DOCUMENT RESUME

ED 437 379 SP 038 965

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TITLE California Teacher Preparation for Instruction in Critical Thinking: Research Findings and Policy Recommendations.
INSTITUTION California Commission on Teacher Credentialing, Sacramento.
PUB DATE 1997-03-00
NOTE 194p.
PUB TYPE Reports - Research (143)
EDRS PRICE MF01/PC08 Plus Postage.
DESCRIPTORS College Faculty; *Critical Thinking; Educational Change; Educational Policy; Elementary Secondary Education; Faculty Development; Higher Education; Preservice Teacher Education; *Problem Solving; Teacher Competencies; Teacher Educators; *Thinking Skills
IDENTIFIERS California

ABSTRACT

This report examines a study on the extent to which California's teacher preparation programs were preparing candidates for teaching critical thinking and problem-solving skills in elementary and secondary schools. Researchers conducted interviews with education and subject matter faculty in private and public colleges and universities. Results indicated that few faculty members in teacher preparation had in-depth exposure to research on the concept, and most had only a vague understanding of what critical thinking was and what was involved in bringing it successfully into instruction. Follow-up interviews with participants who had strong responses asked about classroom teaching practices and found that this group (with initially strong responses) had some depth of understanding. Interviews with faculty members who had undergone professional development on critical thinking found that these faculty members were better able to give detailed and plausible accounts of how they approached critical thinking in the classroom. Selections from work turned in at a Critical Thinking workshop for postsecondary faculty members are included. The report presents five policy recommendations that address information dissemination, postsecondary faculty professional development, accreditation standards focused on critical thinking, career-long preparation and reinforcement, and candidate accountability in performance examinations. (Contains 13 references.) (SM)

California Teacher Preparation for Instruction in Critical Thinking: Research Findings and Policy Recommendations

State of California

California Commission on Teacher Credentialing

March 1997

California Teacher Preparation for Instruction in Critical Thinking: Research Findings and Policy Recommendations

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March 1997

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The mission of the California Commission on Teacher Credentialing is to maintain and enhance quality . . . while encouraging innovation and creativity in the preparation . . . of professional educators for California's public schools.

Acknowledgements by the Commission

The California Commission on Teacher Credentialing expresses its gratitude to the many professional educators who contributed to the study reported here. Many postsecondary faculty members and administrators gave generously of their time by responding to requests for information. Some of them went further by nominating specific college courses and programs as examples of teacher preparation for critical thinking instruction, and by submitting materials for courses that were nominated. Particularly important contributions were made by the eleven members of the Critical Thinking Advisory Task Force, whose insightful discussions led to significant improvements in the analysis and interpretation of the research data.

The Commission expresses its deepest thanks to the principal investigators and authors of this significant report. Dr. Richard W. Paul, Dr. Linda Elder and Dr. Ted Bartell exercised great insight and demonstrated consummate skill in planning and completing the *Study of Teacher Preparation for Critical Thinking Instruction.* In making sense of their voluminous findings, and in conceiving the five policy recommendations in this report, the authors provided an outstanding example of critical thinking in action.

Acknowledgement by the Authors

The authors wish to acknowledge the important contribution of Professor Brian Jersky of the Mathematics Department of Sonoma State University to the quantitative and statistical analysis of the data in this study. Professor Jersky spent considerable time studying the relationships implicit in the data. We deeply appreciate his contribution to this study.

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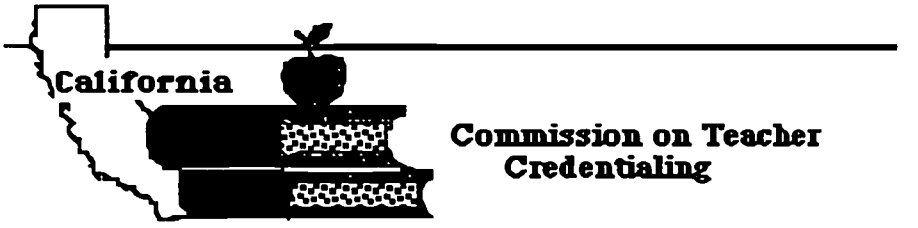

Program Evaluation & Research

Part I
A Study of Critical Thinking in Teacher Education: Faculty Knowledge of the Subject and Teaching Practices

There can be no more important role than the shaping of the thinking and teaching practices of future teachers. This shaping has consequences for many years to come in its effect on the minds and lives of countless students. Furthermore, there can be no more important influence to have on prospective teachers than that of aiding them to discover the potential power of their own minds to think with skill, insight and discipline. Only those teachers with good critical thinking and problem-solving abilities will be able to educate a generation of critical thinkers and problem solvers. This legislatively-mandated study reflects the growing public recognition of this crucial social and economic need. It highlights the fact that we need to be systematically proactive with respect to the teaching of critical thinking and problem-solving.

A Baseline Concept of Critical Thinking

Since one dimension of our assessment of the state of present knowledge of critical thinking and current teaching practices involves an assessment of the extent to which the views expressed demonstrated an internalization of "minimalist" elements of critical thinking, it is appropriate that we lay out the basis for such a minimalist notion. This section provides a brief summary of the following aspects of critical thinking: its etymology and dictionary definition, major definitions and explanations in the literature, a brief history of the idea, major tests, and values.

However, before we look into the concept of critical thinking in a formal way, it may be helpful to provide an informal characterization of the underlying core meaning of critical thinking, a concept which we believe can be generalized across subject matter disciplines and a wide range of human activities.

One way to explicate this core meaning is to view it as constituted by four interrelated components:

(1) ability to engage in reasoned discourse (the faith in this ability is the underlying assumption of a democratic society);

(2) reasoning operating in the context of intellectual standards (clarity, accuracy, precision, relevance, depth, breadth, logic);

(3) involving analytic inferential skills (the ability to formulate and assess goals and purposes, questions and problems, information and data, concepts and theoretical constructs, assumptions and presuppositions, implications and consequences, point of view and frames of reference); and

(4) committed to a fundamental value orientation that includes certain traits and dispositions (intellectual humility, intellectual courage, intellectual empathy, intellectual integrity, intellectual perseverance, faith in reason and fair-mindedness).

It is important to note that these components are interrelated and inter-dependent, functioning as a complex of skills, practices, disposition, attitudes and values. Further, this concept of critical thinking is multi-dimensional, including the intellectual (logic, reason), the psychological (self-awareness, empathy), the sociological (the socio-historical context), the ethical (involving moral norms and evaluation), and the philosophical (the meaning of human nature and life). As the multi-faceted,

multi-dimensional nature of the core concept of critical thinking has been delineated, it should be increasingly apparent that it can be approached both as a universal ideal and as an intensely personal undertaking. It is the ideal that guides the individual as he/she is engaged in the process of becoming a critical thinker. However, the thinking person is in a dynamic relationship with the ideal, discovering its deeper meaning in the process of experimenting with and living it. This is part of what it means to be engaged in a unique educational process leading to a broadly disciplined human mind and character.

The Etymology and Dictionary Definition of "Critical Thinking"

The concept of critical thinking used in the study reflects a concept embedded not only in a core body of research over the last 30 to 50 years but also derived from roots in ancient Greek. The word 'critical' derives etymologically from two Greek roots: "kriticos" (meaning discerning judgment) and "kriterion" (meaning standards). Etymologically, then, the word implies the development of "discerning judgment based on standards." In Webster's New World Dictionary, the relevant entry reads "characterized by careful analysis and judgment" and is followed by the gloss: "critical, in its strictest sense, implies an attempt at objective judgment so as to determine both merits and faults." Applied to thinking, then, we might provisionally define critical thinking as thinking that explicitly aims at well-founded judgment and hence utilizes appropriate evaluative standards in the attempt to determine the true worth, merit, or value of something.

The tradition of research into critical thinking reflects the common perception that human thinking left to itself often gravitates toward prejudice, over-generalization, common fallacies, self-deception, rigidity, and narrowness. The critical thinking tradition seeks ways of understanding the mind and then training the intellect so that such "errors", "blunders", and "distortions" of thought are minimized. It assumes that the capacity of humans for good reasoning can be nurtured and developed by an educational process aimed directly at that end. The history of critical thinking documents the development of this insight in a variety of subject matter domains and in a variety of social situations. Each major dimension of critical thinking has been carved out in intellectual debate and dispute through 2500 years of intellectual history. That history allows us to distinguish two contradictory intellectual tendencies: a tendency on the part of the large majority to uncritically accept whatever was presently believed as more or less eternal truth and a conflicting tendency on the part of a small minority—those who thought critically—to systematically question what was commonly accepted (and seek, as a result, to establish sounder, more reflective criteria and standards for judging what it does and does not make sense to accept as true).

Background Assumptions of the Study: A Minimalist Baseline View of Critical Thinking

In most of the questions included in the interviews for this study, we assessed the faculty views only to determine their clarity, elaborateness, specificity, and internal coherence. However, as indicated above, in some questions we also did some assessment of the faculty's understanding of what we assumed to be "essential" notions and base line elements. To illustrate this strategy, let's consider one such question. In question # 5, for example, we sought to determine whether faculty thought of "knowledge, truth, and sound judgment" as a) "not fundamentally a matter of my own personal preference or subjective taste" or b) "fundamentally, a matter of my own personal preference or subjective taste." We took this question to be significant because we assume that critical thinking is incoherent without "intellectual standards" and, hence, if a faculty member thinks of knowledge as purely subjective, that faculty member could not help students develop essential intellectual standards; he or she could do no more than encourage the students to think in any way they preferred (subjectively), to base their thinking on any criteria they personally and subjectively selected.

