

Dispositional Differences in Critical Thinking Related to Gender and Academic Major

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ABSTRACT

Dispositional differences among several university majors and across gender were examined in this exploratory study, using Facione's California Critical Thinking Disposition Inventory. Participants were 334 baccalaureate undergraduates (121 males, 213 females) enrolled in majors classified as practice disciplines (i.e., nursing, education, business) and nonpractice disciplines (i.e., English, history, psychology). A MANCOVA with grade point average as a covariate was conducted for majors, indicating significant main effects for major. Highest scores generally were found in English, psychology, and nursing. When majors were grouped into practice and nonpractice disciplines, nonpractice had generally higher disposition scores, and female scores in both practice and nonpractice disciplines were higher than males on Open-Mindedness and Maturity.

A panel of experts convened by the American Philosophical Association (APA) in 1988 formed a working group (a Delphi Group) resulting in the conceptualization of critical thinking in terms of two broad dimensions: skills (e.g., induction, deduction) and dispositions (e.g., Inquisitiveness, Open-Mindedness, Truth-Seeking) (Facione, 1990a; Pless & Clayton, 1993). Prior to the early 1980s, critical thinking generally had been used synonymously with critical thinking skills (Dressel & Mayhew, 1954; Glaser, 1941; Pascarella & Terrenzini, 1991; Perry, 1970), and the explication of the disposition to use critical thinking as a separate entity is a relatively recent development. Scholars generally agree that critical thinking dispositions are necessary to critical

thinking to ensure that skills are used in the proper spirit (Ennis, 1987; Jones et al., 1995; Oxman-Michelli, 1992).

The relationship between critical thinking skills and critical thinking dispositions has not been empirically investigated, but there has been some initial conceptual exploration. Facione, Sanchez, and Facione (1994) have suggested critical thinking skills and critical thinking dispositions may be mutually reinforcing and that dispositions and skills may interact in clusters (e.g., Confidence and Maturity working together may lead one to higher-level inferences or more judicious explanations). Perkins, Jay, and Tishman (1993) alternatively suggest there is a one-to-one correlation between skills and dispositions. Facione and Facione (1992) developed the California Critical Thinking Disposition Inventory (CCTDI) as an instrument to assess disposition toward critical thinking, suggesting that it consisted of seven separate subdispositions: Truth-Seeking, Open-Mindedness, Analyticity, Systematicity, Confidence, Inquisitiveness, and Maturity.

Facione, Sanchez, and Facione (1994) has stated that mere training to use critical thinking skills does not by itself constitute education of good critical thinkers. The disposition toward critical thinking is important to insure "the use of critical thinking skills outside the narrow instructional setting" (Facione, Sanchez, & Facione, 1994, p. 4). Because several dispositions are constitutive of an overall disposition toward critical thinking, strengths in some subdispositions over others may be a factor in success in an academic major because different majors may call on different dispositions.

The purpose of this study was to examine differences in the disposition toward critical thinking in college students in different types of majors and across genders. The study sought to answer the following questions:

- Are there dispositional differences in critical thinking among college students in different academic majors?
- Are there dispositional differences in critical thinking related to gender?

Positive results would be pertinent to university missions for undergraduate education and augment information necessary for educators to encourage development of dispositions that may be important to academic major or gender.

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TABLE 1
Sample by Gender, Age, Race, and Major (N = 334)

Variable	Sample	
	n	%
Gender		
Male	121	36.2
Female	213	63.8
Age		
18 to 25	292	87.4
26 to 35	30	9.0
Older than 36	10	3.0
Missing data	2	.6
Race		
White	317	92.2
Black	11	3.3
Hispanic	1	.3
Asian	2	.6
Other	3	.9
Missing data	9	2.7
Major		
Nonpractice disciplines		
English	26	22.6
History	23	20.0
Psychology	66	57.4
Total nonpractice disciplines	115	34.4
Practice disciplines		
Education	54	24.6
English-Secondary education	17	7.8
History-Secondary education	18	8.2
Business	82	37.4
Nursing	48	2.2
Total practice disciplines	219	65.6
Total sample	334	100.0

