Assessing the CRITICAL THINKING SKILLS of Faculty: *What Do the Findings Mean for Nursing Education?*

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While there is agreement that a relationship among nursing education, clinical practice, and critical thinking exists, the exact nature of that relationship is unclear (1-3). WHAT IS CLEAR IS that advanced cognitive skills are needed to manage complex encounters in today's health care environment (4,5). Some of the qualities identified as necessary to critical thinking include the ability to engage in reflective thinking, use metacognitive strategies, and apply the nursing process (1). • If critical thinking (CT) skills are needed in practice, it seems reasonable to suggest that education is responsible for providing them. HOWEVER, the amount of time and experience needed to facilitate the transition from being inclined to thinking critically and actually having the skill suggests that a combination of education that encourages CT, work experience, and mentoring may be the essential ingredients in its development (1,6).

ABSTRACT The purpose of this study was twofold: to determine the critical thinking skills of nurse faculty and to examine the relationship between epistemological position and critical thinking. Most participants reported having no education on critical thinking. Data were collected using the California Critical Thinking Skills Test (CCTST) and the Learning Environment Preferences (LEP). Findings from the CCTST indicated that faculty varied considerably in their ability to think critically; LEP findings suggested that participants had not reached the intellectual level needed for critical thinking. In addition, 12 faculty participated in one-hour telephone interviews in which they described experiences in which students demonstrated critical thinking. Despite a lack of clarity on the definition of critical thinking, faculty described clinical examples where students engaged in analysis, inference, and evaluation. Based on these findings, it is recommended that faculty transfer their ability to engage students in critical thinking in the clinical setting to the classroom setting. Benchmarks can be established based on the ability of faculty to engage in critical thinking.

The epistemological position of the individual has been proposed as a possible answer to equivocal results on standardized CT measures (1,5,7-9). While critical thinking refers to the ability to engage in the specific skills of analysis, inference, evaluation, and inductive and deductive reasoning (10), epistemology refers to one's understanding of knowledge as either static and absolute or relative and situational (11). Individuals who view knowledge as absolute and dualistic are generally unable to think critically. Seeking the right answer, they are unable to engage in the process of identifying alternative solutions. In contrast, individuals who view knowledge as relative and situational are able to think on more than one level, which correlates with critical thinking. It is possible that one's epistemological position changes as a result of education. While the foundation for CT is established during one's education, actual CT skills develop through experience.

The literature suggests that a direct relationship exists between the ability of students to engage in CT and the types of questions posed by faculty (12). In clinical settings, students are primarily asked questions consistent with lower cognitive levels rather than the higher levels reflective of CT; their tendency is to respond at the same cognitive

level as the question. Given Duldt's (13) proposal that current faculty members are products of an educational system that did not teach CT, it is logical to question the ability of nurse faculty to assist students with the development of CT skills.

This article reports on a study based on two assumptions: 1) there is a relationship between the CT skills of nurse faculty and student achievement of CT, and 2) the epistemological position of an individual is related to the ability to think critically. Thus, this study was designed to 1) determine the CT skills of nurse faculty, 2) establish a benchmark of performance for CT skills in nursing students, and 3) examine the relationship between epistemological position and CT skills of faculty.

Review of the Literature Fundamental to any discussion is the need for agreement on a definition. In one study, 37 percent of nurse faculty identified CT as a process of linear problem solving; 18.5 percent identified reflection as a component of CT; and 14.3 percent recognized the importance of the affective/attitudinal dimension to CT (14). Despite the identification of an accepted multidisciplinary definition of CT, nursing continues to seek a discipline-specific definition. However, if CT is a metacognitive process unrelated to a particular knowledge domain, it seems reasonable to question the understanding of CT on the part of nurse faculty (10,15,16).

Researchers propose that the ability to contextualize opens an individual to alternative ways of thinking and fosters the ability to engage in the critical reflection required for critical thinking (16-20). While the ability to solve problems and make decisions in a context-specific situation is a requirement of graduate nurses, many faculty continue to rely on teaching methods that foster rote memorization of facts rather than the process of thinking (13,21-23).