Let's consider another question. In question # 8, we asked faculty "how important is it for students to learn how to assess their own work?" We asked this question because we assume that self-assessment is essential to critical thinking. Students cannot take their instructors with them through life. Only those who learn to assess their own thinking can be said, on any plausible concept of critical thinking, to be critical thinkers.

In sum, though much of the study's findings are independent of any particular view of critical thinking--when, for example, we assess merely for clarity, elaborateness, and coherence--some parts of the study reflect evaluative judgments about elements which we view as essential to critical thinking. Let us now look at the grounding for those judgments.

Here are the operational (minimalist) assumptions behind the evaluative judgments we made.

Background Assumptions

(1) Critical thinking enables thinkers who are proficient in it to better produce and assess intellectual work as well as to act more "reasonably" and "effectively" in the world of affairs and in personal life.
(2) The possibility of assessing intellectual work and action in the world requires intellectual standards essential to sound reasoning and personal and professional judgment.
(3) Self-assessment is an integral dimension of such reasoning and judgment.
(4) As one learns to think critically one is better able to master content in diverse disciplines.
(5) Critical thinking is essential to and made manifest in all academic disciplines, including sound reasoning and expert performance in such diverse fields as biology, chemistry, mathematics, sociology, history, anthropology, literature, philosophy, as well as in all of the arts and professions.
(6) As one becomes proficient in critical thinking one becomes more proficient in using and assessing goals and purposes, questions and problems, information and data, conclusions and interpretations, concepts and theoretical constructs, assumptions and presuppositions, implications and consequences, and points of view and frames of reference.
(7) Mastery of language contributes to critical thinking.
(8) As one becomes more proficient in critical thinking one improves one's capacity to think more clearly, more accurately, more precisely, more relevantly, more deeply, more broadly, and more logically.
(9) As one becomes more proficient in critical thinking one becomes more intellectually perseverant, more intellectually responsible, more intellectually disciplined, more intellectually humble, more intellectually empathic, and more intellectually productive.
(10) As one becomes more proficient in critical thinking one becomes a better reader, writer, speaker, and listener.
(11) Proficiency in critical thinking is integral to lifelong learning and the capacity to deal effectively with a world of accelerating change.

Relationships Between Critical Thinking and Problem Solving

(1) Problem solving requires critical thinking (it would make no sense to be an "uncritical" problem solver nor to think that uncritical thinking is effective in the solution of problems).
(2) Well-conceived critical thinking invariably contributes to the solution of problems (it would make little sense to say, "I need to think critically, but I have no problems that I need to solve).
(3) All of the points made above with respect to critical thinking can be made with minor adjustments for problem solving; and hence.
(4) Problem solving is a major use of critical thinking and critical thinking a major tool in problem solving (and therefore that the two are best treated in conjunction rather than in disjunction).

One way to assess the reasonability of these assumptions is to randomly choose a few of them, negate them, and see if their negations have any plausibility. What you will find, we suggest, is that negating the "minimalist" assumptions we made leads to views that are inconsistent with virtually any reasonable construal of critical thinking and its traditional agenda (given its history and semantics).

For example, suppose someone denied our first four assumptions. They would, therefore, have to assert:

(1) Critical thinking does not enable thinkers proficient in it to better produce and assess intellectual work nor to act more "reasonably" and "effectively" in the world of affairs and personal life.
(2) The possibility of assessing intellectual work and action in the world does not require intellectual standards essential to sound reasoning and personal and professional judgment .
(3) Self-assessment is not an integral dimension of such reasoning and judgment.
(4) As one learns to think critically one is no better able to master content in diverse disciplines;

Of what possible use would this "alternative" notion of critical thinking be? It would be one in which students would learn something that does not entail better intellectual work, that does not make them more reasonable or effective, that has no intellectual standards, that involves no self-assessment, and does not improve their ability to learn the content of the disciplines.

In other words, a close examination of our "minimalist" assumptions reveals that they are fully in keeping with the semantics of the words 'critical thinking,' with the history of the concept, with what is tested in established critical thinking tests, and with the variety of ways that critical thinking is defined in the field.

No Single Definition of Critical Thinking Will Do

Given the complexity of critical thinking--its rootedness in 2500 years of intellectual history as well as the wide range of its application--it is unwise to put too much weight on any one "definition" of critical thinking. Any brief formulation of critical thinking is bound to have important limitations. Some theoreticians well established in the literature have provided us with a range of useful "definitions", each with their limitations. In **Educating Reason: Rationality, Critical Thinking, and Education,** Harvey Siegel (1988) defines critical thinking as "thinking (that is) appropriately moved by reasons". This definition highlights the contrast between the mind's tendency to be shaped by phenomena other than reasons: desires, fears, social rewards and punishments, etc. Robert Ennis (1985) defines critical thinking as "rational reflective thinking concerned with what to do or believe." This definition usefully calls attention to the wide role that critical thinking plays in everyday life, for since all behavior depends on what we believe, all human action depends upon what we in some sense decide to do. Matthew Lipman (1988) defines critical thinking as "skillful, responsible, thinking that is conducive to judgment because it relies on criteria, is self-correcting and is sensitive to context". This definition highlights the need for intellectual standards and self-assessment.

Scriven and Paul (Paul, 1995) define critical thinking (for the National Council For Excellence in Critical Thinking) as follows: "Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action."..."critical thinking can be seen as having two components: 1) a set of information and belief generating and processing skills, and 2) the habit, based on intellectual commitment, of using those skills to guide behavior. It is thus to be contrasted with: 1) the mere acquisition and retention of information alone, because it involves a particular way in which information is sought and treated; 2) the mere possession of a set of skills, because it involves the continual use of them; and 3) the mere use of those skills ("as an exercise") without acceptance of their results."

To look at the question of "definition" from another point of view, we will now review basic explanations of critical thinking expressed in interviews of a number of scholars in the field of critical thinking research conducted by John Esterle and Dan Cluman of The Whitman Institute of San Francisco (1993). One of the questions asked all interviewees was, "What is your conception of critical thinking?" A review of these answers demonstrates, as above, that despite diversity of expression there is a core of common meaning in the field.

CAROLE WADE: "In our introductory psychology book, Carol Tavris and I have a definition we thought quite a bit about. We define critical thinking as "the ability and willingness to assess claims and make objective judgments on the basis of well-supported reasons." We wanted to get in the *willingness* as well as the ability because a person can master critical thinking skills without being the least bit disposed to use them. Also, we didn't want critical thinking to be confined to problem solving. Unless you construe problem solving extremely broadly, critical thinking goes beyond that, to include forming judgments, evaluating claims, defending a position. We said "well-supported reasons" rather than "evidence" because, although our own discipline emphasizes empirical evidence, we wanted to recognize that you don't reach all conclusions or assess all claims on the basis of such evidence. Sometimes there is no empirical evidence and critical thinking is purely a process of reasoned judgment."

MICHAEL SCRIVEN: "... it's the skill to identify the less obvious alternatives to positions, claims, arguments, generalizations, and definitions and to evaluate the alternatives with reasonable objectivity. Both are equally important. You may be commenting on what's there, but often that's only the tip of the iceberg. If you haven't seen the hidden presuppositions or the built-in point of view, then you're not thinking critically, however smart you are in analyzing the stuff that's actually presented. And the other way around: You may be good at seeing the presuppositions, the prejudices and so on, but very poor at actually analyzing them. So both those skills are key."

STUART M. KEELEY: (Interviewed with Browne) "Rather than using a formal definition, we emphasize primarily the questions critical thinkers *think* should be questions and *want* to be questions. In other words, there is a set of questions that constitutes a rubric of what it means to be a critical thinker."

M. NEIL BROWNE: (Interviewed with Keeley) "And it's *a* set of questions, not *the* set of questions. I would add that a sine qua non of critical thinking is a focus on assessment, or evaluation, of the link between a claim and the basis for the claim. If there's not some orientation designed to move toward improved judgment—not right judgment but improved judgment—then I would be reluctant to label such a thing critical thinking. Our questions were not generated out of any theoretical framework but from our teaching practice. We were led to questioning as a format to express our standards because, unlike declarative stipulations of standards, there's greater openness to questioning, there's greater curiosity implied by questioning, and there's a requirement of action on the part of the person receiving the question.

We're personally not as interested in a process that improves reflection as we are in a process that improves living, that improves practice, and that thus improves judgment. I don't think I'd want to put a lot of energy into something that just enables me to reflect more profoundly. Not that there's not merit in that, but I prefer something that people can use to address problems in their lives."

RICHARD PAUL: "I think the best way to get to the nub of it is to see that everyone thinks and that their thinking is deeply involved in every dimension of their daily life. If there's one thing that you can't escape, it's your own thinking. It's everywhere you are and it's always shaping and influencing everything you do--your emotions and all your decisions. Every nook and cranny that's in you is thoughtful, i.e. full of thought. The key question is: Are you in charge of your thinking; or is your thinking in charge of you? You discover critical thinking when you realize how deeply the

quality of your life is dependent on the quality of your thinking, and that it's possible to take charge of your thinking to make it what you want it to be rather than what it has been made to be by your environment, your parents, your society, the media and so on. That's the basic idea behind critical thinking. It's intrinsically connected with a self determining way of living. It's a commitment to continually upgrade the quality of your thinking so as to upgrade the quality of your life."

