURCES.** *Knowledge from relevant literature sources was summarized.*

**DATA SYNTHESIS.** *The provision of high-quality nursing care requires use of critical thinking with three elements of nursing care: nursing diagnosis, health outcomes, and nursing interventions. Metacognition (thinking about thinking) should be used with knowledge of the subject matter and repeated practice in using the knowledge. Because there are limited clinical opportunities to practice using metacognition and knowledge of these nursing care elements, case studies can be used to foster nurses' expertise.*

**CONCLUSIONS.** *Simulations of clinical cases are needed that illustrate application of the nursing knowledge represented in NANDA International, Nursing Outcomes Classification, and Nursing Interventions Classification.*

**IMPLICATIONS.** *The International Journal of Nursing Terminologies and Classifications will promote the dispersion of case studies as a means of facilitating the implementation and use of nursing languages and classifications.*

**Search terms:** *Case studies, critical thinking, health outcomes, intelligence, nursing diagnosis, nursing interventions*

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Scientists, philosophers, and others have been interested in human intelligence and the associated thinking processes since early Greece, when Plato compared human intelligence to blocks of wax, "differing in size, hardness, moisture and purity" (Cianciolo & Sternberg, 1998, p. 1). However, knowledge development related to intelligence and thinking has mainly occurred since the 1900s, and has been based on many different theories of intelligence and the related research to test these theories. The knowledge bases that have been generated by psychologists and cognitive scientists about human intelligence, how people think and how they learn to apply thinking processes in daily living, are used by scientists and professionals in other disciplines to guide members of the discipline in the development and effective use of thinking processes.

Nursing is a science and a professional discipline that requires efficient and effective thinking processes; thus, nurses use knowledge developed by psychologists and cognitive scientists to facilitate optimum thinking processes for quality-based nursing care. Three of the four elements of nursing care identified in the Nursing Minimum Data Set (Maas & Delaney, 2004) are nursing diagnoses, the health outcomes of individuals, families, and communities, and the nursing interventions to achieve these outcomes. Nursing knowledge related to these three elements are represented in the classifications of NANDA International (2007), the Nursing Outcomes Classification (NOC) (Moorhead, Johnson, Maas, & Swanson, 2008), and the Nursing Interventions Classification (NIC) (Bulechek, Butcher, & Dochterman, 2008).

In order to use the knowledge represented in NANDA International, NOC, and NIC, nurses need to

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use appropriate thinking processes for decision-making and problem-solving. For example, when nurses use NANDA International nursing diagnoses and see a person gasping instead of breathing quietly, they decide that the person is in respiratory distress. Problem-solving also occurs in diagnostic reasoning. The problem for nurses and the people who are recipients of nursing care is to identify the person's response to health problems and life processes for which nursing interventions are indicated, and to help this person achieve positive health outcomes (NANDA International, 2007). With the use of NOC, decision-making and problem-solving occur during selection with the consumer of the most appropriate outcome, indicators, baseline score, and outcome evaluation score. With use of the NIC, decision-making and problem-solving occur in the selection of the most appropriate interventions to achieve the identified outcome and the activities that are indicated for the specific individual, family, or community being served. The purpose of this paper is to review what is currently known about intelligence and thinking, and to explicate the relationship of this knowledge to the development and use of case studies for learning to use NANDA International nursing diagnoses, NOC, and NIC.

### **The Nature of Intelligence, Thinking, and Critical Thinking**

Scientific knowledge of what constitutes the nature of intelligence, thinking, and critical thinking has steadily evolved over hundreds of years, and significant progress has been made since the late 1900s (Cianciolo & Sternberg, 1998). Based on the findings of many research studies, some of the current beliefs about intelligence and thinking include the following (Cianciolo & Sternberg, 1998; Spellman & Willingham, 2004; Sternberg, 1997, 1999; Sternberg & Williams, 1998; Willingham, 2007a,b):

- All humans have intelligence and use thinking processes for daily functioning.

