

The Disposition Toward Critical Thinking¹

by

Peter A. Facione, Santa Clara University
Carol A. Giancarlo, University of California Riverside
Noreen C. Facione, University of California San Francisco
Joanne Gainen, Santa Clara University

ABSTRACT

There is a set of characterological attributes thought to be associated with developing success at critical thinking (CT). This paper explores the disposition toward CT theoretically, and then as it appears to be manifest in college students. Factor analytic research grounded in a consensus-based conceptual analysis of CT described seven aspects of the overall disposition toward CT: truth-seeking, open-mindedness, analyticity, systematicity, CT-confidence, inquisitiveness, and cognitive maturity. The California Critical Thinking Disposition Inventory (CCTDI), developed in 1992, was used to sample college students at two comprehensive universities. Entering college freshman students showed strengths in open-mindedness and inquisitiveness, weaknesses in systematicity and opposition to truth-seeking. Additional research indicates the disposition toward CT is highly correlated with the psychological constructs of absorption and openness to experience, and strongly predictive of ego-resiliency. A preliminary study explores the interesting and potentially complex interrelationship between the disposition toward CT and CT abilities. In addition to the significance of this work for psychological studies of human development, empirical research on the disposition toward CT promises important implications for all levels of education.

¹ This essay appeared as Facione, PA, Sánchez, (Giancarlo) CA, Facione, NC & Gainen, J., (1995). The disposition toward critical thinking. *Journal of General Education*. Volume 44, Number(1). 1-25.

The Disposition Toward Critical Thinking

Peter A. Facione, Santa Clara University
Carol A. Giancarlo, University of California Riverside
Noreen C. Facione, University of California San Francisco
Joanne Gainen, Santa Clara University

The Ideal Critical Thinker

There is a characterological profile, a constellation of attitudes, a set of intellectual virtues, or, if you will, a group of habits of mind which we refer to as the overall disposition to think critically. Nearly a century ago John Dewey, in How We Think, expressed the significance of these habits of mind as follows:

"If we were compelled to make a choice between these personal attributes and knowledge about the principles of logical reasoning together with some degree of technical skill in manipulating special logical processes, we should decide for the former." (1933, p.34)

The purpose of the current research is to explore conceptually the disposition toward critical thinking, and to explore empirically for the first time whether entering college freshmen, display that disposition. Let us note from the outset, however, that the expectations of some educators and many policy-makers might be several steps ahead of the concept development and empirical measurement strategies.

The enthusiasm with which North America has come to embrace critical thinking (CT) as a central outcome of higher education manifests itself in university goal statements, accreditation standards, and government policy. Hardly a college or university in the nation would fail to identify the development of CT as a vital outcome of its core curriculum. Regional and professional accrediting associations have begun to require student assessment measures of CT as a curricular outcome (National League for Nursing, 1990; Western Association of Schools and Colleges, 1990; North Central Association of Colleges and Schools, 1992). In 1990 President Bush, in concert with the Governors of the 50 States, preeminent among them being Governor Clinton, articulated five national educational goals. Goal 5 states that adult Americans will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship. To achieve this "the proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems will increase substantially" (US Department of Education, 1990). With "Goals 2000: Educate America Act" Congress established these as national education goals (Ratcliff, 1993).

While CT is being more and more widely recognized as a liberating force in education and a powerful resource in one's personal and civic life, the burgeoning national interest in developing students' CT has deep historic roots. The educational goal of teaching students to reason well and willingly can be traced back through the eighteenth century Enlightenment, the Renaissance, the medieval focus on logical argumentation, the North African and Roman preparation of jurists and lawyers, and the Aristotelian and Socratic concern for logic, rhetoric, and warranted assertibility.

Educators and scholars recommend that CT instruction in the K-12 and college curricula develop CT skills and foster in students the disposition to use those skills. Both the dispositional dimension of CT and its cognitive abilities dimension are reflected in theoretical characterizations of CT (Dewey, 1933;

Scheffler, 1965; D'Angelo, 1971; Passmore, 1972; Glaser, 1985; Meyers, 1986; Mayfield, 1987; Kurfiss, 1988; Siegel, 1988; Browne & Keeley, 1990; Paul, 1990; Chaffee, 1992; Oxman-Michelli, 1992; Wade and Tavis, 1993; Gray, 1993). There is broad consensus among CT theoreticians that the educational goal is to prepare persons, particularly at the college level, who willingly and skillfully engage in CT. In short, baccalaureate education should produce graduates who are willing and able to use their cognitive powers of analysis, interpretation, inference, evaluation, explanation, and self-monitoring meta-cognition to make purposeful judgments about what to believe or what to do (Paul, 1984; Ennis, 1985; 1987; Meleis, 1988; APA, 1990; Carter-Wells, 1992).

Efforts to define, teach, and measure CT have intensified throughout the last quarter of the century (Kurfiss, 1988; Norris & Ennis, 1989; Jones, 1993). In 1990, under the sponsorship of the American Philosophical Association, a cross-disciplinary panel completed a two-year Delphi project which yielded a robust conceptualization of CT understood as an outcome of college level education. Broadly conceived, CT was characterized as purposeful, self-regulatory judgment, a human cognitive process. As a result of this non-linear, recursive process a person forms a judgment about what to believe or what to do in a given context. In so doing a person engaged in CT uses a core set of cognitive skills -- analysis, interpretation, inference, explanation, evaluation, and self-regulation -- to form that judgment and to monitor and improve the quality of that judgment. CT is non-linear and recursive to the extent that in thinking critically a person is able to apply CT skills to each other as well as to the problem at hand. For example, one is able to explain one's analysis, analyze one's interpretation, or evaluate one's inference (APA, 1990).

The scholars and teachers who participated in this Delphi research determined that while CT per se was a form of cognition, it would be impossible to understand the teaching of CT without an appreciation of the characterological profile of the kind of individual one was trying to nurture. Hence, the consensus extended beyond identifying a core set of cognitive skills and sub-skills to the articulation of a description of the ideal critical thinker.