CAROL TAVRIS: "We developed what we called eight guidelines to critical thinking. We don't care about the number—there could be fourteen, there could be six. Several people have said, "You know, really you've got four and a half here and several of them should be combined." I don't care! They work. They're handy. And they identify different steps in critical thinking, different dispositions, and different skills: How to ask questions. Why are things this way? The fact that everybody says it's so doesn't mean it's so. You need to examine evidence, look for other interpretations of phenomena, and tolerate uncertainty; some things we're never going to know. By the second edition of our book, we realized that many people were confusing `critical thinking' with exclusively negative thinking—debunking, tearing down. So we now speak of `critical *and* creative thinking,' to show that the other face of critical thinking is the ability and willingness to envision new possibilities and solutions.

Since this book came out we've developed our ideas in a handbook called *Critical and Creative Thinking: The Case of Love and War*, which introduces these guidelines and shows how they might be applied to subjects that many people think irrationally about—love, attraction, and intimacy, and prejudice, hostility, and war.

Carole Wade and I have become interested in the psychological impediments to clear thinking, and the way in which the mind is designed to serve itself, to protect self-esteem, to protect its own way of seeing the world, to keep things orderly so that everything fits into the existing framework."

JOHN CHAFFEE: To understand the nature of critical thinking, we first have to define the concept of *thinking*. From my perspective, thinking is a very practical, holistic integrated mental activity we engage in to make sense of the world. We use thinking in many different contexts: to solve problems, move towards goals, analyze complex issues, communicate with other people, and make informed decisions. So the thinking process is a global, purpose-seeking, meaning-seeking activity that is the essence of being human. Critical thinking builds on this fundamental process. The heart of thinking critically is developing a reflective orientation toward our minds. It involves exploring our thinking and the thinking of other people so that we can understand how our minds work, how we conceptualize the world and construct knowledge. Becoming a critical thinker goes beyond developing intellectual abilities. It also involves developing basic attitudes and dispositions. In a way, it's a whole philosophy of life, a process of personal transformation. A critical thinker views the world in a qualitatively different way from someone who is not a critical thinker. In this sense, there are intrinsic qualities that characterize a critical thinker: thinking actively, carefully exploring issues with penetrating questions, developing independent viewpoints based on analysis and reasoning, exploring issues from different perspectives, engaging in dialogue with other people, and exchanging views with them. Thinking critically is a community activity as well as a reflective process; by listening to and sharing ideas with others, our own thinking is expanded, clarified, and enriched.

The other distinction that's important is that while people *think* all the time, that doesn't mean they are *thinking critical*. A critical thinker is not only *capable* of reflecting, exploring, and analyzing but *chooses* to think in these advanced, sophisticated ways. For example, seeing something from a variety of perspectives involves the intellectual capability to empathize or identify with somebody else, but it also involves the desire to do it. Becoming a critical thinker is a melding of our intellect, with our emotions, attitudes, and dispositions.

MARLYS MAYFIELD: Ideally, I would say a critical thinker shows awakeness and alertness, particularly to incongruities, and a willingness to challenge incongruities. And all this takes courage and initiative. A critical thinker also appreciates clarity and precision, really relishes these qualities, and values the truth--whatever that might be--over being right. By my definition, those are the traits necessary to be a critical thinker.

Each of these definitions, as many others in the field, cut in fundamentally the same direction. All deal with the problem of up-grading the quality of human thinking by the cultivation of special skills, abilities, and insights that enable the thinker to take mindful command of his or her thinking. What is most obvious from a serious examination of these multiple characterizations of critical thinking is how much they share a common set of concerns and objectives--quite in line with the history of the concept, with the nature of critical thinking tests, and with the orientation of this study.

In the light of the above, we have elected not to work with any one definition of critical thinking, but rather to use a minimalist conception, one that is consistent with many definitions of critical thinking and which emphasizes only traditional base-line concepts and concerns well-established in intellectual history. We have striven for maximum openness in the concept behind the study to provide plenty of room for those may have a non-traditional concept of critical thinking. To put the point another way, we have restricted ourselves to clear-cut themes which emerge intrinsic to the history of critical thinking and hence correlate well with concepts and distinctions embedded in traditional tests and textbooks of critical thinking as well as with the problematics of thinking critically in both professional and everyday life settings.

The most basic theme underlying all traditional approaches to critical thinking is something like this. Though it is certainly of the nature of the human mind to think--spontaneously, continuously, and pervasively--it is not of the nature of the human mind to think critically about the standards and principles guiding its spontaneous thought. The human mind has no built-in drive to question its innate tendency to believe what it wants to believe, what makes it comfortable, what is simple rather than complex, and what is commonly believed and socially rewarded. The human mind is ordinarily at peace with itself as it internalizes and creates biases, prejudices, falsehoods, half-truths, and distortions. The human mind--in a natural state of uncriticalness--spontaneously experiences itself as in tune with "reality," as directly observing and faithfully recording it. It takes a special intervening process to produce the kind of self-criticalness that enables the mind to effectively and constructively question its own creations.

Learning to think critically is therefore an extraordinary process that cultivates capacities merely potential in human thought and develops them at the expense of capacities spontaneously activated from within and reinforced by normal socialization. It is not normal and inevitable or even common for a mind to discipline itself intellectually and direct itself toward intellectually defensible rather than egocentric beliefs, practices, and values. This problem is reflected in the history of critical thought.

A Brief History of the Idea of Critical Thinking

The intellectual roots of critical thinking are as ancient as its etymology, traceable, ultimately, to the teaching practice and vision of Socrates 2500 years ago who discovered by a method of probing questioning that people could not rationally justify their confident claims to knowledge. Confused meanings, inadequate evidence, or self-contradictory beliefs often lurked beneath smooth but largely empty rhetoric. Socrates established the fact that one cannot depend upon those in "authority" to have sound knowledge and insight. He demonstrated that persons may have power and high position and yet be deeply confused and irrational. He established the importance of asking deep questions that probe profoundly into thinking before we accept ideas as worthy of belief. He established the importance of seeking evidence, closely examining reasoning and assumptions, analyzing basic concepts, and tracing out implications not only of what is said but of what is done as well. His method of questioning is now known as "Socratic questioning" and is the best known critical thinking teaching strategy. In his mode of questioning, Socrates highlighted the need in thinking for clarity and logical consistency.

Socrates set the agenda for the tradition of critical thinking, namely, to reflectively question common beliefs and explanations, carefully distinguishing those beliefs that are reasonable and logical from those which--however appealing they may be to our native egocentrism, however much they serve our vested interests, however comfortable or comforting they may be--lack adequate evidence or rational foundation to warrant our belief.

Socrates' practice was followed by the critical thinking of Plato (who recorded Socrates' thought), Aristotle, and the Greek skeptics, all of whom emphasized that things are often very different from what they appear to be and that only the trained mind is prepared to see through the way things look to us on the surface (delusive appearances) to the way they really are beneath the surface (the deeper realities of life). From this ancient Greek tradition emerged the need, for anyone who aspired to understand the deeper realities, to think systematically, to trace implications broadly and deeply, for only thinking that is comprehensive, well-reasoned, and responsive to objections can take us beyond the surface.

In the middle ages, the tradition of systematic critical thinking was embodied in the writings and teachings of such thinkers as Thomas Aquinas (**Summa Theologica**) who--to ensure his thinking met the test of critical thought--always systematically stated, considered, and answered all criticisms of his ideas as a necessary stage in developing them. Aquinas heightened our awareness not only of the potential power of reasoning but also of the need for reasoning to be systematically cultivated and "cross-examined." Of course, Aquinas' thinking also illustrates that those who think critically do not always reject established beliefs, only those beliefs that lack reasonable foundations.

In the Renaissance (15th and 16th Centuries), a flood of scholars in Europe began to think critically about religion, art, society, human nature, law, and freedom. They proceeded with the assumption that most of the domains of human life were in need of searching analysis and critique. Among these scholars were Colet, Erasmus, and More in England. They followed up on the insight of the ancients.

Francis Bacon, in England, was explicitly concerned with the way we misuse our minds in seeking knowledge. He recognized explicitly that the mind cannot safely be left to its natural tendencies. In his book **The Advancement of Learning** , he argued for the importance of studying the world empirically. He laid the foundation for modern science with his emphasis on the information-gathering processes. He also called attention to the fact that most people, if left to their own devices, develop bad habits of thought (which he called "idols") that lead them to believe what is false or misleading. He called attention to "Idols of the tribe" (the ways our mind naturally tends to trick itself), "Idols of the market-place" (the ways we misuse words), "Idols of the theater" (our tendency to become trapped in conventional systems of thought), and "Idols of the schools" (the problems in

thinking when based on blind rules and poor instruction). His book could be considered one of the earliest texts in critical thinking, for his agenda was very much the traditional agenda of critical thinking.