Despite the use of program-specific definitions for CT, 79.7 percent of undergraduate nursing programs and 83.3 percent of graduate programs use standardized assessments to measure outcomes. Most use the California Critical Thinking Skills Test (CCTST), the California Critical Thinking Disposition Inventory (CCTDI), or the Watson-Glaser Critical Thinking Appraisal (WGCTA) (1,14,24-26). Results of student achievement are equivocal at best, with reports of increases, decreases, or no change in student performance over time (2,26-32). These results lead to several questions:

- Are programs using instruments to measure CT that are inconsistent with the program's definition?
- Is CT misunderstood by faculty?
- Are nonscientific benchmarks of CT success being used?
- Is teaching focused toward covering content rather the process of CT? (33).

The ability of faculty to think critically has been questioned (22,34). Consistent with this concern is the suggestion that faculty members continue to use instructional methods antithetical to developing CT skills in students. They teach too much content in too short a period of time (22,33,35), and, rather than engaging students in the learning process, they focus on the transmission of knowledge (21,36-38). The use of teaching methods that have not been found to increase CT ability leads to the question of how versed faculty are in the process of developing critical thinkers.

According to Jones (39), problem solving is commonly associated with the science disciplines, and CT is associated with the behavioral disciplines. A review of student portfolios demonstrated that rather than giving creative writing assignments, which have been found to foster CT, faculty have predominantly focused assignments on developing expertise in scientific writing (40). Thus, the problems associated with measuring CT may actually be discipline based, which explains the equivocal results found with standard assessments and suggests the need to develop a discipline-specific level of achievement or benchmark for these instruments.

Studies support a positive relationship between cognitive development and CT ability (5,8,27,41). Cognitive development has been identified as a precursor to the ability to develop CT abilities. According to Perry (11), it is a process of moving from a dualistic mode of thinking to one that incorporates multiplicity and contextualism. If the ability to contextualize is a component of CT, then the epistemological position is integral in determining readiness to engage in CT. Neither the WGCTA, CCTST, nor the CCTDI measures the epistemological position.

Methodology INSTRUMENTS A descriptive correlation design was used to achieve the goals of the study. Data triangulation through the use of quantitative and qualitative methods was used to strengthen the findings. The CCTST was chosen to measure the CT skills of faculty because it is based on a nationally accepted, interdisciplinary definition of CT that includes analysis, inference, evaluation, and inductive and deductive reasoning (10,42). This instrument was also recently developed. The Learning Environment Preference (LEP), which assesses an individual's learning environment preference as an indication of epistemological position (43), was selected because of its focus on components of the educational process and ease of completion.

The CCTST is a 34-item multiple-choice instrument that measures CT ability. Reliability was established with a Kuder Richardson value of 0.68 to 0.75 (10). Content, construct, and criterion validity were also established. The CCTST reliability coefficient for this study was 0.86. Completed instruments were scored by Insight Assessment, which reported results as a total score indicative of overall CT ability and a

separate score for each of five subscales: analysis, evaluation, inference, deductive reasoning, and inductive reasoning. Results were then compared to the results of a comparable aggregate sample.

The LEP has 65 items categorized into five domains: course content/view of learning, role of instructor, role of student/peers, classroom atmosphere/activities, and evaluation procedures. Faculty were asked to respond to a series of items using a four-point Likert scale ranging from not at all significant to very significant. Criterion group reference and concurrent and construct validity were established. Cronbach's alpha for each domain in the instrument ranges from 0.63 to 0.84 (43). Overall reliability for this study is 0.79. Completed instruments were scored by the Center for Intellectual Development. Scores were reported as the Cognitive Complexity Index (CCI); this value was used to determine the epistemological position of an individual (range: Positions 2-5, with Position 5 indicative of CT). (See Table 1.)