"The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit." (APA, 1990, p. 3)

In 1993 the United States Department of Education funded a national survey of educators, employers, and policy-makers to determine their priorities with regard to the CT skills and dispositions appropriate for college graduates. In a clear example of building on prior research, the National Center for Postsecondary Teaching, Learning, and Assessment located at The Pennsylvania State University has utilized the APA Delphi conceptualization to undergird their survey instrument. The listing of CT skills, sub-skills, and dispositional attributes articulated in the APA Delphi research guides the structure and provides terminology for the survey instrument in this research project.

Thus, there is a growing consensus that a complete approach to developing college students into good critical thinkers must include the nurturing of the disposition toward CT. Some might argue that cultivating the disposition is necessary before implanting the skills, but a developmental perspective would suggest that skills and dispositions are mutually reinforced and, hence, should be explicitly taught and modeled together. In either case, common sense tells us that a strong overall disposition toward CT is integral to insuring the use of CT skills outside the narrow instructional setting. Motivational theory

(Lewin, 1935) provides the theoretical grounds for the assumption that the disposition to value and utilize CT would impel an individual to achieve mastery over CT skills, being motivated to close the gap between what is valued and what is attained.

Empirical Refinements of the Concept "The Disposition Toward CT"

Considerations of the disposition toward CT have remained largely within the realm of theoretical speculations, working assumptions, anecdotal observations, and pedagogical discussions, rather than the subject of scientific investigations. Few have taken an empirical approach to exploring the overall disposition to value and utilize CT, nor has empiricism been used to study the relationship between that disposition and the attainment of CT skills. Exploration of this phenomenon, or any other phenomena of interest related to CT for that matter, has been constrained by a dearth of instruments designed to measure the disposition toward CT. The California Critical Thinking Disposition Inventory (CCTDI) (Facione & Facione, 1992), which derives its conceptualization of the disposition toward CT from the APA Delphi Report, is the first such instrument. Building on the power of a relatively rare occurrence in research, a cross-disciplinary consensus on the dispositional description of the critical thinker, iterative empirical methods were utilized to derive a measure of the construct (Facione, 1992; Facione & Facione, 1992).

The CCTDI contains 75 likert style items and reports eight scores: a score on each of the seven scales (Inquisitiveness, Open-mindedness, Systematicity, Analyticity, Truth-seeking, CT Self-confidence, and Maturity) and an overall score of CT Disposition (derived from mathematically equal contributions from each scale). A score of 30 and below on any of the scales indicates consistent opposition or weakness in relation to the given attribute or characteristic, a score of 40 indicates minimal endorsement on average, and scores above 50 indicate consistent endorsement or strength of the given characteristic. (Facione & Facione, 1992). In developing the CCTDI, multiple pilot item prompts were written for each of the 19 Delphi dispositional phrases describing the ideal critical thinker. The resulting 250 prompts were screened by college level CT educators to identify possible ambiguities of interpretation. A selection of 150 pilot prompts were retained and incorporated into a preliminary version of the instrument which was then piloted at two comprehensive universities in the United States and one in Canada. Seventy-five items were chosen for retention in the final form of the instrument based on both their internal consistency and their ability to discriminate between respondents. Factor analysis supported retention of items within their various scales. (Facione, Facione & Sanchez, in press).²

The seven CCTDI dispositional scales are discipline neutral, yet each can be readily interpreted within the liberal arts and sciences as well as professional disciplines. Below, each scale is described as it pertains to the outcomes of college level liberal education and college level professional preparation.

The Inquisitiveness scale on the CCTDI measures one's intellectual curiosity and one's desire for learning even when the application of the knowledge is not readily apparent. Intellectual curiosity and a desire to know are among the defining characteristics of the liberally educated person. Considering that the knowledge base for competent engineering (psychology, nursing, teacher education, journalism) practice continues to expand, a deficit in inquisitiveness would signal a fundamental limitation of one's potential to develop expert knowledge and professional practice ability.

² Alpha reliabilities for the seven individual scales in the initial pilot sample ranged from .71 to .80. The alpha reliability for the overall instrument, measuring the overall disposition toward CT, was .91. The instrument was later administered to two additional samples totaling 1019 freshmen college students. The alpha levels in the later samples remained relatively stable (ranging from .60 to .78 on the scales and .90 overall), thus empirically supporting the internal reliability of the instrument and each scale.

In general an inquisitive person can be predicted to agree with: "No matter what the topic, I am eager to know more about it." "Learn everything you can, you never know when it could come in handy." And, "Studying new things all my life would be wonderful." Those inclined away from inquisitiveness might say, "most college courses are uninteresting and not worth taking."

The Open-mindedness scale addresses being tolerant of divergent views and sensitive to the possibility of one's own bias. Open-mindedness is crucial for citizens of a pluralistic, multi-cultural society which values tolerance and understanding of the beliefs and lifestyles of others. Conversely, dispositional intolerance of divergent views might preclude effective client services, clinical practice interventions, or educational efforts in such varied populations as those with substance abuse problems, those in the criminal justice system, and those enmeshed in urban violence.

Persons who are intolerant toward divergent views might be expected to agree with: "Open-mindedness has limits when it comes to right and wrong." And, "You are not entitled to your opinion if you are obviously mistaken." In contrast, persons inclined toward open-mindedness could be predicted in general to agree with: "It's important to me to understand what other people think about things." And, "It concerns me that I might have biases of which I am not aware."

The Systematicity scale measures being organized, orderly, focused, and diligent in inquiry. No particular kind of organization, e.g. linear or non-linear, is given priority on the CCTDI. Organized approaches to problem-solving and decision-making are hallmarks of a thoughtful person regardless of the problem domain being addressed. The inclination to approach problems in an orderly and focused way is an indispensable part of competent clinical (accountancy, managerial, psychological, scientific) practice, and deficits in systematicity might particularly predispose a nurse (CPA, pharmacist, attorney, physician) to the possibility of negligence in practice.

One would expect persons disposed toward systematicity to generally agree with "I always focus the question before I attempt to answer it." However, in general, one would expect them to disagree with: "My opinion about controversial topics depends a lot on who I talked to last." "My problem is I'm easily distracted." And, "People say I rush into decisions too quickly."