Some fifty years later in France, Descartes wrote what might be called the second text in critical thinking, **Rules For the Direction of the Mind.** In it, Descartes argued for the need for a special systematic disciplining of the mind to guide it in thinking. He articulated and defended the need in thinking for clarity and precision. He developed a method of critical thought based on the principle of systematic doubt. He emphasized the need to base thinking on well-thought through foundational assumptions. Every part of thinking, he argued, should be questioned, doubted, and tested.

In the same time period, Sir Thomas More developed a model of a new social order, **Utopia**, in which every domain of the present world was subject to critique. His implicit thesis was that established social systems are in need of radical analysis and critique. The critical thinking of these Renaissance and post-Renaissance scholars opened the way for the emergence of science and for the development of democracy, human rights, and freedom for thought.

In the Italian Renaissance, Machiavelli (**The Prince**) critically assessed the politics of the day, and laid the foundation for modern critical political thought. He refused to assume that government functioned as those in power said it did. Rather, he critically analyzed how it did function and laid the foundation for political thinking that exposes both, on the one hand, the real agendas of politicians and, on the other hand, the many contradictions and inconsistencies of the hard, cruel, world of the politics of his day.

Hobbes and Locke (in 16th and 17th Century England) displayed the same confidence in the critical mind of the thinker that we find in Machiavelli. Neither accepted the traditional picture of things dominant in the thinking of their day. Neither accepted as necessarily rational that which was considered "normal" in their culture. Both looked to the critical mind to open up new vistas of learning. Hobbes adopted a naturalistic view of the world in which everything was to be explained by evidence and reasoning. Locke defended a common sense analysis of everyday life and thought. He laid the theoretical foundation for critical thinking about basic human rights and the responsibilities of all governments to submit to the reasoned criticism of thoughtful citizens.

It was in this spirit of intellectual freedom and critical thought that people such as Robert Boyle (in the 17th Century) and Sir Isaac Newton (in the 17th and 18th Century) did their work. In his **Sceptical Chymist**, Boyle severely criticized the chemical theory that had preceded him. Newton, in turn, developed a far-reaching framework of thought which roundly criticized the traditionally accepted world view. He extended the critical thought of such minds as Copernicus, Galileo, and Kepler. After Boyle and Newton, it was recognized by those who reflected seriously on the natural world that egocentric views of world must be abandoned in favor of views based entirely on carefully gathered evidence and sound reasoning.

Another significant contribution to critical thinking was made by the thinkers of the French enlightenment: Bayle, Montesquieu, Voltaire, and Diderot. They all began with the premise that the human mind, when disciplined by reason, is better able to figure out the nature of the social and political world. What is more, for these thinkers, reason must turn inward upon itself, in order to determine weaknesses and strengths of thought. They valued disciplined intellectual exchange, in which all views had to be submitted to serious analysis and critique. They believed that all authority must submit in one way or another to the scrutiny of reasonable critical questioning.

Eighteenth Century thinkers extended our conception of critical thought even further, developing our sense of the power of critical thought and of its tools. Applied to the problem of economics, it produced Adam Smith's **Wealth of Nations.** In the same year, applied to the traditional concept of loyalty to the king, it produced the **Declaration of Independence.** Applied to reason itself, it produced Kant's **Critique of Pure Reason.**

In the 19th Century, critical thought was extended even further into the domain of human social life by Comte and Spencer. Applied to the problems of capitalism, it produced the searching social and economic critique of Karl Marx. Applied to the history of human culture and the basis of biological life, it led to Darwin's **Descent of Man**. Applied to the unconscious mind, it is reflected in the works of Sigmund Freud. Applied to cultures, it led to the establishment of the field of Anthropological studies. Applied to language, it led to the field of Linguistics and to many deep probings of the functions of symbols and language in human life.

In the 20th Century, our understanding of the power and nature of critical thinking has emerged in increasingly more explicit formulations. In 1906, William Graham Sumner published a land-breaking study of the foundations of sociology and anthropology, **Folkways**, in which he documented the tendency of the human mind to think sociocentrically and the parallel tendency for schools to serve the (uncritical) function of social indoctrination:

> "Schools make persons all on one pattern, orthodoxy. School education, unless it is regulated by the best knowledge and good sense, will produce men and women who are all of one pattern, as if turned in a lathe...An orthodoxy is produced in regard to all the great doctrines of life. It consists of the most worn and commonplace opinions which are common in the masses. The popular opinions always contain broad fallacies, half-truths, and glib generalizations (p. 630)."

At the same time, Sumner recognized the deep need for critical thinking in life and in education:

> "Criticism is the examination and test of propositions of any kind which are offered for acceptance, in order to find out whether they correspond to reality or not. The critical faculty is a product of education and training. It is a mental habit and power. It is a prime condition of human welfare that men and women should be trained in it. It is our only guarantee against delusion, deception, superstition, and misapprehension of ourselves and our earthly circumstances. Education is good just so far as it produces well-developed critical faculty. ...A teacher of any subject who insists on accuracy and a rational control of all processes and methods, and who holds everything open to unlimited verification and revision is cultivating that method as a habit in the pupils. Men educated in it cannot be stampeded...They are slow to believe. They can hold things as possible or probable in all degrees, without certainty and without pain. They can wait for evidence and weigh evidence...They can resist appeals to their dearest prejudices...Education in the critical faculty is the only education of which it can be truly said that it makes good citizens (pp. 632, 633)."

John Dewey agreed. From his work, we have increased our sense of the pragmatic basis of human thought (its instrumental nature) , and especially its grounding in actual human purposes, goals, and objectives. From the work of Ludwig Wittgenstein we have increased our awareness not only of the importance of concepts in human thought, but also of the need to analyze concepts and assess their power and limitations. From the work of Piaget, we have increased our awareness of the egocentric and sociocentric tendencies of human thought and of the special need to develop critical thought which is able to reason within multiple standpoints, and to be raised to the level of "conscious realization." From the massive contribution of all the "hard" sciences, we have learned the power of information and the importance of gathering information with great care and precision, and with sensitivity to its potential inaccuracy, distortion, or misuse. From the contribution of depth-psychology, we have learned how easily the human mind is self-deceived, how easily it unconsciously constructs illusions and delusions, how easily it rationalizes and stereotypes, projects and scapegoats.

To sum up, the tools and resources of the critical thinker have been vastly increased due to the history of critical thought. Hundreds of thinkers have contributed to its development. Each major discipline has made some contribution to critical thought. Yet for our purposes, it is the summing up of base-line common denominators for critical thinking that is most important. Let us consider now that summation.

The Common Denominators of Critical Thinking

We now recognize that critical thinking, by its very nature, requires, for example, the systematic monitoring of thought, that thinking, to be critical, must not be accepted at face value but must be analyzed and assessed for its clarity, accuracy, relevance, depth, breadth, and logicalness. We now recognize that critical thinking, by its very nature, requires, for example, the recognition that all reasoning occurs within points of view and frames of reference, that all reasoning proceeds from some goals and objectives, has an informational base, that all data when used in reasoning must be interpreted, that interpretation involves concepts, that concepts entail assumptions, and that all basic inferences in thought have implications. We now recognize that each of these dimensions of thinking need to be monitored and that problems of thinking can occur in any of them.

The result of the collective contribution of the history of critical thought is that the basic questions of Socrates can now be much more powerfully and focally framed and used. In every domain of human thought, and within every use of reasoning within any domain, it is now possible to question:

- ends and objectives,
- the status and wording of questions,
- the sources of information and fact,
- the method and quality of information collection,
- the mode of judgment and reasoning used,
- the concepts that make that reasoning possible,
- the assumptions that underlie concepts in use,
- the implications that follow from their use, and
- the point of view or frame of reference within which reasoning takes place.

In other words, questioning that focuses on these fundamentals of thought and reasoning are now baseline in critical thinking. It is beyond question that intellectual errors or mistakes can occur in any of these dimensions, and that students need to be fluent in talking about these structures and standards.

Independent of the subject studied, students need to be able to articulate thinking about thinking that reflects basic command of the intellectual dimensions of thought: "Let's see, what is the most fundamental issue here? From what point of view should I approach this problem? Does it make sense for me to assume this? From these data may I infer this? What is implied in this graph? What is the fundamental concept here? Is this consistent with that? What makes this question complex? How could I check the accuracy of these data? If this is so, what else is implied? Is this a credible source of information?, etc..., etc..." (For more information on the basic elements of thought and basic intellectual criteria and standards, see Appendices D and E).

With intellectual language such as this in the foreground, students can now be taught at least minimal critical thinking moves within any subject field. What is more, there is no reason in principle that students cannot take the basic tools of critical thought which they learn in one domain of study and extend it (with appropriate adjustments) to all the other domains and subjects which they study. For example, having questioned the wording of a problem in math, I am more likely to question the wording of a problem in the other subjects I study.

As a result of the fact that students can learn these generalizable critical thinking moves, they need not be taught history simply as a body of facts to memorize; they can now be taught history as historical reasoning. Classes can be designed so that students learn to think historically and develop skills and abilities essential to historical thought. Math can be taught so that the emphasis is on mathematical reasoning. Students can learn to think geographically, economically, biologically, chemically, in courses within these disciplines. In principle, then, all students can be taught so that they learn how to bring the basic tools of disciplined reasoning into every subject they study.

Unfortunately, it is apparent, given the results of this study, that we are very far from this ideal state of affairs. We now turn to the fundamental concepts and principles tested in standardized critical thinking tests.