LITERATURE REVIEW

Most of the investigations of critical thinking have been concerned with critical thinking skills, their correlates, and their improvement. Tiessen (1987) investigated the relationship to critical thinking of verbal Scholastic Aptitude Test (SAT) score, math SAT score, grade point average (GPA), age, and the total number of credit hours in the natural sciences, behavioral and social sciences, arts and humanities, and nursing courses in a baccalaureate nursing program. Math SAT scores, total number of credit hours in the arts and humanities, and GPA explained 24% of the variance in scores on the Watson-Glaser Critical Thinking Appraisal (WGCTA) (Watson & Glaser, 1980). Math SAT scores accounted for 14% of the variance, credit hours in art and humanities accounted for 8% of the variance, and GPA accounted for 2% of the variance on the criterion variable

of critical thinking. Facione (1990b) reported that in studies of improvement of critical thinking skills, as measured on the California Critical Thinking Skills Test (CCTST), scores could be predicted by a combination of SAT verbal and math scores, and GPA ($R^2 = .41$). When CCTST pretest data were included in the regression model, the R^2 increased to .71.

In a longitudinal study, Pascarella (1989) investigated a sample of 70 seniors randomly chosen from five mid-western high schools. During the year following their high school graduation, the college group (47 attending college full-time) were paired with noncollege subjects (20 former seniors who did not attend college) on the basis of ethnicity, combined American College Testing (ACT) scores, average secondary school grades, family socioeconomic status (parents' level of education and combined yearly earnings), and scores on the WGCTA (Watson & Glaser, 1980). Controlling for the covariates ACT composite scores, secondary school grades, family SES, and educational aspirations, results showed that those comprising the college group had significantly higher scores in the total critical thinking scores and two subscale scores (interpretation and evaluation of arguments) than those in the noncollege group.

Academic major (grouped in clusters) was examined by Facione (1990c) and found to be significantly related to CCTST posttest scores but not to pretest scores. All academic majors reported raised scores after a critical thinking course. The highest gain scores were obtained by the mathematics-engineering-statistics-computer science cluster (pretest = 16.14, gain = +2.04). The humanities cluster posted the highest pretest scores (17.18, gain = +1.32). The lowest pretest scores (pretest 15.47, gain = +.62) were in performance studies cluster (i.e., drama, art, music, physical education). The sciences cluster (including the health professions) posted the smallest gain scores (pretest = 16.77, gain = +.09).

Pascarella and Terrenzini (1991) reported that research generally is inconclusive regarding the relationship between science disciplines and critical thinking. Some research has suggested that science majors were more likely to be more logical than nonscience majors and, therefore, were better critical thinkers. Other studies reported no differences. Pascarella (1989) conducted a longitudinal study of freshman year students in which he found that the number of science and logic courses taken during the freshman year was not related to critical thinking scores on the WGCTA (Watson & Glaser, 1980) when the WGCTA pretest and initial aptitude were held constant. Pascarella and Terrenzini (1991) reported studies showing that students whose course work during college was oriented toward the humanities had the highest scores in humanistic reasoning, and students whose course work was oriented toward the sciences had the highest scores in scientific reasoning. Pascarella and Terrenzini cited other studies (Dressel & Mayhew, 1954; Forrest, 1982; Winter, McClelland, & Stewart, 1981) which reported an increase in critical thinking skills after

TABLE 2
Means and Standard Deviations for Overall and Subscale Scores of the
California Critical Thinking Disposition Inventory by Major and Gender (N = 334)