Nearly all interviewees noted that their examples involved students who were not in the upper academic ranks. Rather, these were typically B or C students academically and A students clinically.

A demographic questionnaire was developed by the researchers. In addition to items such as age, gender, and years of experience, faculty were asked to identify whether or not they had any formal or informal education in CT. The scored results from the LEP and CCTST and the results from the demographic questionnaire were analyzed.

The investigators also conducted telephone interviews with faculty who volunteered to share their experiences and describe either a classroom or clinical incident that reflected a student's use of CT. Interviews lasted approximately 60 minutes and were audiotaped and transcribed verbatim by the investigators.

SAMPLE A randomized national sample of 300 full-time nurse faculty from National League for Nursing member schools was targeted. All types of nursing education programs (excluding doctorate) were included. Five packets were sent to the director or chair of a random sample of 60 schools of nursing. Each packet contained the CCTST, LEP, the demographic questionnaire, a return envelope, and a response card indicating a willingness to be interviewed. A low response rate prompted the investigators to mail additional packets to a convenience sample of 50 schools; these were not restricted to NLN member schools.

To minimize bias, faculty were excluded from the study if they had completed the CCTST or the LEP in the past or if they had direct responsibility for administering these instruments to students as part of a nursing program outcomes assessment. Thirty-seven instruments were completed, representing a response rate of 12 percent.

The mean age of respondents was 50.66 years (SD = 6.61); 75 percent were female. The majority (78.4 percent) reported having no formal or informal education in CT; 18.9 percent reported attending some educational program on the topic. Most faculty (81.1 percent) had dual responsibility for both classroom and clinical instruction; only 2.7 percent reported teaching exclusively in the classroom or clinical setting. A combined faculty/clinician or faculty/administration role was reported by 2.7 percent and 8.1 percent of respondents, respectively. Respondents reported teaching in three types of programs: diploma/associate, 32.4 percent; baccalaureate, 43.2 percent; and master's, 21.6 percent. Where more than one program was indicated, the highest degree is reported. A mean of 14.47 years (SD = 9.62) teaching experience was reported, with a mean of 12 years (SD = 8.8) in undergraduate education and two years (SD = 3.34) in graduate education.

Findings CCTST Analysis of the data indicated some variability in the CT ability of faculty. The reported mean total score of 19.14 (SD = 6.76) was compared with mean total scores of two norm groups of students, one enrolled in a four-year college and one enrolled in a graduate nursing program. The latter group was tested using a different but statistically comparable version of the CCTST. (See Table 2.)

Study data were examined for existing correlations among scores for the total CCTST and the subscales. In the study sample, there was no correlation between the analysis score and the remaining subscale scores. Strong, positive correlations were found between the total score and the inference, evaluation, induction, and deduction subscales. (See Table 3.)

The data were then analyzed for correlations between the CCTST and the demographic questionnaire. A low, negative correlation was found between age and the evaluation subscale ($r = -.289$, $p < .04$).

LEP Analysis of the LEP data indicates that no faculty viewed knowledge as absolute or dualistic as indicated by Positions 1 through 3. However, no faculty achieved Position 5, which is indicative of critical thinking. The CCI (total LEP) mean score for the entire sample was 395.41 (SD = 28.70), indicating Position 4. Table 4 indicates the total CCI and percentage of faculty within each epistemological position.

The LEP results were then compared to the demographic questionnaire. Negative correlations were found between Position 3 and years of graduate teaching ($r = -.389$, $p < .01$) and Position 4 and having an education in CT ($r = -.292$, $p < .04$).

Table 1.

Description of Learning Environment Preferences (LEP) Positions and Cognitive Complexity Index (CCI) Score

POSITION	EXPLANATION	CCI SCORE
Position 1	Theoretical position	Not measured
Position 2	Absolute or dualistic thinkers; only one right answer	200–240
Position 2/3	Transition	241–284
Position 3	Early multiplicity; alternative views accepted in particular situation, i.e., a class	285–328
Position 3/4	Transition	329–372
Position 4	Late multiplicity; beginning to see multiple views in other situations, i.e., other classes	373–416
Position 4/5	Transition	417–460
Position 5	Relational knowing and critical thinking; relativism accepted as way of viewing/analyzing information	461–500

Table 2.