The Analyticity scale targets prizing the application of reasoning and the use of evidence to resolve problems, anticipating potential conceptual or practical difficulties, and consistently being alert to the need to intervene. Analyticity is a core disposition for the inquiring mind. Persons with this characteristic are inclined to want to anticipate the consequences of events and ideas, and to use reason, rather than some other strategy to address serious problems as well as entertaining puzzles. Analyticity is a virtue for the psychologist (scientist, educator, humanist, jurist, economist) as a scholar and researcher; but it is no less important to the nurse (teacher, attorney, journalist, physician, psychologist, pharmacist, journalist, manager) as a working professional. Being analytical disposes the person in professional practice to connect observations with her/his theoretical knowledge base, and to anticipate events likely to threaten the safety or limit potential or create an advantage for a given client.

Persons with a positive inclination toward analyticity can, in general, be predicted to disagree with: "I pretend to be logical, but I'm not." And, "There is no way to know whether one solution is better than another." But, we can predict they would tend to agree with, "It bothers me when people rely on weak arguments to defend good ideas." And, "People need reasons if they are going to disagree with another's opinion."

The Truth-seeking scale targets the disposition of being eager to seek the best knowledge in a

given context, courageous about asking questions, and honest and objective about pursuing inquiry even if the findings do not support one's self-interests or one's preconceived opinions. Once a liberally educated person acknowledges a given set of facts to be the case or a given set of reasons to be relevant and forceful, that person is inclined to adjust his or her beliefs in accord with those facts and reasons. The truth-seeker is one who remains receptive to giving serious consideration to additional facts, reasons, or perspectives even if this should necessitate changing one's mind on some issue. The truth-seeking professional (student, faculty member, scholar) continually evaluates new information and evidence. In contrast, being un-attuned to counter-evidence perpetuates professional practice which is unreflective and unresponsive to changes in its theory-base. Deficits in truth-seeking may subject a client to malpractice resulting from the practitioner's inattention to evidence of a missed diagnosis or the changing status of their case.

Persons positively disposed toward truth-seeking can be predicted in general to disagree if prompted with: "Everyone always argues from their own self-interest, including me." "If there are four reasons in favor and one against, I'll go with the four." And, "To get people to agree with me I'd give any reason that worked."

The CT Self-Confidence scale measures the trust one places in one's own reasoning processes. CT self-confidence allows one to trust the soundness of one's own reasoned judgments and to lead others in the rational resolution of problems. An appropriate level of CT self-confidence, increasing in relation to one's maturity and in relation to one's mastery of CT skills, would be the desired developmental trajectory for all students. Rises and falls in CT self-confidence might suggest the progress of a person through developmental levels, with a rise of CT self-confidence indicating comfort at a given level of cognitive development and a fall in CT self-confidence resulting from the same cognitive dissonance which gives impetus to an upward movement. Whether an individual's level of CT self-confidence is warranted is another matter, however. Some under-estimate their ability to think critically, while others over-rate their CT ability. Practicing professionals who over-rate their CT abilities may act with inadequate caution, while those whose CT self-confidence is lower than their actual CT skills level might be expected to demonstrate a lack of leadership in both intimate client contacts and larger group settings.

Students who display confidence in their reasoning would be expected to agree with prompts such as "Tests that require thinking, not just memorization, are better for me." And, "I take pride in my ability to understand the opinions of others."

The Maturity scale targets the disposition to be judicious in one's decision-making. The CT-mature person can be characterized as one who approaches problems, inquiry, and decision making with a sense that some problems are necessarily ill-structured, some situations admit of more than one plausible option, and many times judgments must be made based on standards, contexts and evidence which preclude certainty. This dispositional attribute has particular implications for responding to ill-structured problems and making complex decisions involving multiple stakeholders, such as policy-oriented and ethical decision-making, particularly in time-pressured environments. Cognitive maturity in CT would appear to be critical to the development of expertise as a clinician, administrator, educator, attorney, or a policy-maker in any venue.

Face validity in attitudinal measures is not always desirable as it introduces the potential for socially desirable response sets. Although socially desirable response sets might lead to the CCTDI reporting higher than "true" scores, items on the CCTDI discriminate well between respondents, attracting endorsements from those individuals who oppose the value of various aspects of the disposition toward CT. Those who score low on the maturity scale, for instance, typically agree with the statements: "The best argument for an idea is how you feel about it at the moment." "Things are as they appear to be." And,

"The best way to solve problems is to ask someone else for the answers." These example prompts, like the example prompts quoted above, when taken not individually but along with those several others that form each of the seven CCTDI scales, permit us to describe with confidence the CT inclinations and disinclinations of groups of students.

The Disposition Toward CT and Related Psychological Characteristics

The disposition towards CT has begun to draw the interest of psychologists who study personality attributes in relation to motivations and cognitive strategies in problem solving and decision-making (Cantor & Kihlstrom, 1987; Healy, 1989; Norem, 1989). Initial psychological research suggests that significant relationships could be predicted to exist between the disposition toward CT and the constructs "openness to experience" (Costa & McCrae, 1985) and "ego-resiliency" (Block & Block, 1980). Openness to experience, which has been identified as one of the Big-Five factors of human personality (Costa & McCrae, 1985, 1992), is defined as "a broad dimension of personality manifested in a rich fantasy life, aesthetic sensitivity, awareness of inner feelings, need for variety in actions, intellectual curiosity, and liberal value systems" (McCrae & Costa, 1987, p.145). As predicted, five of the seven scales of the CCTDI were found to share significant correlations with the openness to experience construct: Truth-Seeking ($r=.27$, $p<.001$), Open-mindedness ($r=.33$, $p<.001$), CT Self-Confidence ($r=.25$, $p<.004$), Inquisitiveness ($r=.37$, $p<.001$), and Cognitive Maturity ($r=.30$, $p<.001$) (Sánchez, 1993).

The disposition toward CT, as measured by the CCTDI scales, was also found to be significantly related to ego-resiliency, which refers to a person's ability to alter their modal perceptual and behavioral functioning to adapt to situational constraints, that is, being a flexible and adaptable person (Block & Block, 1980). Ego-resiliency, can be viewed as a continuum, high scorers on ego-resiliency are referred to as ego-resilient, and low scorers referred to as ego-brittle (Block & Block, 1980). The ego-resilient person is resourceful, flexible, engaged in their surroundings, and able to modify their responses in line with situational requirements. The ego-resilient person is not only flexible interpersonally, but cognitively as well, with several problem-solving strategies available to them when faced with difficult tasks. The ego-brittle person, on the other hand, is not able to vary his or her roles, is not resourceful and is not as capable at handling stressful situations (Block & Block, 1980).