- Successful intelligence and thinking processes are needed for optimum functioning in human-environment interactions.
- There are many different types of thinking abilities (e.g., perceiving similarities and differences among objects), with many different theoretical perspectives that explain these abilities.
- Thinking abilities vary among people with similar backgrounds and experiences (i.e., in any group of people with similar education and experience, some people are better at specific kinds of thinking abilities than others).
- Certain kinds of thinking abilities are probably needed to deal with specific situations, but, for many types of situations, it is not yet known exactly what types of thinking abilities are needed.
- Thinking abilities are directly related to the person's content knowledge about the specific situation (e.g., being able to use thinking abilities to solve an algebraic problem is directly related to knowledge of algebra and how to solve algebraic problems).
- Human beings have the capacity to improve their thinking abilities.
- Thinking about thinking or metacognition is an important process to improve thinking abilities.
- To improve thinking abilities for specific types of thinking tasks, the person should integrate thinking about thinking with knowledge related to the thinking task.
- Critical thinking is a type of thinking needed for problem-solving and complex decision-making.
- Critical thinking is not an independent skill but one that develops in the context of domain knowledge (e.g., the domains of diabetes and self-management).
- Repeated experiences or practice with thinking as it relates to specific knowledge domains improves the ability to make decisions and problem solve in that domain.

### **Metacognition or Thinking About Thinking**

*Metacognition* is a word used to capture the idea that humans have the potential to think about their

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thinking (Pesut & Herman, 1999; Willingham, 2007a,b). People have the capacity to consider how well they are doing with specific types of thinking processes and how they can improve thinking processes; for example, they can evaluate their personal ability to be flexible in thinking and make efforts to increase thinking flexibility. Thus, thinking about thinking is expected to improve thinking abilities. However, to think about thinking, the concepts of thinking need to be known (for example, the definition of flexible thinking). Yet, there are many different perspectives in relation to thinking; therefore, in using metacognition, choices need to be made regarding which concepts are important. Because of the wide variety of perspectives on thinking and critical thinking, Scheffer and Rubenfeld (2000) conducted a Delphi study to identify the critical-thinking terms that were considered by nurse experts to be important for nursing practice. The findings from this study can provide a framework for nurses to think about their thinking as illustrated in Lunney (2001) and Rubenfeld and Scheffer (2006).

Studies with children led cognitive scientists to conclude that critical thinking is not a generic skill that can be improved by metacognition alone (Willingham, 2007b). Many programs to improve the critical thinking of children were initiated with only modest benefits, until it was found through further research that teaching critical thinking has positive effects on application only when it is associated with content knowledge and repeated practice with the specific types of thinking tasks. For nursing, association of metacognition with specific types of knowledge means that nurses and nursing students will be able to improve their abilities to use thinking processes only when they have previous knowledge about these topics and have opportunities for repeated practice in the use of this knowledge. This conclusion by cognitive scientists is consistent with previous research done in nursing (Benner, 1984), which showed that nursing expertise develops in relation to specific areas of knowledge and experience (i.e., repeated practice).

Numerous studies have shown that adults demonstrate wide variance in thinking abilities of all types (Gambrill, 2005; Sternberg, 1988, 1997; Willingham, 2007a,b). It is assumed that nurses also vary widely in thinking abilities. This assumption was validated in a study of 86 nurses with bachelor's degrees in nursing and 1 to 5 years' experience in which the nurses varied widely in the divergent thinking abilities of fluency, flexibility, and elaboration (Lunney, 1992a). *Fluency* is the ability to think of many units of information. *Flexibility* is the ability to mentally change from one category of information to another. *Elaboration* is the ability to identify many implications from a unit of information. Some nurses scored very high while others scored very low on fluency, flexibility, and elaboration. Just as with other adults and children, the thinking abilities of nurses can be improved through instruction and practice.

### Integration of Metacognition With Content Knowledge

Through continued research and theory development, cognitive scientists have concluded that, to be effective, metacognition must be integrated with content knowledge and repeated practice in using the content knowledge to solve specific types of problems (Willingham, 2007b). One of the reasons for this is that the problems related to any content, including nursing care, have surface structures and deep structures. The surface structure consists of data that would be obvious to most people, regardless of knowledge related to the topic. The deep structure consists of the hidden dimensions that become salient with content knowledge and experience in solving these types of problems. To effectively use thinking processes with the content knowledge in NANDA International, NOC, and NIC, nurses must recognize the deep structures of clinical cases. Recognition of these deep structures is expected to occur with content knowledge of diagnoses, outcomes, and interventions, as well as experience in thinking about these phenomena.