Tests of Critical Thinking

Though the concept of critical thinking has been developing over hundreds of years, its currency as an explicit term of discussion and as a focal point for testing in education dates from 1941, with the publication of **An Experiment in Critical Thinking** by Edward M. Glaser. On the basis of this research the **Watson-Glaser Critical Thinking Test** was developed which assesses a number of dimensions of critical thinking, including the ability to make valid inferences, identify assumptions, and trace implications implicit in a text. Following the Watson-Glaser test development, the next 60 years saw the development of many other instruments for assessing components of critical thinking, the most important being that developed by Robert Ennis, first at Cornell and then at the University of Illinois.

As Director of the **Cornell Critical Thinking Project** (1958-1970), Ennis developed the **Cornell Critical Thinking Tests**, focusing on induction, credibility, prediction, fallacies, deduction, definition, and assumption identification. Subsequently, Ennis developed with Weir, the **Ennis-Weir Critical Thinking Essay Test** which focuses on getting the point, seeing reasons and assumptions, stating one's point, offering good reasons, seeing other possibilities and avoiding equivocation, irrelevance, circularity, over generalization and misleading emotive language. In 1964 Ennis published, with associates, the **Cornell Class-Reasoning Test** and the **Cornell Conditional-Reasoning Test**.

Other more recent tests have been developed, including the **New Jersey Test of Reasoning Skills** in 1983 by Virginia Shipman which focuses on the syllogism, assumption identification, induction, and good reasons; the **Test on Appraising Observations** in 1983 by Stephen Norris and Ruth King; the **California Critical Thinking Skills Test** by Peter Facione; and **ICAT Critical Thinking Essay Test** in 1995 by the staff of the International Center For Assessment of Higher Order Thinking.

These tests collectively establish the operational grounding for the base-line concepts of critical thinking (question, information, inference, concept, assumption, implication, etc...) and criteria for critical thinking (clarity, precision, accuracy, relevance, logicalness, etc...).

These concepts are reflected, as well, in the **California State University's Executive Order 338** (November 1, 1980), which provides guidelines for instruction in critical thinking within all the California State Universities and Colleges:

> "Instruction in critical thinking is to be designed to achieve an understanding of the relationship of language to logic, which should lead to the ability to analyze, criticize, and advocate ideas, to reason inductively and deductively, and to reach factual or judgmental conclusions based on sound inferences drawn from unambiguous statements of knowledge or belief. The minimal competence to be expected at the successful conclusion of instruction should be the ability to distinguish fact from judgment, belief from knowledge, and skills in elementary inductive and deductive processes, including an understanding of the formal and informal fallacies of language and thought."

We now turn to the values that are essential for critical thinking.

Values of Critical Thinking

What the history of critical thinking and its research tradition reveals is that critical thinking is not value free. It could not be—given that it seeks to distinguish the sound from the unsound, the logical from the illogical, the clear from the vague, the relevant from the irrelevant... It represents a commitment to address the world in a questioning way, not to accept things as they are, but continually to seek ways to analyze, assess, and improve things. Critical thinkers, historically speaking, have been persons of intellectual courage who were willing to question what others accepted without question. They displayed dispositions or value commitments that motivated their involvement in critical thinking.

Those who have deeply studied critical thinking have articulated these values somewhat differently, but, nevertheless, clearly agree on the common core. For example, Robert Ennis (1985) defines the value commitments or dispositions in the following way." Critical thinkers:

- seek a clear statement of the thesis or question
- seek reasons
- try to be well-informed
- use credible sources and mention them
- take into account the total situation
- try to remain relevant to the main point
- keep in mind the original and/or basic concern
- look for alternatives
- are open-minded
- consider seriously other points of view than one's own
- reason from premises with which one disagrees--without letting the disagreement interfere with one's reasoning
- withhold judgment when the evidence and reasons are insufficient
- take a position (and change a position) when the evidence and reasons are sufficient
- seek as much precision as the subject permits
- deal in an orderly manner with the parts of a complex whole
- are sensitive to the feelings, level of knowledge, and degree of sophistication of others"

Harvey Siegel (1980) sums up the values and commitments of the critical thinker with the phrase "having the critical spirit." One who has the critical spirit recognizes the right of everyone to question and demand reasons and is eager to base his or her behavior on good reasons. Having the critical spirit one is willing "to subject all beliefs and practices to scrutiny" and to face oneself honestly. Such a person is committed to "honestly appraising the power" of all reasons given and willing to have his or her reasons subjected to independent evaluation. To be a critical thinker, Siegel argues, requires a deep commitment to live "a rational life, a life in which the critical question for reasons is a dominant and integrating motive."

R.S. Peters (1973), In **Reason and Compassion,** has developed the significance of the value commitments of reason and critical thought as follows:

> "There is, for instance, the hatred of contradictions and inconsistencies, together with the love of clarity and hatred of confusion without which words could not be held to relatively constant meanings and testable rules and generalizations stated. A reasonable man cannot, without some special explanation, slap his sides with delight or express indifference if he is told that what he says is confused, incoherent and perhaps riddled with contradictions.
>
> Reason is the antithesis of arbitrariness. In its operation it is supported by the appropriate passions which are mainly negative in character—the hatred of irrelevance, special pleading

and arbitrary fiat. The more developed emotion of indignation is aroused when some excess of arbitrariness is perpetuated in a situation where people's interests and claims are at stake. The positive side of this is the passion for fairness and impartial consideration of claims.

A man who is prepared to reason must feel strongly that he must follow the arguments and decide things in terms of where they lead. He must have a sense of the giveness of the impersonality of such considerations. In so far as thoughts about persons enter his head they should be tinged with the respect which is due to another who, like himself, may have a point of view which is worth considering, who may have a glimmering of the truth which has so far eluded himself."

Richard Paul (1995) argues that there are fundamental intellectual traits that are based on basic values essential to critical thinking. He delineates them as follows: intellectual humility, intellectual courage, intellectual empathy, intellectual perseverance, intellectual integrity, faith in reason, and fair-mindedness. His delineation of questions appropriate to the application of intellectual standards implicitly reflects traditional values basic to critical thinking (see Appendix F for elaboration).

Methodology of the Study of Faculty Knowledge and Teaching Practices

On September 29, 1994 Governor Wilson signed legislation authored by Senator Leroy Greene (SB1849) directing the Commission on Teacher Credentialing to conduct a study of teacher preparation programs to assess the extent to which these programs prepare candidates for teaching credentials to teach critical thinking and problem-solving skills in elementary and secondary schools.

During the spring of 1995, Commission staff began to conceptualize a study design that would yield descriptive information on course content and teaching practices being employed by post-secondary faculty to train teacher candidates. With assistance from the Center for Critical Thinking at Sonoma State University, an interview protocol was designed for use in telephone interviews with a cross-section of education and subject matter faculty in both public and private colleges and universities in California.

Sample Design

During the study planning process, a decision was made to design respondent selection procedures in such a way as to assure that information collected would be generalizable to all faculty preparing teachers across the state. To accomplish this objective, two statewide probability samples were designed: a sample of teacher education faculty based in Schools of Education, and a separate sample of Arts and Sciences faculty teaching courses in Commission-approved subject matter programs.

An equal probability sample of education faculty was generated by selecting every 15th name from the 1994-1995 California Teacher Education Directory recently compiled by Caddo Gap Press under the sponsorship of the California Council on the Education of Teachers, California Association of Colleges of Teacher Education, and State of California Association of Teacher Educators. The Directory groups names by institution and purports to include all regular/continuing faculty involved in credential programs in California. Although the composition of faculties changes over time, the Directory, nevertheless, represents the best approximation available of those working in teacher preparation programs at the present time. This systematic, stratified sample of education faculty yielded 120 selections in 57 individual colleges/universities (28 public, 29 private).

The sampling procedure for faculty teaching in subject matter programs was more complex, owing to the fact that no published lists exist on a statewide basis of individuals teaching in these areas. A three-stage sample was designed that entailed the following steps:

- Stage 1: Select approximately thirty institutions with probabilities proportional to the number of education faculty listed in the California Teacher Education Directory.

- Stage 2: Select 1-2 subject matter preparation programs at the sample institution from among the Commission approved subject matter programs in the areas of English, Government, History, Life Sciences, Physical Sciences, Mathematics, Social Sciences, and Multiple Subjects Preparation.

- Stage 3: Select at random two faculty members from the list of all faculty teaching courses in each subject matter program sampled at Stage 2.

The rationale for designing a separate sample of subject matter program faculty rests, in part, on the fact that multiple subject and single subject preparation constitute an essential part of teacher preparation, and this preparation is typically provided by faculty outside the School of Education.

One of the key design considerations for this second sample was a desire to select numbers of potential respondents that would generally be reflective of where most teacher candidates receive subject matter preparation; that is, the larger teacher preparation programs would have a proportionately greater chance of being selected into the second sample. This was accomplished by utilizing the number of education faculty at the institution to establish the first stage selection probability.

A second design aspect was to assure sufficient spread (heterogeneity) of sample programs across institutions through limiting the number of subject matter programs selected in each sample institution to 1 or 2 depending on size. Finally, the decision to select two faculty members from each subject matter program was motivated by a desire to include at least one faculty respondent in every sample program, in the event that one of the two faculty members refused or was otherwise unavailable for interviewing.