Sánchez (1993) found that all seven of the CCTDI scales were positively correlated with a measure of ego-resiliency. The highest correlates were with systematicity ($r=.47$, $N=200$, $p<.001$), truth-seeking ($r=.41$, $N=200$, $p<.001$) and inquisitiveness, ($r=.39$, $N=200$, $p<.001$) indicating that ego-resiliency was most highly associated with the focused diligence, objectivity, and intellectual curiosity of the CT cognitive style.

The CCTDI appears to be a useful tool for measuring intellectual curiosity, as well as active engagement in one's surroundings. Particularly intriguing is the significant correlations between each of the CT dispositional scales and ego-resiliency. If ego-resiliency is taken to be a valid indicator of psychological adjustment (Block & Block, 1980), it would seem then that the disposition toward CT serves as a strong indicator of psychological health and well-being.

Pursuing further the apparent relationship between the overall disposition toward CT and various understandings of "openness" suggests consideration of the absorption construct elaborated by Tellegen (Tellegen & Atkinson, 1974; Tellegen, 1981, 1982). The absorption construct refers to the personality disposition or inclination to be engaged in absorbing and self-altering experiences. Tellegen (1981) described the experiential set required for absorption as:

"a state of receptivity or openness to experiencing in the sense of readiness to undergo whatever experiential events, sensory or imaginal, that may occur, with a tendency to dwell on, rather than go beyond, the experiences themselves and the objects they represent" (p. 222).

A factor analytic study of the Tellegen Absorption Scale (TAS) found two factors which could be labeled internality and externality. The internality TAS factor reflects absorbing self-generated images; the externality factor indicates absorbing external contextual images. CCTDI scores correlated significantly with the externality factor ($r = .31, n=200, p<.001$), but not with the internality factor ($r = .04, n=200, p < .21$). These preliminary findings suggest the CCTDI is measuring a similar construct as is openness to experience and the externality factor, namely, cognitive engagement with one's surroundings. The findings suggest that the CCTDI is not measuring self-generated experiences resembling altered states of consciousness (Sánchez, 1993).

Further research is now underway to identify other psychological variables that are related to CT dispositional attributes, as well as establish the degree to which close peers are able to match a subject's self-described disposition to think critically.

College Freshmen Profiles

During fall orientation week, before college level instruction began, 587 new freshmen at a selective, private, comprehensive university completed the CCTDI. For each of the seven CCTDI scales and the overall CCTDI composite Table 1 presents group means, range, standard deviations, number of items in the scale, and alpha reliability of the scale. Scores on the seven CCTDI scales can range from 10 to 60; scores above 40 indicate a positive inclination toward the scale's target disposition. The CCTDI total is the sum of the seven scale scores. It can range, therefore, between 70 and 420, with a total score above 280 indicating a positive overall disposition toward CT. The students surveyed were academically strong students, by such customary indicators as high school GPA in academic subjects (3.47) and SAT scores (1095 combined math and verbal).

The sample described in Table 1 includes only entering freshmen who had not yet experienced college level instruction. Only 13% of these 587 new college students were positive on all seven CT dispositional scales of the CCTDI. The other 87% were disposed against at least one of the seven aspects of the overall disposition toward CT. The most common profile among the sample of 587 new freshmen was of the student who showed a positive disposition toward all six CT aspects except truth-seeking. 19% of the sample displayed that profile.

Figure 1 arrays graphically the ranges of individual scores on CCTDI scales among the group of 587 new freshmen. The mean total score of this sample on the CCTDI was 299. The percentages of students with scores over 40 on each of the seven given dispositional attributes are reported along the bottom. Table 2 offers a visual profile of this cadre of entering students. Given these data, it would be reasonable to describe this group of entering freshmen college students as: (a) Positively disposed toward open-mindedness and inquisitiveness. (b) Their CT-confidence, analyticity, and cognitive maturity varies, but tends in the positive direction. (c) They are not inclined toward focus, diligence, and persistence in inquiry. (d) They oppose seeking knowledge which threatens their preconceptions or interests.

Table 1. Freshmen Cohort—Private Four-Year Comprehensive University
(*N* = 537)

Scale Name	Number of Items	Mean	Range	S.D.	<i>a</i>
Truth-seeking	12	35.36	20–50	5.40	.72
Open-mindedness	12	44.96	26–60	5.73	.73
Analyticity	11	42.89	24–58	5.08	.72
Systematicity	11	40.30	20–57	6.55	.74
Self-Confidence	9	42.53	20–58	6.22	.78
Inquisitiveness	10	47.60	24–60	6.10	.80
Maturity	10	44.58	18–60	6.38	.75
Total CCTDI Score)	75	298.22	184–377	27.36	.90

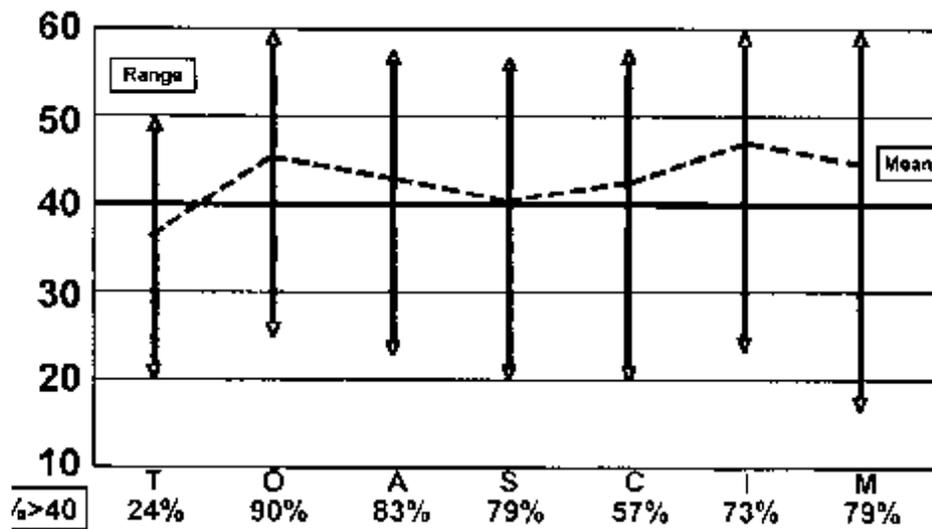


Figure 1. Profile of 587 new freshmen on orientation day, private university

A mid-year follow up of the 587 freshmen discovered that the mean total CCTDI score of those students who earned a grade of "C" in English Composition had been 290 (*n*=67). The mean total CCTDI score of those who earned an "A" had been 305 (*n*=93). Beside the total score, of the seven CCTDI scales scores, the two correlated with the grades faculty assigned in English Composition were the students' analyticity ($p < .003$) and cognitive-maturity ($p < .001$) scores.