Comparison of California Critical Thinking Skills Test Sample Mean Scores and Norm Mean Scores

VARIABLE	NORM MEAN (SD) FOUR-YEAR COLLEGE	SAMPLE MEAN (SD)	NORM MEAN (SD) GRADUATE NURSING STUDENTS
Total score	16.8 (5.06)	19.14 (6.76)	19.01 (5.08)
Analysis	4.43 (1.4)	4.78 (1.87)	subscale scores unavailable
Inference	7.84 (2.6)	8.97 (3.39)	
Evaluation	4.51 (2.1)	5.37 (2.47)	
Induction	9.52 (2.8)	11.08 (3.75)	
Deduction	7.27 (2.8)	8.05 (3.39)	

Note. *Insight Assessment reported that 2002-2003 normative data were reported with study data.*

For California Critical Thinking Skills Test sample mean scores, see (10).

Table 3. Correlation Matrix for CCTST Subscales

	TOTAL	ANALYSIS	INFERENCE	EVALUATION	INDUCTION	DEDUCTION
Total						
Analysis						
Inference	.817*					
Evaluation	.727*					
Induction	.801*		.519**	.697*		
Deduction	.900*		.835*	.527**	.461***	

Legend: *p <.000; **p <.01; ***p <.002

Table 4. Faculty Epistemological Position Using Learning Environment Preferences (LEP)

POSITION	CCI	N	PERCENT
2	200-240		0
2/3	241-284		0
3	285-328		0
3/4	329-372	8	21.6
4	373-416	20	54.1
4/5	417-460	9	24.3
5	461-500		0

COMPARISON OF CCTST AND LEP No correlation was found between the total CCTST and the CCI. Since the originators of the instruments recommend using total scores for analysis purposes, no other comparative data are reported (10,43).

ANALYSIS OF THE NARRATIVE DATA Twelve interviews were conducted with faculty who provided a clinical or classroom example of a student's use of CT. Narrative data were analyzed to determine the subjects' understanding of CT and to identify examples of three a priori categories of CT: analysis, evaluation, and inference. According to Facione and colleagues (10), the sum of these subscale scores equals the total CCTST score. (See Table 5 for definitions.)

Table 5. Definition of the CCTST Subscales Used in the Analysis of the Narrative Data

ANALYSIS

- To comprehend and express the meaning or significance of a wide variety of experiences, data, or events, with the ability to categorize, interpret significance, or clarify meaning
- To identify inferential relationships, with the ability to examine ideas, detect arguments, and analyze arguments into their component parts

EVALUATION

- To assess the credibility of statements or other representations
- To assess the strength of actual or intended inferential relationships, with the ability to assess claims and arguments
- To state the results of or justify one's reasoning in terms of criteria, context, or evidence

INFERENCE

- To identify and secure elements needed to draw conclusions
- To form conjectures and hypotheses
- To consider relevant information and elicit consequences flowing from the data, with the ability to query evidence, conjecture alternatives, and draw conclusions

Note. *Adapted from the definitions provided by Insight Assessment on the CCTST 2000 Interpretation Document*

Each of the investigators analyzed the interview transcripts independently for examples that demonstrated recognition of analysis, evaluation, and inference and other common themes that emerged from the data. Consensus on the meaning and interpretation of the data was achieved through discussion. Most faculty examples of analysis, evaluation, and inference came from the clinical area; only three faculty provided examples that occurred in the classroom.