Third stage selection of individual subject matter faculty was implemented by phone with the assistance of campus-based Single Subject Coordinators, Multiple Subject Coordinators, and Liberal Studies Deans. After the specific subject matter program at a campus was selected at Stage 2, a telephone contact was made with the respective Coordinator or Dean to request that a list be drawn up of all full-time and part-time faculty teaching courses in the approved subject matter program. The Study Director then implemented a random selection of two names from the list, and these two individuals were subsequently contacted directly by the Study Director to request their participation in an interview. The sampling procedure just described yielded 60 sample names in 30 subject matter programs at 27 colleges/universities (18 public, 9 private). The subject matter programs selected included 7 programs in life sciences or physical sciences, 7 multiple subjects programs, and 2-5 programs in each of the other subject areas sampled.

Since the number of faculty teaching courses in approved subject matter programs tends to be proportionate to the number of faculty in education, and since the number of subject matter programs in an individual institution tends to vary only slightly (typically, 6-8 approved programs for the areas included in the study), the selection probability of any individual faculty respondent from this second sample tends to be roughly equal. Formally, each individual's probability of selection can be calculated as shown on the following page.

First Stage		Second Stage		Third Stage
Number of Faculty in School of Education / Total Number of Education Faculty in Directory	X	1 / N	X	2 / Number of Faculty Teaching in Subject Matter Program

Where N=number of approved subject matter programs at the institution.

Development of the Interview Protocol

Open-ended questions were formulated that addressed a number of key aspects of teaching practice in the area of critical thinking. Special efforts were made to allow the faculty respondent to describe the content and methodology of his/her practice in his/her own words without reference to a specific theoretical or philosophical stance.

The content of the interview protocol included questions regarding the respondent's own conception of critical thinking; the potential trade-off between content coverage vs. emphasis on development of critical thinking skills; which specific skills respondents deem to be most important and the ways in which they have attempted to teach those skills in their classroom; how faculty efforts in this area might be best assessed; the respondent's conception of intellectual criteria or standards; and their understanding of the meaning of terms such as assumption, inference, and implication. In each of these areas follow-up questions were also developed to give the respondent an opportunity to provide the kinds of details and elaboration that would generate a deeper understanding of their views and practices (see Appendix A for copy of interview protocol).

Conduct of Interviews

In order to facilitate the scheduling of faculty interviews, the Commission's Executive Director contacted the Dean of the School of Education in each sample institution in October 1995 to ask that the individuals selected for interviewing be notified by the Dean of their inclusion in the statewide representative sample, and that they would be contacted shortly to schedule a 45 minute telephone interview.

A telephone call was then placed to the individual faculty member by the Study Director to request their participation in a telephone interview at a pre-designated time during November/December. Additional information on the study's purpose, design, and content was provided at this time. Almost all persons contacted agreed to participate.

The telephone interviews themselves were conducted by staff of the Center for Critical Thinking at Sonoma State University under an Interagency Agreement with the Commission. Interviewers employed the protocol that had been previously developed, and were trained in questioning and follow-up techniques to assure accuracy and consistency. With the consent of each interview subject, the interviews were recorded on audio tape for later coding and analysis. Respondents were additionally promised confidentiality and anonymity.

The same interview protocol was utilized for both education faculty and subject matter faculty. A total of 140 interviews were completed during November and December, 1995 as follows:

Education Faculty	101
Subject Matter Faculty	39

The response rate for each sample was calculated as:

Education Faculty	84%
Subject Matter Faculty	65%

Coding and Analysis of Interview Data

Information contained in the taped interviews was independently coded for the degree to which the respondent had a well-developed conceptualization of the particular concept queried. Notations were also made of key phrases or quotations that might typify the respondent's own approach to the training of critical thinking skills among teacher candidates.

Numeric data were then entered onto a data file and subjected to principal component analysis (using SAS) to determine the structure or pattern, if any, underlying the answers provided by faculty respondents. It was hoped that these dimensional analyses might allow detection and interpretation of any such cognitive structures. No special patterns were found that added to our interpretation of these data.

In addition, the frequency distributions for the multiple choice items were tabulated separately for each sample grouping, and for the combined samples, in an effort to identify important differences in response patterns across groups of faculty.

In general, the analysis strategy entailed calculation of incidence levels for the response categories on each item, cross-tabulation of individual items to determine the strength of any relationships, an analysis of open-ended responses to try to explain the characteristics of faculty respondents with well developed conceptualizations of critical thinking, the relationship between individual practices and particular conceptions of critical thinking, and the extraction of anecdotes or vignettes from the interviews to illustrate important findings.

Search for Exemplary Practices in Teaching for Critical Thinking

The second major component of the research effort was identification and analysis of exemplary practices in the teaching of critical thinking skills. The methodology and results of this component are reported in Part II of the present report. The study of exemplary practices had four phases, as follows.

(1) *Direct Solicitation of Exemplary Practices From All Campuses With Approved Teacher Preparation Programs.* In late January of 1996, the Commission's Executive Director sent a letter to all Deans of Schools of Education and Deans of Colleges of Arts and Sciences, asking that faculty be encouraged to submit examples to the Commission of program design, course design (including model syllabi), assessment of teaching for critical thinking, and teaching strategies (model assignments, tests, and assessment tools, including those which facilitate student self-assessment).

(2) *Follow-Up Interviews of Strong Profiles.* Those faculty who were most specific, clear, and plausible about how they approached critical thinking in the classroom were interviewed again in the spring of 1996. In the follow-up interview we focused in-depth on classroom teaching

practices and also invited the submission of concrete details which provide the fullest possible understanding of how the individual professor sought to enhance the critical thinking of students.

(3) *Solicitation Among Those Who Have Undergone Professional Development In Critical Thinking.* Persons contacted were those who have attended either: 1) The International Conference on Critical Thinking and a workshop on critical thinking, 2) two workshops on critical thinking, or 3) The National Academy on Critical Thinking.

(4) *Selections From Workshop For University Faculty.* Examples were chosen of an initial class design from a hands-on session of the National Academy On Critical Thinking. In this exercise, the faculty had approximately 40 minutes to develop a conception of a class focused on the thinking essential to the content of a course, highlighting one organizing idea and describing the main features of a "typical" day.

Limitations of the Study

The resources available to conduct this study did not permit direct observation of actual teaching practices at the university level. We are thus limited to the self-reported information provided by faculty respondents. Although we have reason to believe that this information is accurate, we were not able to independently verify these self-reports.

Additionally, it should be noted that our data collection and analysis were intentionally limited to programs of teacher preparation. We recognize that there are other portions of the collegiate curriculum, as well as broader aspects of college life and learning, that fall outside the scope of our current inquiry.

Results of the Study of Faculty Knowledge and Teaching Practices

Aggregated Results from Education Faculty and Arts & Sciences Faculty

(1) Though the overwhelming majority (89%) claimed critical thinking to be a primary objective of their instruction, only a small minority (19%) gave a clear explanation of what critical thinking is. Furthermore, according to their answers, only 9% of the respondents were clearly teaching for critical thinking on a typical day in class.

(2) Though the overwhelming majority (78%) claimed that their students lacked appropriate intellectual standards (to use in assessing their thinking), and 73% considered that students learning to assess their own work was of primary importance, only a very small minority (8%) enumerated any intellectual criteria or standards they required of students or gave an intelligible explanation of what those criteria and standards were.

(3) While 50% of those interviewed said that they explicitly distinguish critical thinking skills from traits, only 8% provided a clear conception of the critical thinking skills they thought were most important for their students to develop. Furthermore the overwhelming majority (75%) provided either minimal or vague allusion (33%) or no allusion at all (42%) to intellectual traits of mind.

(4) When asked how they conceptualized truth, a surprising 41% of those who responded to the question said that knowledge, truth and sound judgment are fundamentally a matter of personal preference or subjective taste.

(5) Although the majority (67%) said that their concept of critical thinking is largely explicit in their thinking, only 19% elaborated on their concept of thinking.

(6) Although the vast majority (89%) stated that critical thinking was of primary importance to their instruction, 77% of the respondents provided limited or no conception of how to reconcile content coverage with the fostering of critical thinking.

(7) Although the overwhelming majority (81%) felt that their department's graduates develop a good or high level of critical thinking ability while in their program, only 20% said that their departments had a shared approach to critical thinking, and only 9% clearly articulated how they would assess the extent to which a faculty member was or was not fostering critical thinking. The remaining respondents had a limited conception or no conception of how to do this.

(8) Although the vast majority (89%) stated that critical thinking was of primary importance to their instruction, only a very small minority clearly explained the meanings of basic terms in critical thinking. For example, only 8% clearly differentiated between an assumption and an inference, and only 4% differentiated between an inference and an implication.

(9) A very small minority (9%) mentioned the special and/or growing need for critical thinking today in virtue of the pace of change and the complexities inherent in human life. Not a single respondent elaborated on the issue.

(10) In explaining their views of critical thinking, the overwhelming majority (69%) made either no allusion at all, or a minimal allusion, to the need for greater emphasis on peer and student self-assessment in instruction.