The content knowledge for nursing care differs for health promotion, health protection, and health restoration, and for the specific phenomena being addressed, such as sleep, pain, or nutrition. Content knowledge related to these three nursing care elements is available in the NANDA International, NOC, and NIC books, and in a variety of other books and journal articles.

The opportunities for repeated practice, however, to learn the deep structures of the associated content knowledge are limited in clinical settings. For this reason, simulations of clinical cases, such as written case studies, are needed for nurses and nursing students to attain the repeated practice experiences necessary to develop expertise in diagnosing human responses, and selecting health outcomes and nursing interventions.

### **Case Studies for Repeated Practice in Using Nursing Knowledge**

Case studies are simulations of individual, family, and community stories that can be written, video-taped, or computer-based (Lunney, 1992b). There are a variety of possible designs for case studies in terms of length, content, and style. The goal in developing case studies like a story is for other nurses to feel connected with persons in the story and to use thinking similar to that used in real situations when considering how to provide quality-based nursing care.

Case studies can be developed for practice, education, and research. There are many possible uses for case studies, as shown in the following examples. In practice, they can be used to orient new nurses to the types of patient cases that they will encounter or for discussion of complex case management. In education, instructors can use case studies as teaching aids, to test students' ability to apply content, or as student assignments. DeSanto-Madeya (2007) showed how student-developed case studies could be used to teach medical-surgical nursing. In research, case studies can be used to measure various phenomena;

for example, accuracy of nurses' diagnoses (Lunney, 1992a).

The advantages of developing case studies are that they (a) are standardized (i.e., each nurse who uses a case study receives the same data, and, if the directions are clearly written, the case studies are used in consistent ways); (b) represent important, usual, familiar, and challenging clinical situations; (c) restrict the complexity of practice, so that specific aspects of practice can be discussed, analyzed, or measured; (d) generate involvement by the user, almost as if it is a real clinical situation; and (e) the cost is relatively low. In contrast, real clinical situations are constantly changing and very complex; hence, it is difficult to capture the essence of what nurses want to teach or measure. Furthermore, opportunities to practice the use of content knowledge in real clinical situations are sometimes limited. Case studies can capture the elements of clinical stories that are important to discuss with other nurses.

The limitations of case studies are that they (a) do not represent all aspects of reality; (b) are not necessarily the best method for teaching, grading, training new nurses, or research measurement; and (c) cannot replace other methods of teaching, evaluating, and measuring. In actual clinical situations, which involve the interactions of consumers and health providers, there is constant change within the individuals involved as well as in the interactions among the individuals; thus, it is impossible to completely capture actual clinical situations through any type of language (Hayakawa & Hayakawa, 1990). In talking or writing about clinical situations, nurses are abstracting the key points of the situation for specific purposes.

Good case studies are difficult to develop because they are tools or instruments that are used as measures of nursing phenomena. To develop good case studies, the principles of measurement (i.e., validity and reliability) should be used as described in Waltz, Strickland and Lenz (2005). At the very least, case studies should have face validity; that is, nurses with similar education and experience would agree that the case study represents what it was developed to

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represent. Case studies developed as research tools or for decisions such as a course grade require that validity and reliability studies are completed before they are used. Case studies are difficult to develop, take time, energy, and commitment, and cannot be done without considerable thought and effort.

As tools, the goal of case study development is to strengthen the link between knowledge and application. Nurses learn about various abstract concepts, such as hope, self-management, and caregiver stress, but these concepts are difficult to apply. With case studies, nurses can operationalize these abstract concepts through the stories of "real" individuals, families, and communities. Development and use of good case studies enables educators, practitioners, and researchers to simulate real applications of nursing concepts.