The interview subjects provided many unique descriptions of CT, for example, "I would say that critical thinking is seeing beyond the 1 plus 1…that they are putting 2 and 2 together and are coming up [with] 5 because they [see beyond the 1+1]." Another described CT as "taking those leaps that are logical but nobody tells you what to do, you have to figure it out for yourself without being taught step by step." The interviewees acknowledged that there is a lack of understanding surrounding the concept: "It's a buzzword….I ask somebody to define it and they can't."

Some indicated that they viewed CT and problem solving as synonymous: "I think you [have to point out] this is problem solving because they do not know when they are problem solving or doing critical thinking." One example involved a patient with diabetes: "[his] blood sugar was 90 at 7 am and I gave him his usual dose [of insulin]. But he didn't eat any breakfast because he felt nauseated. So at 11 am, I have to keep an eye on him." Because this activity involved nothing more than knowing the side effect of insulin, the investigators interpreted it as an example of problem solving rather than CT.

One faculty member differentiated between problem solving and CT:

"Problem solving is much more narrow in focus [than critical thinking]. If a student who solves a problem of patient [dietary] needs, for instance — they need diet education on how to be on a low-salt diet — [if they provided the education] they solved a problem. The critical thinker goes on to [teach about] buying your groceries, reading labels, eating at restaurants…and you can have multiple problems and solve each one individually. The critical thinker puts all those problems together and solves [each of the] problems, then goes on to see how the problems interact with each other and how we can prevent those from occurring again."

Some faculty had other interpretations of CT, as in, "Critical thinking is how you structure your day, am I going to do this first or that first," or, "They are starting to put together chronic diseases." Walthew (44) also found a variety of dissimilar definitions of CT among nurse faculty, with some seeing it as a linear process and others as a more creative, "curvilinear" process.

Faculty identified noncritical thinkers as students who "are still doing the step-by-step thinking without being able to look at what is not in the immediate procedure or the books," "can't move beyond, it's like every step is isolated by itself," "[they are] very black and white, very concrete thinkers." Some provided a succinct differentiation of CT versus noncritical thinking, where "problem solving [is] much more linear and finite….critical thinking is more, life changing…involves more synthesis and listening…it's bigger…more information…bringing themselves into it…."

One particularly descriptive example shows the complexity of the integrative process that represents critical thinking:

"The students are pulling on things they learned as freshmen and sophomores, sort of common sense things they might know. They're bringing all of these pieces of information in to make clinical decisions. They're looking at the patient beyond the hospital bed. What's going on in their home life, their community life, what's their support system like.

The students I think who are critically thinking and not just about getting this person better now, but about keeping them better….The best students are asking the question about cancer screening…when this person is not here for cancer. They're asking about other health-related issues. So they're pulling those things [together]. What fits into this puzzle versus what might not fit into this puzzle. The critical thinkers are the ones who are taking all those things into account, how the patient can be, how their health can be once they are out of the hospital room. The people who are non-critical thinkers are the ones who just see this patient, in this bed, in this room, right now."

Despite confusion surrounding the understanding of CT, there is evidence that faculty recognized when higher order cognitive skills associated with CT were being used. Using phrases such as, "not looking at the basic information but beyond," "we want the students to be thinking, asking question," "learn for learning sake…are just intrinsically more inquisitive," indicates that faculty recognized that critical thinking represents a different process from rote learning. The student engaged in CT is described as "excited," "intense," or one who "gets that look in her eye, like I'm not going to let this one go." This is the student who "looks off to the side, and you can tell she is trying to process something."

Students who are not thinking critically are also recognized by their outward behavior: "They try to look like they're listening, but you know they're not." "You can't get them off the tasks they did that day." They seem "unable to make the connections." These descriptions suggests that even if faculty were unable to define CT, they recognized when something unique was happening with the students' cognitive processing.