Major/Gender	Overall Score*	T*	O*	A*	S*	C*	I*	M*
All N = 334								
Male n = 121	292.0 (34.1)	37.6 (6.5)	41.2 (6.9)	43.6 (5.8)	39.1 (7.3)	42.7 (7.0)	44.6 (6.9)	43.5 (6.7)
Female n = 213	303.8 (30.4)	37.8 (6.6)	45.3 (5.6)	43.6 (5.3)	41.5 (7.3)	43.4 (6.7)	46.5 (6.4)	46.0 (5.9)
English n = 26								
Male n = 7	332.7 (32.6)	46.3 (5.9)	46.0 (7.7)	46.4 (7.6)	43.0 (10.8)	48.4 (6.0)	51.1 (5.2)	51.4 (4.8)
Female n = 19	309.7 (28.4)	38.5 (6.4)	47.4 (5.3)	42.5 (7.0)	39.6 (7.4)	47.4 (5.7)	47.0 (5.6)	47.4 (4.8)
History n = 23								
Male n = 18	289.0 (31.5)	36.7 (5.8)	41.3 (6.5)	41.7 (6.8)	37.2 (6.5)	42.3 (7.9)	45.8 (6.6)	44.0 (7.0)
Female n = 5	294.6 (55.2)	40.4 (11.1)	43.2 (8.3)	41.6 (6.2)	42.0 (10.4)	40.4 (9.5)	43.8 (7.6)	43.2 (10.8)
Psychology n = 66								
Male n = 14	298.6 (37.8)	39.3 (6.5)	44.0 (8.4)	44.8 (5.8)	39.1 (6.2)	44.0 (7.5)	45.7 (6.5)	41.6 (7.0)
Female n = 52	311.4 (29.8)	39.3 (6.8)	46.4 (5.9)	44.8 (5.0)	42.3 (7.7)	44.5 (6.1)	47.7 (5.5)	46.4 (5.7)
Education n = 89								
Male n = 31	286.6 (33.7)	35.8 (6.8)	41.3 (5.1)	43.4 (6.5)	38.1 (7.0)	42.8 (5.9)	44.1 (8.1)	42.7 (6.4)
Female n = 58	305.7 (28.8)	36.1 (6.5)	45.3 (5.9)	44.8 (4.7)	41.8 (7.4)	44.9 (6.5)	47.2 (7.1)	45.5 (5.6)
Business n = 82								
Male n = 48	288.2 (33.0)	39.3 (6.1)	39.4 (7.3)	43.7 (4.4)	40.0 (7.5)	41.7 (6.7)	43.0 (6.3)	42.6 (6.5)
Female n = 34	287.1 (32.0)	38.3 (5.7)	43.1 (5.1)	42.4 (5.8)	39.7 (6.9)	39.6 (8.2)	42.9 (7.1)	44.1 (4.9)
Nursing n = 48								
Male n = 3	301.0 (23.5)	39.3 (5.5)	43.0 (3.6)	43.0 (3.5)	39.3 (11.0)	39.7 (11.1)	48.7 (2.3)	48.0 (4.4)
Female n = 45	303.5 (25.1)	38.3 (5.8)	45.0 (4.6)	42.3 (4.7)	42.2 (6.6)	41.7 (5.0)	46.8 (5.3)	47.2 (6.3)

* Standard deviations are in parentheses.

Note: T = Truth-seeking; O = Open-Mindedness; A = Analyticity; S = Systematicity; C = Confidence; I = Inquisitiveness; M = Maturity.

integrative general education programs compared to programs in which courses were not integrated.

Self-selection into academic majors was reviewed by Pascarella and Terrenzini (1991) in pre-1970 literature investigating student attitudes and values; associating academic major with significant increases in cultural and aesthetic values of students in liberal arts and social sciences; and insignificant increases in values in business administration, engineering, and professional programs. Kintgen-Andrews (1991) reported equivocal findings in several studies in nursing education regarding the relationship of GPA and critical thinking scores. In studies by Berger (1984) and Sullivan (1987), no relationships were found, whereas Bauwens and Gerhardt (1987) found positive relationships between these variables. Strongest positive correlations between GPA and critical thinking were for subjects in practical nurse programs (Kintgen-Andrews, 1988). Other studies in nursing education found that the level of basic academic program (baccalaureate degree versus associate of arts) was not related consistently to critical thinking levels (Gross, Takazawa, & Rose, 1987; Gunning, 1981; Saarmann, Freitas, Rapps, & Riegel, 1992).