Analyses such as the above provide faculty with data of relevance to instructional questions such as whether to adjust their teaching and grading to reflect a greater or lesser emphasis on a given dispositional attribute. For example, a study of the correlations of scores on each of the CCTDI scales with final course grades might reveal -- as one actually did -- that the faculty of a given program reward analyticity but not truth-seeking. Faculty concerned to foster more objectivity and fair-mindedness in students might consider how to adjust course assignments and grading practices to give greater emphasis

on fact-finding, objective analysis, and courageous questioning. Rather than exercises or exams on which students marshal arguments that supported what might be nothing more than their preconceptions, faculty might structure exercises and exams which reward students for how objectively they can present the evidence and arguments against views they hold uncritically. Faculty might wish to adjust their grading so that presenting a winning argument is less important to earning high marks than is presenting an complete, unbiased, and fair-minded array of accurately interpreted evidence and carefully considered reasons pro and con.

In other words, faculty concerned to improve instruction and academic advising might build upon the strengths of a group of students as those strengths are made evident by percentages of students with marks above 40 on given dispositional attribute (e.g. I=90%, O=83%, A=79%, and M=79%). That only 24% of the students in this sample scored over 40 in truth-seeking challenges faculty with bringing the majority of students into the academic culture which values open inquiry, attends to reasons, and is moved by relevant evidence. That the mean for systematicity hovered near 40 indicates a general indifference in many students toward systematic, organized, focused, and diligent inquiry. Nurturing a stronger inclination toward systematicity and truth-seeking might become goals of co-curricular programs, particularly for new students, originating out of student affairs as well as out of academic departments working with their own majors. For example, faculty and student development professionals might examine the extent to which the campus culture, including the residence life programs, support or undermine the inclination toward organized, focused, and diligent inquiry.

An overall appraisal by gender revealed CCTDI scores to be more similar than different. Yet small, but statistically significant differences, were observed between the means for the 324 women and the 262 men on three of the dispositional attributes scales: 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 statistically more inclined toward being analytical. Preliminary conjectures attribute the differences in these two samples either to developmental differences in young adult men and women or to their perceptions of their social-gender roles. The possible implications for college level pedagogy and curricular development are yet to be explored. An over-emphasis on statistical differences in the scales scores might be less beneficial to educators than focusing attention on the important finding that there is no difference between the means for women and for men in the overall disposition toward CT.

In considering the implications of CCTDI findings for instruction and developmental academic advising, it would be wise to remember that a disposition is not a skill; hence, it remains to be determined whether a stronger tendency toward cognitive maturity predicts greater skill at making mature judgments. A stronger inclination toward analyticity may or may not predict greater analytic skills. Strength in a given dispositional attribute indicates that a person is more inclined to use what skills he or she may have, while opposition to a given aspect of the overall disposition toward CT suggests that a person would be inclined not to use his or her skills, even if they were considerable.

Relation of CT Skills and the Disposition Toward CT

"We know how to think, thank you. But, frankly, we're just not interested." That might be the most telling negative comment college graduates could offer with regard to their general education. How should we evaluate a general education program if it taught tremendous facility with CT skills but utterly failed to nurture in students the disposition to actually engage in CT? Clearly, the question "Is the ability to think critically an outcome of a college education?" is a different question than "Is the disposition to think critically an outcome of a college education?"

Given traditional conceptualizations of the purposes of a liberal education, one might expect that institutional level evaluations would have focused on the inclination toward CT. However, evaluations of general education programs at the college level have tended to be driven by the available instrumentation. National tests, student self-reports, objective tests, and essay exam scoring have focused on indirect manifestations of CT skills. Even the research on college students CT skills has generally been limited by many of the same problems which plague much of the research on collegiate outcomes. Studies which are multi-institutional and longitudinal and which include sufficient control variables and appropriate comparison groups are rare (Ewell, 1993; Pascarella and Terenzini, 1991). Empirical research on CT skills is further inhibited by disagreement among leading theoreticians with regard to the definition of the construct (Jones, 1993; Ewell, 1993; Kurfiss 1988). However, recent CT skills testing, self-report studies, and studies using other indirect indicators report that growth in CT skills at the college level has occurred and has been perceived to have occurred (Facione, 1990a; Pascarella, 1989; Astin, 1993; Ewell, 1993).

By comparison to CT skills, broad attention to the precise theoretical delimitation of the dispositional dimension of CT is relatively recent. As a result, at the empirical level the question of the relationship between the disposition toward CT and CT skills is virtually unexplored. While acknowledging that a person who is capable of good CT may not be inclined to engage in CT, the APA Delphi report suggests in general terms one might expect to find a positive correlation (APA, 1990). Rather than being merely correlational, however, it might be more reasonable to hypothesize that the disposition toward CT reinforces CT skills and that success with CT skills reinforces the disposition.

This interactionist hypothesis can be formulated on three levels. First, in the most general sense, one's overall disposition toward CT might be conceived of as the nurturing ground on the basis of which one decides to attempt to use one's CT skills. In turn, successes in the use of CT skills might reinforce one's disposition toward CT. Whereas, should the outcome be unsuccessful, one would become less inclined to see CT as a viable way to cope with problems in the future. This suggests that the general education curriculum should focus on global applications of CT and a general nurturing process. Under this interpretation, it would seem wrongheaded to inquire too minutely into how to improve a given CT skill or sub-skill, or how to nurture one dispositional attribute in isolation from the others.