ANALYSIS The ability to examine multiple datasets and identify the individual pieces of data that lead to a relevant conclusion is indicative of analysis. Faculty were able to identify examples of analysis in clinical situations as the beginning stages of CT requiring faculty assistance: "and then we looked at the labs and we looked at that kind of data." This account of a student experience with a postoperative patient is a more advanced example of analysis:

"And I can say, 'Have they voided?' and [the student] says, 'No, they have not. But they only had 600 cc in the OR; they have been NPO since midnight; they told me they usually drink a lot of water, usually 6 or 7 glasses of water by this time. I can cath them…but they have not been drinking much. I think it would be a good idea if we did a bladder scan.' And I think good, …they (the students) are putting together all that has gone on today without me telling them."

Walthew (44), who supports the significance of analysis in the delivery of nursing care, also found that faculty acknowledge the importance of integrating multiple datasets with theoretical and clinical knowledge.

EVALUATION Evaluation involves the ability to examine context, criteria, and evidence in justifying results and looking at a situation in its entirety before drawing conclusions. Basketball was used as a metaphor to describe this component of CT: "I think of people who play the point guard position in basketball. The point guard isn't the one who does everything themselves. He sees the whole floor. He can dish the ball to the person who is open or who is hot shooting… [Nurses] are the ones who kind of see the whole picture…"

Evaluation is demonstrated in this account of a student's being asked to translate for an African patient: "The student was African [and] there was a patient on another floor. They said we can't understand a word he says. We can't do a thing with him. And they wanted her to translate, because he was African too. She comes back and said the man spoke English. English was his first language. But because of his accent and dialect, no one had paid enough attention to know that he was speaking English."

Another student, assigned to a patient with diabetes, demonstrated the ability to assess the credibility of statements and intended relationships:

"A male who was diabetic who had foot ulcers. The docs and all the nurses called him noncompliant and they called him all sorts of other not nice things…I talked to him a little bit about what they heard in report…And he came out a little bit later and he said to me, 'Can I talk to you about something?' …And he [the student] said that nobody had known that he [the patient] worked night duty for 14 years and nobody had ever talked to him about how to schedule his insulin and his eating in relation to his work schedule and night duty."

INFERENCE Inference is the ability to draw conclusions or create hypotheses from the data. The essence of inference is captured in this description: "Relevance is probably one of the most essential aspects of it…As the critical thinking becomes more sophisticated, what we are doing is pulling together relevant information and putting together a unique formulation out of relevant information from a unique situation…So when you're thinking critically, you're pulling together formulations or conclusions from the relevant data."

Several faculty provided examples of inference in their clinical examples. A particularly eloquent example of inferential relationships among data involves a student caring for a patient hospitalized with a DVT who is scheduled to be discharged:

"And the patient said, 'I feel worse than I did yesterday. And the student said, 'Tell me more about that'…the woman said 'I don't really know what it is, it's nothing really specific. But I don't feel as good as I did yesterday.' So the student came out and got the BP cuff and pulse ox and took the woman's vitals…they were all normal…however…her pulse ox was 92 percent. This student had done her vitals earlier and her pulse ox was 99 percent. So she came out and said 'she's getting ready to go home, she's all ready, she's all packed, she has this complaint. It's real vague, no rales. She doesn't really have anything going on. But I have a funny feeling about her. Her pulse ox is 92 percent. It's normal, I know it's normal. It's in that normal range. It was 99 percent earlier so

I'm a little concerned.' By the time she got to scan she was significantly short of breath. It happened in about 10 minutes…and she ended up having a very large pulmonary emboli.…that's an example of using critical thinking skills and not taking things for what they might represent on paper but what they represent in the big picture."

The role of faculty in helping students develop CT was described as being "beyond giving information" and being "a guide to help them." Most of the interview subjects acknowledged the role of the student-teacher relationship in establishing an environment where students can risk asking questions or issuing a challenge: "How can we expect them to think critically if they're not encouraged to ask questions. I think it's threatening to faculty." "Students feel it's safe to take risks when [we assume] the role of the expert learner. And not put [our]selves above the students but kind of beside them…and help them understand that we're not going to know all the answers but we're going to learn from [each other]." This is consistent with the implementation of student-centered paradigms, such as Narrative Pedagogy (7).