There is a paucity of studies reporting on the effect of gender on critical thinking skills. Hickman (1993), alluding to work by Belenky, Clinchy, Goldberger, and Tarule (1986), suggested developmental pathways related to critical thinking may differ for gender. Facione (1990c), like Hickman (1993), also reported that initial CCTST pretests showed gender differences in a sample of 1,196 undergraduates at a west coast state college, but those differences disappeared when SAT and GPA were held constant.

Very little work has been conducted on the disposition of college students toward critical thinking, partly because of the recent conceptual separation from critical thinking skills and partly because the newness of an instrument to measure it. A study conducted in 1992 investigated disposition toward critical thinking in 587 freshmen at a private, west coast university (Facione, Sanchez, Facione, & Gainen, 1995). Mean high school GPA for the group was 3.47, and combined SAT scores were 1,095. Only 13% of the group scored "positive" (scores above 40) on the seven subscales of the instrument (Facione, Sanchez, & Facione, 1994). The other 87%

TABLE 3
MANCOVA for Overall Scores of the
California Critical Thinking Disposition Inventory
by Major (English, History, Psychology, Education,
Business, and Nursing) and Gender,
using GPA as a Covariate (N = 334)

Source	df	F
Major	40	2.26*
Gender	8	3.16**
Major × Gender	40	.48
Error	1372	—

* $p \leq .01$. ** $p \leq .001$.

Note: *df* for Major = 40, 1372. *df* for Gender = 8, 1372.

scored below 40 on at least one of the seven subscales. The most common finding among the sample of 587 was a negative disposition toward Truth-Seeking (Facione, Sanchez, Facione, & Gainen, 1995). Repeated samples (198 freshmen and sophomores at a public, urban university in California and another sample of unreported size at a public, rural university in California) with participants from academic majors of dance, physical education, nursing, and physical therapy reinforced the initial findings. Another study by Facione, Sanchez, and Facione (1994) found

small but statistically significant differences...for...324 women and...262 men on the Analyticity ($p < .043$) Open-Mindedness ($p < .002$) and Maturity ($p < .001$). Women were more disposed toward being open-minded and cognitively mature, whereas men were...more inclined toward being analytical (p. 10).

Bers, McGowan, and Rubin (1996) reported that in a longitudinal study of critical thinking dispositions of community college students (106 males and 118 females from a single institution) over a semester, a higher percentage of males weakened in Truth-Seeking (25%) than did females (16%), whereas 33% of females weakened in Confidence compared to 13% of the males.

SUMMARY OF RELEVANT LITERATURE

The literature on critical thinking skills cited in this article can be summarized in terms of:

- The effects of college, academic major, type of major, general education programs, and gender on critical thinking skills improvement.

- The effects of gender on critical thinking disposition. The literature on critical thinking skills indicated an improvement during college. However, the effects of academic major on skills showed equivocal results, with some studies showing increased skills and some showing no differences. Moreover, baccalaureate nursing programs showed a less than positive effect on critical thinking skills than nonbaccalaureate programs. Greater critical thinking

skill increases occurred in the humanities and math-related majors as opposed to majors in science and the health professions. Greatest improvement in humanistic critical thinking skills occurred in students with the greatest number of humanities courses. Greatest improvement in scientific thinking occurred in students with more science courses. This implies that greater exposure to a way of thinking (e.g., humanistic, scientific) encouraged greater improvement and proficiency in those reasoning skills. Other work (Facione, 1990c) indicates that students in humanities made more cultural and aesthetic value gains than those in business and professional programs. Additionally, improvement in critical thinking skills resulted from integrated general education programs where students themselves were forced to make the connections among ideas. Empirical investigations of gender differences are few and have found little if any variance in critical thinking skills when initial differences are controlled.