(11) From either the quantitative data directly, or from minimal inference from those data, it is clear that a significant percentage of faculty interviewed (and, if representative, most faculty) :

- do not understand the connection of critical thinking to intellectual standards.
- do not specify intellectual criteria and standards.
- inadvertently confuse the active involvement of students in classroom activities with critical thinking in those activities.
- do not provide an elaborated articulation of their concept of critical thinking.
- do not provide plausible examples of how they foster critical thinking in the classroom.
- do not name specific critical thinking skills they think are important for students to learn.
- do not explain how to reconcile covering content with fostering critical thinking.
- do not consider reasoning as a significant focus of critical thinking
- do not think of reasoning within disciplines as a major focus of instruction
- do not specify basic structures essential to the analysis of reasoning
- do not give an intelligible explanation of basic abilities either in critical thinking or in reasoning
- do not distinguish the psychological dimension of thought from the intellectual dimension
- have had no involvement in research into critical thinking and have not attended any conferences on the subject.
- do not name a particular theory or theorist that has shaped their concept of critical thinking.

Quantitative Findings that Illuminate the Main Differences Between Education Faculty and Arts and Sciences Faculty

Some differences were observed between education and Arts and Sciences faculty responses. These differences provide some interesting points of contrast that suggest more or less predictable strengths and weaknesses, given their overall orientation. For example, as one would expect, education faculty are, in general, somewhat more articulate than their Arts and Sciences counterparts about teaching techniques and in reconciling content with process, while the Arts and Sciences faculty are somewhat more articulate than Education faculty regarding the basic skills of thought that are integral to thinking within a discipline. Here are the specifics:

(1) Education faculty were slightly more likely (91%) to state that critical thinking is of primary importance to their instructional objectives than Arts and Sciences faculty (82%).

(2) Education faculty were somewhat more likely (55%) to include in their concept of critical thinking a distinction between critical thinking skills and traits than Arts and Sciences faculty (39%), though neither group effectively articulated that difference.

(3) Education faculty were somewhat better in articulating how they bring critical thinking into the curriculum on a typical class day. (33% of the Arts and Sciences faculty had little or no conception of how to do this while only 15% of the Education faculty had the same lack of conception.)

(4) Education faculty were more likely to elaborate on how they would reconcile content coverage with fostering critical thinking. (25% were able to elaborate on reconciliation of these, while only 8% of the Arts and Sciences faculty elaborated on the same point.)

(5) The Arts and Sciences faculty better articulated the basic skills of thought that students need to effectively address issues and concerns in their lives such as clarifying questions, gathering relevant data or information, formulating or reasoning to logical or valid conclusions, interpretations or solutions, etc. Of the Education faculty, 40% failed to mention any of these basic skills while only 5% of the non-education faculty failed to mention any.

(6) The Education faculty were somewhat less likely to ignore the importance of emphasizing problem solving in the classroom than the Arts and Sciences group. Only 10% of this group failed to mention its importance while 26% of the Arts and Sciences faculty failed to mention it.

(7) The Education faculty were somewhat less likely to ignore the special need for critical thinking today in virtue of such phenomena as accelerating change, intensifying complexity, and increasing interdependence. (64% of the Arts and Sciences faculty failed to mention its importance, while 51% of the Education group failed to mention it.)

(8) The Education faculty were less likely to ignore the need for emphasis on peer and student self-assessment. (33% percent of this group failed to mention it, while 55% of the Arts and Sciences group failed to mention it.)

Qualitative Generalizations: Responses to Open-Ended Questions

A close look at the open-ended responses obtained in the interviews provides a realistic sense of the empirical foundation for generalizations that go beyond purely quantitative data. Many of the samples from the interviews are vivid and deeply revealing. A full airing of these samples, with commentary, is contained in Appendix B.

The data collected enable us to present illustrative profiles of faculty who had a vague and or internally incoherent conception of critical thinking, in contrast to those who had a developed notion of critical thinking (irrespective of their orientation toward it). If we assume that those who had a vague or internally contradictory concept of critical thinking simply haven't thought much about the subject, and those who had a clear, well-elaborated, and internally coherent concept had thought seriously about the subject, then we can infer that comparatively few faculty have thought seriously about critical thinking. In other words, we were able to get a strong sense of how many faculty had seriously thought through the concept of critical thinking--irrespective of how they defined it--and then, we were able to separate out those whose views were not only highly elaborated but coherent.

From delving into the rich details of the open-ended responses, one finds not only confirmation of the quantitative data, but also powerful support for significant qualitative generalizations. What is more, a close look at individual cases reveals that there is significant contrast between those faculty members who have a developed concept of critical thinking and those who do not. The profiles of individual faculty that are summarized in the next section illustrate clearly the kind of differences that existed between those who were articulate in explaining how they approach critical thinking and those who were not. It also confirmed what the quantitative data showed, namely, that many faculty, without knowing it, are confused about the basic concepts and skills of critical thinking. Let us now look at some illustrative faculty profiles from the study.

Some Illustrative Profiles of Faculty Knowledge and Teaching Practices

What follows is a series of "profiles" that suggest some of the basic patterns of thinking found in particular faculty members who participated in the interviews. Each profile represents one faculty member who participated in the study. Each profile is anonymous—in keeping with the commitment made to all of those who agreed to be interviewed.

The Basic Pattern in Faculty Responses to Interview Questions

Most faculty members answered open-ended questions with vague answers, rather than clear and precise answers. In many of their answers there were internal "tensions" and in some cases outright contradictions. The magic talisman were phases like "constructivism", "Bloom's Taxonomy", "process-based", "inquiry-based", "beyond recall", "active learning", "meaning-centered" and similar phrases that under probing questions the majority of interviewees were unable to intelligibly explain in terms of critical thinking. The most common confusion, perhaps, was a confusion between what is necessary for critical thinking and what is sufficient for it. For example, active engagement is necessary to critical thinking, but one can be actively engaged and *not think critically*. To illustrate, many gang members are actively engaged in gang activities, but that does not make them critical thinkers. It is not *that* you are engaged but *how* you are engaged that matters.

Virtually all of those interviewed identified critical thinking and the learning of intellectual standards as primary objectives in instruction, yet few gave a clear explanation of what their concept of either was. Virtually all said that students lacked intellectual standards when they entered their classes, yet implied, at the same time, that they left with those intellectual standards in place. They also overwhelmingly stated or implied that their students left them with a good level of critical thinking as well as a good level of ability to foster critical thinking in their future students.

By direct statement or by implication, most claimed that they permeated their instruction with an emphasis on critical thinking and that the students internalized the concepts in their courses as a result. Yet only the rare interviewee mentioned the importance of students thinking clearly, accurately, precisely, relevantly, or logically, etc... Very few mentioned any of the basic skills of thought such as the ability to clarify questions; gather relevant data; reason to logical or valid conclusions; identify key assumptions; trace significant implications, or enter without distortion into alternative points of view. Intellectual traits of mind, such as intellectual humility, intellectual perseverance, intellectual responsibility, etc... are virtually unheard of by the interviewees.

Weak Profiles of Faculty Interview Responses

Commentary: The weak profiles are characterized by some combination of the following flaws: vagueness, confusion, inconsistency, and misconception. Frequently, within a weak profile, it is clear that the interviewee is speaking impressionistically and associationally, saying what occurs to him or her at the moment to say--leading, often, to statements in conflict with each other. At times they seem simply to have nothing more than a floating metaphor in mind--like an image of "construction" or "expressing autonomy" (thinking for oneself). Following the interview from beginning to end convinces us that the interviewees are not developing a coherent view from clearly understood basic principles, but rather fishing around for answers to questions they had never been asked before. The strong profiles are characterized, in contrast, by characteristics such as: clarity of view, consistency, intellectual humility, apt illustration and exemplification, commitment to plausible intellectual standards, and command of the basic concepts of critical thinking. In the strong profiles it is clear that the person is engaged in unfolding views which he or she has previously thought through--and not simply spontaneously fabricating something to say in answer to a question that catches one "off guard." They understand some basic principles and are comfortable developing those principles in extended, interrelated answers expressive of a coherent view.

Profile A (8): Professor A thinks of critical thinking as of primary importance in his instructional objectives. He identifies his concept of critical thinking as intuitive and a product of his own thinking. He does not distinguish critical thinking skills, traits, and values. According to him, his students come to class with well-developed intellectual standards and graduate with a good level of critical thinking ability and a high level of ability to foster critical thinking in their future students.

His responses to the open-ended questions, however, are quite vague in general and suggest that he hasn't in fact thought much about critical thinking. His explanation of critical thinking, for example, is vague and possibly self-contradictory:

"Critical thinking means to think analytically and be aware that everyone thinks for himself. All thinking is critical to some extent. Anyone who thinks intelligently. Reflectiveness."

When asked what critical thinking skills are most important for students to develop, he says, "I can't answer this. I can't identify skills."

When asked how he would assess the extent to which another faculty member was or was not fostering critical thinking in their classes, the vagueness of his thinking about critical thinking is again

apparent when he says "You look at their publishing. And I'd hear from students. They'd be complaining. It takes time."

When asked for his personal conception of intellectual standards, it is clear that he does not have one: "That's a hard question to answer. I don't think I see an answer to it."

In addition to his general lack of clear thinking about critical thinking, it is apparent that he is also confused about the basic concepts in critical thinking. When asked to explain the difference between an assumption and an inference, he says, "An inference is something based on information. An assumption is based on feeling and a lack of thinking" (ignoring the fact that we can make empirically well-founded assumptions and infer something based on prejudices or stereotypes).