Nearly all interviewees noted that their examples involved students who were not in the upper academic ranks. Rather, these were typically B or C students academically and A students clinically. This phenomenon was captured succinctly: "I guess I have to say that the person who is like your average person, they sometimes are able to think more critically…it's just that they struggle when it comes to academics…because they may not always have that right answer because they look beyond or look at things more globally."

Discussion The mean score on the CCTST indicates that most faculty are considerably more skilled at CT than the typical senior in a four-year college; 70 percent achieved a total score greater than 19. The standard deviation indicates that while some in the sample may be very skilled, others may not be at all skilled at CT. In contrast, when compared to students enrolled in a graduate nursing program (10), the mean scores are similar, leading to several possible conclusions. 1) CT is a process that occurs over time and may only be begun in undergraduate education. The development of CT skills may also be related to time and experience as well as education. 2) There may be a relationship between the ability of nurse faculty to engage in CT and the ability of the learner to learn CT skills. Thus, students taught by faculty not skilled in CT may be at a disadvantage in developing the CT skills required in the work environment. 3) The graduate nursing students may be a self-selected group, which could explain their mean CCTST score and the similarity to the nurse faculty mean score.

Examination of the CCTST subscales reveals that the analysis subscale did not correlate at all with the total CCTST while inference, evaluation, induction, and deduction correlated highly. These findings were consistent with those of Bondy, Koenigseder, Ishee, and Williams (45), who found the analysis subscale to yield the lowest reliability coefficient of the five subscales. This finding could account for the variability in sample scores as well as the equivocal result for nursing in general. However, the narrative data demonstrate that faculty incorporate analysis into their descriptions of CT. For a profession that relies heavily on analysis in delivering patient care and where context and therapeutic use of self are integral, these results suggest that the total CCTST may not adequately represent nurses' ability to think critically (44).

Contrary to intuitive thought, the data suggest that as faculty advance in age, their ability to engage in evaluation is diminished. In addition, there seems to be an increased likelihood that with more years teaching in a graduate program, the higher the likelihood of being at Position 3. Epistemologically, individuals in Position 3 can think relatively in one situation but are unable to transfer this type of thinking to other situations, suggesting that a more inflexible approach to situations begins to occur over time. This could represent environmental factors, such as increasingly heavy workloads, burnout, and stress. It may also reflect on how these faculty were taught and the tendency of nurse faculty, in general, to model teacher-centered behaviors. It may also reflect the tendency of faculty to see themselves as having to know all the answers rather than being co-learners with their students (46).

In contrast to the CCTST score, which indicates that some faculty members can think critically, no faculty achieved Position 5 in the LEP, the level that represents CT. That they achieved the transition Position 4/5 indicates that most faculty (75 percent) are at a developmental level that could support the process of mastering CT. One explanation may be in the design of the LEP itself, which asks respondents to identify their preferred learning environments with questions that are most amenable to a classroom setting. Since most faculty examples of CT occurred in the clinical arena, it is possible that the relationship between classroom instruction and CT is absent in this sample. This would be consistent with the tendency of faculty to focus on lecture as the predominant instructional technique (22) and their proclivity for a teacher-centered instructional style (21,46). These results may also support the belief that CT is a conscious cognitive process that does not necessarily involve the higher level metacognitive skills (47) that are required to engage in reflection. By determining the broader construct of epistemological position, it is possible that the LEP is actually indicative of a tendency to participate in and create environments that encourage reflective thinking.

Individuals with formal or informal education in CT are less likely to be in Position 4, suggesting that CT may be a habit of mind rather than the result of an educational program. If this is true, creating environments where inquisitiveness and learning for learning's sake should be encouraged. The findings also suggest that faculty who encourage "out of the box thinking" are more likely to create critical thinkers (2,6).