There is a relatively small body of research in critical thinking disposition. A consistent finding among studies on disposition is the generally low Truth-Seeking disposition among all undergraduate students. Critical thinking disposition has been shown to vary with gender, with males being stronger in Analyticity than females, and females being stronger in Open-Mindedness and cognitive Maturity. No research was found at this time investigating strength of critical thinking disposition and chosen academic major. Given the newness of disposition as an operationalized concept, gaps in disposition studies are numerous. Included in these gaps are the relationship of different critical thinking dispositions to specific academic majors and to the type of major (i.e., nonpractice, practice) chosen by students. Exploration of these relationships will inform both cognitive theory and educational practice.

METHODS

The study was conducted at one mid-Atlantic, comprehensive public university using a descriptive, exploratory design across undergraduate students in six majors, encompassing all four divisions of the University (i.e., School of Business, Liberal Arts, Education, and Science). The CCTDI (Facione & Facione, 1992) was used as a measure. In constructing the CCTDI, Facione, Facione, and Sanchez (1994b) used factor analytic methods to decide which items to retain in the instrument from an initial pool of approximately 150 items. These procedures resulted in a final instrument consisting of 75 items grouped in seven factors (subscales). Individual subscale scores could range up to 60, and the overall score could range up to 420. Facione, Facione, and Sanchez (1994b) stated that scores less than 40 on any subscale indicated weakness in that disposition, whereas scores greater than 50 indicated strength in that disposition. Similarly, an overall CCTDI score of less than 280 showed serious overall deficiency in the critical thinking dispositions, whereas an overall score of 350 was an indication of strength in overall critical thinking disposition. However, high overall scores were

TABLE 4
Means and Standard Deviations of California Critical Thinking Disposition Inventory for Overall and Subscale Scores ($N = 334$) by Type of Major (Practice $n = 219$, Nonpractice $n = 115$) and Gender (Male $n = 121$, Female $n = 213$)

Scale	Type of Major	Male (SD)	Female (SD)
Overall	Nonpractice	300.0 (35.49)	309.9 (31.72)
	Practice	288.1 (32.77)	300.3 (29.24)
T	Nonpractice	39.3 (6.56)	39.1 (7.02)
	Practice	37.1 (6.36)	36.7 (6.19)
O	Nonpractice	43.1 (7.36)	46.5 (5.96)
	Practice	40.3 (6.46)	44.6 (5.34)
A	Nonpractice	43.7 (6.81)	44.0 (5.67)
	Practice	43.6 (5.21)	43.4 (5.05)
S	Nonpractice	39.0 (7.36)	41.6 (7.84)
	Practice	39.3 (7.37)	41.4 (7.04)
C	Nonpractice	44.0 (7.61)	45.0 (6.44)
	Practice	42.0 (6.54)	42.5 (6.74)
I	Nonpractice	46.7 (6.38)	47.2 (5.68)
	Practice	43.6 (6.96)	46.0 (6.72)
M	Nonpractice	44.5 (7.22)	46.5 (5.98)
	Practice	42.8 (6.40)	45.7 (5.83)

Note: T = Truth-Seeking; O = Open-Mindedness; A = Analyticity; S = Systematicity; C = Confidence; I = Inquisitiveness; M = Maturity.

rare (Facione, Facione, & Sanchez, 1994b). Cronbach's alpha coefficients in their study ranged from .70 to .80 for the subscales, and .90 for the overall instrument.