A second interactionist possibility, is that the operative relationships might occur between specific combinations of CT dispositional attributes and specific sets of CT skills. Hence, open-mindedness and inquisitiveness might lead one to ask interpretive and analytical questions. Cognitive maturity and CT-confidence might lead one toward more sophisticated inferences and judicious explanations. Truth-seeking might lead toward more effort in conjecturing alternatives or in honest self-correction. In other words, the second possibility is that the skills and the dispositional attributes interact, but in interesting clusters.

If this second interpretation turns out to be the case, then the exact mapping will have significant practical implications for educators. Knowing the linkages between certain clusters of skills and certain clusters of dispositions can guide the development of classroom exercises and assignments. Questions emphasizing specific combinations of skills can be placed in contexts that would tend to reinforce certain of the dispositions. For example, exercises to strengthen skills of categorization, analysis, and interpretation might be placed in a context requiring systematic and focused database inquiry and a measure of intellectual curiosity. Exercises to develop CT skills of evaluation and self-reflection might be placed in a context of certain belief structures, such as ethical or political views, which are challenging to consider open-mindedly and evaluate objectively. Preliminary empirical studies using the CCTDI and its companion skills test, the CCTST (Facione, 1990b), are beginning to suggest that perhaps truth-seeking is the most crucial dispositional attribute in predicting CT skills.³ If this turns out to be the case, then general

³ One small pilot investigation sampled 20 highly motivated college students and college-bound high

education programs which emphasize and reward unbiased, objective, courageous, fair-minded inquiry which follows where reasons and evidence lead could turn out to be the most effective programs to the development of CT skills.

Perkins and his colleagues posit the third interactionist possibility, namely that there exists a one-to-one connection between each CT dispositional attribute (which they conceive of as both a tendency and a value) and a given CT skill cognitive skill. They go on to theorize that the relationship is conceptual as well as behavioral; asserting, for example, that the disposition toward analyticity ought to be considered part of the very conceptualization of the cognitive skill of analysis, (Perkins, Jay and Tishman, 1993). One would hypothesize that if this were the case one would find a series of empirical correlations pairing each specific CT skill with one and only one CT dispositional dimension. Perkins and his colleagues have yet to gather empirical evidence to support this hypothesis.

Well-established strategies for the measurement of dispositions exist, (Nunnally, 1978; Likert, 1932). Yet empirical research on the relationship between CT skills and the disposition toward CT is still in its infancy. In part this is because the impetus behind the attention to CT in general education came from those concerned with teaching and curriculum development more so than from those concerned with psychological research. Historically more CT theoreticians emerged with backgrounds in the humanities and education than with backgrounds in the social or physical sciences. Even today their discussions about the measurement of CT dispositions appear to occur without awareness of the measurement science, (Ennis, 1994). For the moment this leaves those of us concerned about the improvement of general education with two not-incompatible choices: (a) based on our professional judgment and practical experience as teachers, emphasize both the cognitive skills and CT dispositional attributes in our teaching; and (b) collaborate with scholars interested in exploring empirically the effectiveness of alternative teaching methods and curricular designs as these impact the development of those skills and dispositional attributes

Future Research

The measurement of the disposition toward CT opens new and fertile areas for psychological and educational research. An important place to start is with replication studies. Using the CCTDI several other institutions have reported comparable student profiles to the one described in Table 2. For example, a study conducted at a public comprehensive university which selected its students from among the top 12% of high school graduates of its State, a sample of 198 freshmen and sophomores completed the CCTDI. The profile of their mean scores on each scale and on the CCTDI overall exactly mirrored that of the private university sample reported above. The 113 women and 85 men in this public university sample showed statistically significant differences on two scales, Maturity ($p < .02$) and Open-mindedness ($p < .007$), with the mean score for women being higher. As was the case for the private university students, the means for women and men on the overall CCTDI score did not differ significantly by gender

school students found a significant correlation ($p < .002$; $r = .67$) between CT skills and the disposition toward CT (Facione & Facione, 1992). In 1994, a sample of 106 nursing students at a non-selective college found a significant correlation as well. ($p < .033$; $r = .21$). In that sample truth-seeking was correlated with overall CT skill ($p < .017$; $r = .23$) as was open-mindedness ($p < .04$; $r = .20$). In one sample of 238 high school students there is positive correlation between overall CT skills and the disposition toward CT was $r = .38$ ($p < .001$). In that sample an intricate set of correlations between specific skill areas and multiple dispositional aspects seems to be emerging. However, at the time of this writing this dataset has yet to be fully analyzed. A trend toward a positive correlation between overall CT skills and the disposition toward CT emerged in a sample of 191 native Spanish speaking high school students ($r = .14$; $p < .058$). This finding must be regarded as preliminary, incomplete, and subject to revision, coming, as it does, from the analysis of a dataset piloting Spanish language translations of the CCTST and CCTDI.

in this sample.⁴

The course of development of these CT dispositional attributes, like their relationship to CT skills, is yet to be established. The college freshmen studied show a disinclination toward truth-seeking; but, how might college seniors or graduate students be disposed toward truth-seeking? At what stage of adolescent or adult development do we begin to see stronger dispositions toward analyticity and systematicity? Studies of junior high school students and high school students are now underway, as are others of college undergraduates and graduate students. The CCTDI, translated into French and Spanish, is being used to generate data which cross age, educational level, language, and hopefully cultural boundaries. These data, particularly when linked to demographic and academic information on students, promise to be useful to scholars exploring the developmental and cultural characteristics of the disposition toward CT and the impact of education on that development.

The relationships between the various CT dispositional attributes and metacognition, as well as an array of personality variables has just begun to be examined. Questions regarding the stability of various of the seven CT dispositional attributes across topics, contexts, stages of development, and times of life are just beginning to be asked. As research findings in these areas become more available, testable hypotheses regarding effective ways to nurture the disposition toward CT can begin to be examined. Researchers seeking to measure CT have cleared a near horizon only to discover that a vastly richer, unexplored, and exciting territory lies before them.

Cultivating Intellectual Character

From a research point of view, we cannot yet say exactly how the disposition toward CT relates to career and academic success. But, as many a veteran college instructor will predict, the data will show that the relationship is strong and positive. Nurturing the disposition to think is an important element in the curriculum of professional programs and liberal education programs alike. Engaging students in interesting, complex and realistic problem solving situations, demanding well grounded reasons and systematically gathered evidence, modeling and insisting on objective and courageous analyses, and, at every turn, eliciting meta-cognitive reflection on their reasoning and problem solving will, as experienced educators know, vastly strengthen students' CT. Confident that the empirical research will support professional judgment and practical experience, we can anticipate the next, most reasonable questions: How does our general education curriculum and pedagogy impact the development of the disposition toward CT? Does the program increase open-mindedness, cognitive maturity, and truth-seeking, or might it stunt these or other dimensions of this disposition?