Almost all of the faculty examples of CT included a description of a student involved in analysis. Students typically demonstrated analysis

by examining multiple sources of data and drawing conclusions from the data. This was usually true even when faculty viewed CT and problem solving as synonymous. The presence of analysis is inconsistent with the findings on the CCTST, which indicate that faculty are weak in analysis.

Both the CCTST subscale and narrative data support that faculty are adept at recognizing inference in the clinical area. Indeed, the faculty provided numerous examples of this in their narratives when they described students responding to "what if" questions. Students also used inference when they conjectured about consequences using "if-then" situations.

Faculty, such as the one who compared nurses to the point guard in basketball — "the person who can see the whole picture" — recognized the use of evaluation in the clinical area. They referred to students who "see how an illness affects the whole life of an individual" and "can make judgments and adjustments." However, only a few faculty described classroom assignments that were designed to encourage the development of evaluation. One used a group presentation of a disease-specific diet and its effect on the entire family; another taught diabetes through immersion where students had to pretend they had diabetes and keep a log of their experiences.

The preponderance of clinical examples, and perhaps LEP results, suggest that faculty have not made the transition to teaching CT in the classroom. The clinical examples flow effortlessly, but even when pressed, most faculty could not cite classroom examples of CT, suggesting that the blending of classroom theory and clinical has not occurred. The challenge is to transfer the ability to foster CT in the clinical area into the classroom.

Limitations The study is limited by the small convenience sample and by the LEP design, which is weighted in favor of classroom teaching. The design of the LEP is particularly important in light of the fact that all but three of the examples provided by faculty members were clinical.

Recommendations The results of the CCTST suggest that all faculty are not equally skilled at critical thinking, and findings from the LEP indicate that faculty have not developed intellectually to the point of critical thinking. The narrative data demonstrate that a preponderance of attention to CT is in the clinical area. Faculty seem to be in touch with critical thinking in the applied portion of the discipline but not in the theoretical portion. Several recommendations are offered for developing critical thinking in the classroom environment.

- Examine the literature on student-centered instruction as the first step in recreating a classroom environment conducive to CT. In this type of environment, the relationship between the faculty and student is paramount, and the focus is on the learner learning, rather than on the teacher teaching. The emphasis is on how the learner understands and thinks about content — not on covering content.
- Reflect on clinical experiences and try to recreate those experiences in the classroom. CT is not a skill to be restricted to the clinical area. When looked at in the context of a metacognitive process, it becomes a part of the individual's way of being in the world. As such, students need faculty help in learning how to use the skill in all areas of their lives.
- Incorporate active learning methods into the classroom environment. Learning is an active process, and the mind needs to be active for learning to occur. By making a classroom interactive, the dialogue that is needed to help students reflect on their understanding and experience will be recreated, and CT will more likely occur.
- Implement classroom assignments that encourage students to use their imagination, engage in reflective thinking, or examine topics of personal interest. By creating assignments that stretch the creativity of the students, they will be more likely to develop out-of-the-box thinking than if the assignments are limited to academic papers.
- Establish a departmental/college benchmark of standardized measures of CT using faculty. Since the CT skills of faculty are variable, it may be more advantageous to determine an institutional norm based on the performance of faculty, rather than compare a group of students to a national reference group. As faculty adjust their teaching and thinking, the norm can be adjusted upward.
- Rather than the more limited assessment of CT skills, assess the epistemological development of students as an indication of CT. This is consistent with the finding that the development of CT skills may be a function of time and experience, not just education. In addition, since epistemological position explains one's view of knowledge, the concept is broad and may have implications for an individual's approach to lifelong learning.

In conclusion, the relationships identified suggest that it is important to repeat this study with a larger sample size. Faculty participants and nonparticipants alike commented on the need for this study. Comments such as "It's about time we look at ourselves" and "This study has been needed for a long time" indicate that faculty have the potential to be more open to being critically reflective. NLN

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Key Words Critical Thinking – Faculty Performance of Critical Thinking – California Critical Thinking Skills Test – Learning Environment Preferences – Assessment of Critical Thinking

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