The sample for this study was drawn from undergraduate students in their third year of college, who were beginning their majors in nursing, education, business, English, history, and psychology. The majors represented both practice disciplines (e.g., nursing, education, business) and nonpractice disciplines (e.g., English, history, psychology). There were no eligibility criteria for inclusion in the sample based on age, race, gender, marital status, socioeconomic status, or ethnic origin. The sample was comprised of 334 participants (Table 1). Class time of 35 minutes was donated by professors teaching in the selected disciplines after approval was obtained by the Committee on Human Volunteers. Participants were assured verbally and in writing that participation in the study was voluntary and would not affect course grades or standing in their majors. Students signed a consent form (kept in a separate location from the data), and completed the demographic questionnaire and the CCTDI. Neither the demographic questionnaire nor the CCTDI contained any identifying information.

TABLE 5
MANCOVA for Overall Scores and Subscales of the California Critical Thinking Disposition Inventory by Type of Major (Practice and Nonpractice) and Gender, using GPA as a Covariate ($N = 334$)

Source	df	F
Major	8	3.5*
Gender	8	6.4**
Major \times Gender	8	.73
Error	322	—

* $p \leq .01$. ** $p \leq .001$.
Note: $df = 8, 322$.

RESULTS

Cronbach's alpha coefficients, which were consistent with those of Facione, Facione, and Sanchez (1994a), were computed for this study and ranged from .56 to .77 for the subscales, and .90 for the overall score. The analysis of the research question was conducted using a 2×6 factorial MANCOVA between gender (male and female) and major (English, history, psychology, business, education, and nursing) on the overall score and the seven subscale scores of the CCTDI, using GPA as a covariate. Table 2 presents the means and standard deviations for the subscales for males and females in the six majors and shows that generally speaking, English majors were highest, followed by psychology, nursing, history, education, and business. Table 3 presents the results of the 2×6 MANCOVA procedure. A significant main effect for major was revealed on the overall score and the subscale scores (Wilks $F[40, 1372] = 2.26, p \leq .01$), as well as a main effect for gender (Wilks $F[8, 1372] = 3.16, p \leq .001$). No interactions of major and gender were revealed.

The six majors were divided into practice (e.g., education, business, nursing) and nonpractice disciplines (e.g., English, history, psychology). A 2×2 factorial MANCOVA between gender and major was computed on the overall score and the CCTDI subscale scores, using GPA as a covariate. Table 4 presents the means for practice and nonpractice majors and the mean for males and females. Differences were reported for major on the overall CCTDI score and subscale scores (Wilks $F = 3.5, [8, 322], p = .01$) (Table 5). There were no interactions between practice or nonpractice major and gender on the CCTDI subscales. Table 6 presents the univariate analysis of subscale scores for practice and nonpractice disciplines. Table 7 presents the univariate analysis of subscale scores for practice and nonpractice disciplines by gender.

DISCUSSION

The results of this study showed differences in the overall disposition toward critical thinking among six majors: English, history, psychology, education, business,

TABLE 6
Univariate *F* Tests for Practice
and Nonpractice Disciplines

Subscale	<i>F</i>
Overall score	10.57*
Truth-Seeking	11.04*
Open-Mindedness	11.60*
Confidence	8.64**
Inquisitiveness	9.29*

* $p \leq .01$. ** $p \leq .001$.

and nursing, and between majors clustered into practice and nonpractice groups. English majors showed consistently higher scores than other majors on the CCTDI subscales of Truth-Seeking, Open-Mindedness, Confidence, Inquisitiveness, and Maturity. When the six majors were clustered into practice and nonpractice groups, the nonpractice group showed higher subscale scores in Confidence and Inquisitiveness than the practice group.

Truth-Seeking scores tended to be low across all majors (scores less than 40). Education majors, for example, reported a mean Truth-Seeking score of 37.7, and nursing majors reported 35.6 (the lowest scores of any major). The reason for especially low scores in nursing is unclear. The validity of information as well as truth-telling is strongly emphasized in nursing curricula. However, nursing classes may, in fact, inadvertently reward instructor-defined correctness as opposed to truth, and students may tend to become excessively dogmatic in their approach to problem solving.