The description of a student's disposition toward CT is, in effect, a description of the student's intellectual character (Tishman, 1994). If the goal of college level general education is to prepare people for generative and productive civic, personal, and professional lives, then few things could be more crucial to a successful college curriculum than the cultivation of the intellectual character that would lead a person to approach life's problems objectively, open-mindedly, analytically, systematically, courageously, and judiciously. One might well add humanely, knowledgeably, creatively and ethically as well. And, although these characterological attributes take us beyond the disposition toward CT, they are more than welcome

⁴ Another study of nursing students at a small private college yielded a dataset that mirrored the findings of high means in open-mindedness and inquisitiveness, moderate but positive means in analyticity, confidence, and maturity, a neutral mean very near 40 in systematicity, and a mean that shows resistance to truth-seeking. A study which sampled graduates and undergraduates in a school of allied health at a large public comprehensive university in the midwest reported the same undergraduate profile, but the profile for the graduate student sample, while parallel, was stronger on all seven CCTDI scales.

in a full description of the goals of a college education.

In a national survey of hundreds of educators, employers, and policy-makers conducted by The Pennsylvania State University in 1993/94, the consensus was that CT skills and the disposition toward CT are vitally important to the exercise of work place decision making, leadership, clinical judgment, professional success, and effective participation in a democratic society, (Jones, 1994). The importance of college level CT is being reinforced at the level of national economic policy as much as at the personal level. In their influential book Thinking for a Living: Education and the Wealth of Nations, Marshall and Tucker (1992) express it this way:

"The future now belongs to societies that organize themselves for thinking. Nations that want high incomes and full employment must develop policies that emphasize the acquisition of knowledge and skills by everyone, not just a select few."

Marshall and Tucker argue that the nation's economic survival demands that we abandon an outdated education policy based on the production-line model. We cannot afford mass-produced education which really aims to develop only an elite few who can think, and therefore, who are trusted to make all the decisions while the rest of us receive only as much training as is needed to perform mindless jobs, like cogs in a great social machine. They maintain that the nation's economic survival is based on a population capable of thinking, knowing, learning, and problem-solving at all levels of the economic and social nexus that forms our complex society.

If our practical experience as professors is correct, if the national consensus is correct, if Marshall and Tucker are correct, then any college which merely trains people for entry level jobs, yet instills in them no valid general education, no grounding in how to learn, and no disposition to think does a grave disservice to those graduates and to the nation. And, those misguided or impatient students who seek only job training are asking for far too little. On the other hand, colleges which embrace the development of leadership, citizenship, and good judgment as among their foremost educational goals will achieve these goals only if their general studies programs succeed not just in teaching the skills, but in actually cultivating in their students the disposition toward critical thinking.

References

- American Academy of Nursing. (1992). AAN expert panel report: Culturally Competent Health Care. Nursing Outlook, 40(6), 277-283.
- American Philosophical Association. (1990). Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction, The Delphi Report: Research findings and recommendations prepared for the committee on pre-college philosophy. P. Facione, (Project Director). ERIC Doc. No. ED 315-423.
- Astin, A. W. (1993) What matters in college? San Francisco: Jossey-Bass.
- Block, J.H. & Block, J. (1980). The role of ego-control and ego-resiliency in the organization of behavior. In W. A. Collins (Ed.), Development of Cognition, Affect, and Social Relation: The Minnesota Symposia on Child Psychology, Vol. 13. Hillsdale, NJ: Lawrence Earlbaum.
- Browne, M. N. & Keeley, S. M. (1990) Asking the Right Questions, 3rd Ed. Englewood Cliffs, NJ: Prentice-Hall.
- Cantor, N. & Kihlstrom, J. F. (1987). Personality and Social Intelligence. Englewood Cliffs, NJ: Prentice-Hall.
- Carter-Wells, J. A. (1992, January). Defining, teaching, and assessing critical thinking in a multicultural context. Paper presented at the meeting of the Association of American Colleges,