### Summary

Based on the findings of cognitive scientists that critical thinking only improves when metacognition is combined with knowledge and repeated practice, it is concluded that case studies are needed to give nurses repeated practice in learning how to diagnose and to select health outcomes and nursing interventions. Case studies are efficient, effective, and practical tools to help nursing students and nurses who are inexperienced with using nursing diagnosis in practice to learn to think like diagnosticians and to apply relevant nursing knowledge. When nurses think about the habits of mind and cognitive skills (Scheffer & Rubinfeld, 2000) as they relate to case studies, it helps them to fulfill the goal of nursing to work collaboratively with healthcare consumers for the promotion and protection of health and the management of acute and chronic problems. Because case studies offer an insightful, facilitative approach to the implementation of nursing languages, it is appropriate that they appear in journals and other materials focused on nursing languages and classifications.

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### References

- Benner, P. (1984). *From novice to expert: Excellence and power in clinical nursing practice*. Menlo Park, CA: Addison-Wesley.
- Bulechek, G. M., Butcher, H. K., & Dochterman, J. M. (Eds.) (2008). *Nursing interventions classification (NIC)* (5th ed.). St. Louis, MO: Mosby.
- Cianciolo, A., & Sternberg, R. J. (1998). *Intelligence: A brief history*. Oxford, UK: Blackwell.
- DeSanto-Madeya, S. (2007). Using case studies on a conceptual model to teach medical-surgical nursing. *Nursing Science Quarterly*, 20, 324–329.
- Gambrill, E. (2005). *Critical thinking in clinical practice: Improving the quality of judgments and decisions* (2nd ed.). Hoboken, NJ: John Wiley & Sons.
- Hayakawa, S. I., & Hayakawa, A. R. (1990). *Language in thought and action* (5th ed.). San Diego, CA: Harcourt Brace and Co.
- Lunney, M. (1992a). Divergent productive thinking and accuracy of nursing diagnoses. *Research in Nursing & Health*, 15, 303–311.
- Lunney, M. (1992b). Development of written case studies as simulations of diagnosis in nursing. *Nursing Diagnosis*, 3(1), 23–29.
- Lunney, M. (2001). *Critical thinking and nursing diagnosis: Case studies and analyses*. Philadelphia: NANDA International.
- Maas, M. L., & Delaney, C. (2004). Nursing process outcome linkage research: Current status and health policy implications. *Medical Care*, 42(2 Suppl.), II40–48.
- Moorhead, S., Johnson, M., Maas, M. L., & Swanson, E. (Eds.) (2008). *Nursing Outcomes Classification (NOC)* (4th ed.). St. Louis, MO: Mosby.
- NANDA International. (2007). *Nursing diagnoses: Definitions and classification, 2007–2008*. Philadelphia: Author.
- Pesut, D. J., & Herman, J. A. (1999). *Clinical reasoning: The art & science of critical & creative thinking*. Albany, NY: Delmar.
- Rubinfeld, M. G., & Scheffer, B. K. (2006). *Critical thinking TACTICS for nurses*. Boston: Jones & Bartlett.
- Scheffer, B. K., & Rubinfeld, M. G. (2000). A consensus statement on critical thinking. *Journal of Nursing Education*, 39, 352–359.
- Spellman, B. A., & Willingham, D. T. (Eds.) (2004). *Current directions in cognitive science*. New York: Prentice Hall.
- Sternberg, R. J. (1988). *The triarchic mind: A new theory of human intelligence*. New York: Penguin Books.
- Sternberg, R. J. (1997). *Successful intelligence: How practical and creative intelligence determine success in life*. New York: Plume Books.
- Sternberg, R. J. (1999). The theory of successful intelligence. *Review of General Psychology*, 3, 292–316.
- Sternberg, R. J., & Williams, W. M. (1998). *Intelligence, instruction and assessment: Theory into practice*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Waltz, C. F., Strickland, O. L., & Lenz, E. R. (2005). *Measurement in nursing and health research* (3rd ed.). New York: Springer.
- Willingham, D. T. (2007a). *Cognition: The thinking animal* (3rd ed.). New York: Prentice Hall.
- Willingham, D. T. (2007b). Critical thinking: Why is it so hard to teach? *American Educator*, 31(2), 8–19.