Nursing majors had very low levels of Confidence as well (Table 2). Reasons why a novice nursing major may lack confidence are not difficult to imagine. Many critical decisions must be made and mistakes can be costly. New information; rapidly changing circumstances; and situations with unique elements, unusual twists, and hidden variables commonly bombard these students. It would be of interest for future research to retest nursing students after 2 years of immersion in nursing courses to show whether higher Confidence scores could be anticipated.

Although the evidence in this study suggested there were real differences in disposition toward critical thinking among different majors, differences were mixed. That is, differences were not divided cleanly by practice majors and nonpractice majors. For example, although nonpractice disciplines in general showed greater overall disposition toward critical thinking and were higher in Confidence and Inquisitiveness than practice disciplines, history did not follow this pattern. History majors scored lower than other nonpractice disciplines on the overall CCTDI and lower than nursing majors (a practice discipline) as well. In terms of specific dispositions, history majors showed lower Inquisitiveness than nursing majors

TABLE 7
Univariate *F* Tests for Practice and
Nonpractice Disciplines by Gender

Subscale	<i>F</i>
Open-Mindedness	15.71**
Maturity	4.53*

* $p \leq .05$. ** $p \leq .001$.

but higher Inquisitiveness than business majors. On the other hand, history majors were higher in Confidence than nursing majors. Thus, a somewhat muddled picture emerged regarding the relationship between type of major and strength in specific dispositions. Possible explanations for the incongruity are the lack of "fit" between these students and their chosen major or lack of commitment to their chosen major on the part of students enrolled in the sampled courses.

No gender differences were found in this study on scores of specific subscales of the CCTDI among majors, although females revealed higher scores overall. This contrasted with the findings of Facione, Sanchez, Facione, and Gainen (1995) who reported higher scores for females in Open-Mindedness (tolerance of differences) and Maturity (the awareness that some types of problems can be ill-structured and do not necessarily have only one solution), higher scores for males in Analyticity, and no gender difference in overall disposition. However, when the six majors were combined into practice and nonpractice groups for this study, the results of Facione, Sanchez, Facione, and Gainen (1995) were confirmed, revealing higher scores for females in both practice and nonpractice disciplines on Open-Mindedness and Maturity. The lack of further gender differences in critical thinking dispositions suggests differences may not be as important in this area as they are in other areas such as moral reasoning or connectedness to others. Alternatively, the CCTDI may not have successfully represented gender aspects of the disposition toward critical thinking.

The findings of this study supported the notion that there are differences among college students in different majors in the disposition toward critical thinking. However, the notion that success in different majors may require different strengths in specific dispositions toward critical thinking than others was not clearly supported. In the specific disposition of Systematicity, for example, in which one could reasonably expect nursing majors to excel, scores were approximately the same as non-nursing majors. Facione, Sanchez, Facione, and Gainen (1995) suggested strategies for nurturing dispositions such as academic advising building on the strengths exhibited by students (those with dispositional scores above 40), establishing an academic culture which values open inquiry, and establishing departmental cultures which do the same.

The greatest limitation encountered in this study was

the problem of obtaining sufficient pure history and English majors who also were not enrolled as education majors planning to be certified as high school teachers. Fully one third of English and history majors reported themselves as secondary education majors. Strengths and weaknesses related to practice and nonpractice disciplines thus were confounded. Another limitation was the fact that subjects were from a single institution, serving as a source of possible bias in the sample. This could be remedied in future studies by the inclusion of other academic institutions.

The nature of the differences among majors in disposition toward critical thinking needs further exploration. The study of the disposition toward critical thinking is in its infancy, and therefore, future replication of studies cannot be emphasized strongly enough. Additional demographic questions concerning the eventual career goal of participants may aid in the discrimination of differences between practice and nonpractice majors. This, in turn, may further the development of instruments to assess the discipline-related pertinence of some dispositions over others.

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