- Washington, DC.
- Chaffee, J. (1992). Teaching critical thinking across the curriculum. Critical Thinking: Educational Imperative, 77, 25-35.
- Costa, P.T., Jr., & McCrae, R.R. (1985). The NEO Personality Inventory Manual. Odessa, FL: Psychological Assessment Resources.
- Costa, P.T., Jr., & McCrae, R.R. (1992). The Revised NEO Personality Inventory: Professional Manual. Odessa, FL: Psychological Assessment Resources.
- D'Angelo, (1971). The teaching of Critical Thinking. Amsterdam: B.R. Gruner.
- Dewey, J. (1933). How We Think: A Restatement of the Relation of Reflective Thinking to the Educational Process. Lexington, MA: D.C. Heath.
- Ennis, R. (1985). The logical basis for measuring CT skills. Educational Leadership, 43(2), 44-48.
- Ennis, R. (1987). A taxonomy of critical thinking dispositions and abilities. In, J. B. Barton & R. S. Sternberg, (Eds.), Teaching Thinking Skills: Theory and Practice. New York: W. H. Freeman.
- Ennis, R. (1994). Assessing CT dispositions: Theoretical considerations. Annual meetings of the American Educational Research Association. New Orleans, LA.
- Ewell, P. (1993). A Preliminary Study of the Feasibility and Utility for National Policy of Instructional "Good Practice" Indicators in Undergraduate Education. Boulder, CO.: National Center for Higher Education management Systems.
- Facione, N. C., Facione, P. A., & Sánchez, C. A. (In press). Critical thinking disposition as a measure of competent clinical judgment: The development of the California Critical Thinking Disposition Inventory. Journal of Nursing Education.
- Facione, P. A. (1990a) The California Critical Thinking Skills Test - College level: Technical reports #1 - #4. Washington DC: ERIC Doc Nos: ED 327549, ED 327550, ED 326584, ED 327566.
- Facione, P. A. (1990b). The California Critical Thinking Skills Test (CCTST): Forms A and B; and the CCTST Test manual Millbrae, CA: California Academic Press.
- Facione, P. A. (1992). Empirical methods of theory and tool development for the assessment of college level critical thinking and problem-solving. Report, 1992
- Conference on Collegiate Skills Assessment. Washington, DC: NCES, US Department of Education.
- Facione, P. A. & Facione, N. C. (1992). The California Critical Thinking Dispositions Inventory (CCTDI); and the CCTDI Test manual Millbrae, CA: California Academic Press.
- Glasser, E. M. (1985). CT: Educating for responsible citizenship in a democracy. National Forum, 65, 24-27.
- Gray, P. (1993). Engaging students' intellects: The immersion approach to CT in psychology instruction. Teaching of Psychology, 20(2), 68-74.
- Healy, J.M. Jr., (1989). Emotional adaptation to life transitions: Early impact on integrative cognitive processes. In D.M. Buss, & N. Cantor, (Eds.), Personality Psychology: Recent Trends and Emerging Directions, pp. 115-127. New York: Springer-Verlag.
- Jones, E. A. (1993). CT Literature Review. University Park, PA: National Center for Postsecondary Teaching, Learning and Assessment, The Pennsylvania State University.
- Jones, E. A. (1994). Defining important CT skills for college graduates to achieve. Sixth International Conference on Thinking. Boston, MA.
- Kurfiss, J. (1988). Critical Thinking: Theory, Research, Practice, and Possibilities. ASHE-ERIC Higher Education Report No. 2. Washington DC: Association for the Study of Higher Education.
- Lewin, K. (1935). A Dynamic Theory of Personality: Selected Papers. Translated by D. K. Adams & K. E. Zener. New York: McGraw Hill.
- Likert, R. A. (1932). A technique for the measurement of attitudes. Archives of Psychology, 140, 32-45.
- Marshall, R. & Tucker, M. (1992). Thinking for a Living: Education and the Wealth of Nations. New York: Basic Books.

- Mayfield, M. (1993). Thinking for Yourself: Developing CT Skills Through Writing. Belmont, CA.: Wadsworth Publishing Co.
- McCrae, R. R. & Costa, P. T. Jr. (1987). Validation of the five-factor model of personality across instruments and observers. Journal of Personality & Social Psychology, 52, 81-90.
- Meyers, C. (1986). Teaching Students to Think Critically. San Francisco: Jossey-Bass.
- Meleis, A. I. (1988). Strategies and conditions for teaching theoretical nursing: An international perspective. Journal of Advanced Nursing, 13, 592-604.
- National League for Nursing, (1990). Accreditation standards for baccalaureate degree programs and masters degree programs. New York: National League for Nursing.
- Norem, J. K. (1989). Cognitive strategies as personality: Effectiveness, specificity, flexibility, and change. In, D. M. Buss & N. Cantor, (Eds.), Personality Psychology: Recent Trends and Emerging Directions, pp. 45-60. New York: Springer-Verlag.
- Norris, S., & Ennis, R. (1989). Evaluating Critical Thinking. Pacific Grove, CA: Midwest Publications.
- North Central Association of Colleges and Schools, (1992). A Handbook of Accreditation. Chicago, IL: North Central Association of Colleges and Schools.
- Nunnally, J. C. (1978). Psychometric Theory. New York: McGraw Hill.
- Oxman-Michelli, W. (1992). Critical thinking as critical spirit. Resource Publication Series 4(7), 1-13. Montclair, NJ: Institute for Critical Thinking.
- Pascarella, E. T. (1989). The development of CT: Does college make a difference? Journal of College Student Development, 30, 19-26.
- Pascarella, E. T. & Terenzini, P. T. (1991). How college affects students: Findings and insights from twenty years of research. San Francisco: Jossey-Bass.
- Passmore, J. (1972). On teaching to be critical. In, R. F. Dearden, P. H. Hirst, and R. S. Peters, (Eds.), Education and the Development of Reason. Boston: Routledge & Kegan Paul.
- Paul, R. (1984). CT: Foundation to education for a free society. Educational Leadership, 4-14.
- Paul, R. (1990). Critical thinking. Rohnert Park, CA: Center for Critical Thinking and Moral Critique.
- Perkins, D., Jay, E., & Tishman, S. (1993). Beyond abilities: A dispositional theory of thinking. Merrill-Palmer Quarterly, 39(1), 1-21.
- Ratcliff, J.L. (1993). Achieving National Education Goal 5.5 Within the Framework of the Goals 2000 Program. National Center for Postsecondary Teaching, Learning and Assessment, The Pennsylvania State University.
- Sánchez, C. A. (1993). An exploration of cognitive strategies and dispositions in relation to ego resiliency. Unpublished manuscript, University of California, Riverside.
- Scheffler, I. (1973). Reason and teaching. Indianapolis: Hackett.
- Siegel, H. (1988). Educating Reason: Rationality, Critical Thinking, and Education. New York: Routledge, Chapman & Hall.
- Tanner, C. A. (1987). Teaching clinical judgment. In, H. H. Werley & J. J. Fitzpatrick, Annual Review of Nursing Research, (pp. 153-173). New York: Springer.
- Tellegen, A. (1981). Practicing the two disciplines of relaxation and enlightenment: Comment on "Role of the feedback signal in electromyography biofeedback: the relevance of attention" by Qualls and Sheehan. Journal of Experimental Psychology: General, 110, 217-226.
- Tellegen, A. (1982). Brief Manual for the Multidimensional Personality Questionnaire. Unpublished manuscript, University of Minnesota, Department of Psychology, Minneapolis.
- Tellegen, A. & Atkinson, G. (1974). Openness to absorbing and self altering experiences ("absorption"), a trait related to hypnotic susceptibility. Journal of Personality and Social Psychology, 54, 1031-1039.
- Tishman, S. (1994). Thinking dispositions and intellectual character. Annual meetings of the

American Educational Research Association. New Orleans, LA.

US Department of Education (1990). National goals for education. Washington DC. US Government.

Wade, C., & Tavis, C., (1993). Psychology, 3rd Ed. New York: Harper Collins College Publishers.

Western Association of Schools and Colleges, (1990). Standards for Accreditation Oakland, CA: Western Association of Schools and Colleges.