Profile B (10): Professor B thinks of critical thinking as of primary importance in her instructional objectives. She says her concept of critical thinking is explicit and a product of her own thinking. She does not distinguish critical thinking skills, traits, and values. According to her, students come to class with well-developed intellectual standards and graduate with a good level of critical thinking ability and a high level of ability to foster critical thinking in their future students.

Her responses to the open-ended questions, however, are quite vague in general and suggest that she hasn't clarified the difference between "constructing beliefs" and "constructing knowledge." She in general assumes that if students are actively engaged and "thinking for themselves", they are ipso facto thinking critically. Nowhere does she mention that students actively construct prejudice as well as knowledge, poor thinking as well as sound thinking. Nowhere does she mention the importance of students thinking clearly, accurately, precisely, relevantly, logically, etc...

When asked to explain her concept of critical thinking, she says:

"Critical thinking consists in the active construction of knowledge and valuing social justice, a continuing examining of things as they are and might be..."

When asked what critical thinking skills are most important for students to develop, she says, "I don't think in terms of critical thinking skills. To think critically is to be a competent observer of events and to have a disposition to ask questions about them, to classify and find patterns...". (Note that a person can have the disposition to ask superficial or loaded questions and that all persons, poor reasoners as well as good reasoners, classify and find patterns—merely in virtue of being language users).

When asked how she would assess the extent to which another faculty member was or was not fostering critical thinking in their classes, she equates critical thinking with active learning, saying:

"Critical thinking is built into an active learning model. How are we supporting students in becoming active, autonomous learners. Active participation, reflection, a personal experience and the ability to make connection between their own views and others. Lively dialogue."

When asked for her personal conception of intellectual standards, she looks to find a way to equate intellectual standards with active processing, saying:

"A process conception. There is no finite set of standards to achieve but the learner engages in active dialogue with self and others with increasingly insightful learning..."

Profile C (14): Professor C thinks of critical thinking as of primary importance in his instructional objectives. He identifies his concept of critical thinking as explicit and a product of one or more theories of critical thinking to which he explicitly subscribes. He claims to distinguish critical

thinking skills, traits, and values. According to him, his students do not come to class with well-developed intellectual standards, but graduate with a good level of critical thinking ability and good ability to foster critical thinking in their future students.

His responses to the open-ended questions, however, are quite vague in general and suggest that he assumes that critical thinking is an automatic by-product of the use of discipline-based procedures. It is evident, however, that he has not thought through what the differences are between, say, the "scientific method" and "Bloom's taxonomy." He nowhere discusses the standards and criteria implicit in sound scientific work. His explanation of critical thinking is: "Critical thinking is investigative inquiry, to observe, interpret, and predict."

When asked what critical thinking skills are most important for students to develop, he says, "To analyze, predict, compare, observe... all of those listed by Bloom...all the science processes."

When asked how he would assess the extent to which another faculty member was or was not fostering critical thinking in their classes, he says "Ask them to compare a lecture approach with an investigative inquiry approach. Have them do a self-assessment after they did an inquiry unit."

Though the above answer suggests that Professor C understands the importance of having students engage in self- and peer-assessment, it is also clear that he has not thought through the intellectual criteria or standards that students need to effectively do such self-assessment. To some extent, he appears to equate intellectual standards with intellectual autonomy (forgetting that I can think for myself and yet do a poor job of it). For example, when asked for his personal conception of intellectual standards, he says: "All thoughts should be tentative. Are we using the processes and holding thoughts tentatively. In all cases, we should let the students develop their own level of understanding."

In addition to his vague thinking about critical thinking, it is apparent that he is also confused about the basic concepts in critical thinking. When asked to explain the difference between an assumption and an inference, and says, "Assumptions don't have data behind them. Inferences do." In saying this, he fails to remember that assumptions can be well or poorly grounded and inferences are sometimes based on stereotypes or imagined facts.

Nowhere in the interview does Professor C mention any of the basic skills of thought such as clarifying the question; gathering relevant data; reasoning to logical or valid conclusions; identifying key assumptions; tracing significant implications; or entering without distortion into alternative points of view; neither does he mention important intellectual traits of mind, such as intellectual humility, intellectual perseverance, intellectual responsibility, etc...

Profile D (15): Professor D illustrates a person who seems torn between negating critical thinking and its importance while simultaneously claiming to permeate her teaching with it (as something vitally important). On the one hand, she says that critical thinking is of primary importance in her instructional objectives, but on the other hand, says that "it is not so much critical thinking (that students need) but information." On the one hand she says that critical thinking is explicit in her thinking and that it is a product of one or more theories of critical thinking to which she explicitly subscribes, but she goes on to say that "I never read critical thinking books." She says that critical thinking "is embedded in everything I do," but cannot articulate any critical thinking skills or standards that she emphasizes.

Profile E (16): Professor E illustrates a person who seems torn between a view in which critical thinking is based on objective standards and skills, on the one hand, and a subjective view, on the other (in which whatever satisfies the individual as an autonomous thinker is the only ultimate basis for critical thought). This tension is suggested in Professor E's explanation of his concept of critical

thinking: "Information must be processed. To analyze and synthesize a viewpoint that is your own is critical thinking. Values come into it. We should have the capacity to look at things objectively." When he delineates skills that are important for students to develop, he names values and process, but does not clearly state any skill as such: "(They need to learn) objectivity, (to) weigh through information, balance views, accept new information and process it" When Professor E explains his conception of intellectual standards we see again him oscillating between the objective and subjective. He says that "...accuracy and truth are both relative. ... What is the truth at that moment? (But) be available to find that one is not accurate and that the truth is not comfortable." At the same time Professor E is one of the rare individuals who ranks program graduates as low both in critical thinking abilities and in knowledge of how to teach for critical thinking.

Profile F (19): Professor F thinks of critical thinking as of primary importance in her instructional objectives. She says her concept of critical thinking is explicit and a product of one or more theories to which she explicitly subscribes (though unable to cite any theory when asked). She says she does distinguish critical thinking skills, traits, and values. According to her, students come to class without well-developed intellectual standards but graduate with a good level of critical thinking ability and in fostering critical thinking in their future students.

Her responses to the open-ended questions, however, are peppered with a diversity of responses (and it is not quite clear whether they add up to a coherent notion or represent confusion of thought). Nowhere does she mention that students actively construct prejudice as well as knowledge, poor thinking as well as sound thinking. Nowhere does she mention the importance of students thinking clearly, accurately, precisely, relevantly, logically, etc...

When asked to explain her concept of critical thinking, she says:

"Everyone has a different view of critical thinking. I think of it as thinking skills. I think of words like analytical, evaluative, judgmental and I think of my field and activities I would do with my students. Logic and patterns. For example, classifying skills. Looking at a set of buttons--which one is different. I'm thinking of open-endedness, unifying ideas, and problem-solving."

She provides a similar answer when asked for her personal conception of intellectual standards:

"Open-endedness, trying something new, analyze situations and problem solve, making estimates to see if your answers are reasonable, consider the viewpoint, judge the data, check their work."

She is unable to give a coherent explanation of the difference between an assumption and an inference or between an inference and an implication.

Profile G (76): Professor G is a good example of one who equates critical thinking with thinking for oneself and, beyond that, applies no discernible intellectual standards. She says critical thinking is of primary importance in her instructional objectives, that her concept of critical thinking is explicit and a product of her own thinking. She does not distinguish critical thinking skills, traits, and values. On the other hand, she says that knowledge, truth, and sound judgment are <u>not</u> fundamentally a matter of one's personal preference or subjective taste. On the other hand, she says that it is of primary importance for students to acquire sound intellectual criteria or standards and to learn how to assess their own work. According to her, students come to class <u>without</u> well-developed intellectual standards but graduate with a good level of critical thinking ability and a high level of ability to foster critical thinking in their future students.

When asked to explain her concept of critical thinking she says:

"Critical thinking is being able to look at a situation and analyze what is going on and ask questions that enable you to get at alternatives. To be able to make up your mind by getting beyond the rhetoric."

Her responses to the open-ended questions, however, are quite vague and suggest that she hasn't clarified, for example, the difference between "constructing beliefs" and "constructing knowledge." She in general assumes that if students are actively engaged and "thinking for themselves", they are ipso facto thinking critically. Nowhere does she mention that students can actively construct prejudice as well as knowledge, poor thinking as well as sound thinking. Nowhere does she mention the importance of students thinking clearly, accurately, precisely, relevantly, logically, etc...

When asked to describe a typical day in class that fosters critical thinking she says:

"I use a holistic, constructivist basis. Students construct their own meaning, working together, dynamic, in living and breathing class discussions and debates."

When asked what critical thinking skills are most important for students to develop, she is quite vague. She says, "being able to assess validity, to look at and assess their own work, what the next step ought to be, to be able to choose issues that are important."

When asked how she would assess the extent to which another faculty member was or was not fostering critical thinking in their classes, she equates critical thinking with active learning, saying:

"I would look at students' products. Look for originality. Going beyond the task."

When asked for her personal conception of intellectual standards, she says: "(I would look for them to) take their own positions. I don't know that I would apply general standards."

She is unclear about the differences between assumptions, inferences, and implications.

Profile H (79): Professor H is representative of the many faculty who equate the fact of students actively "processing" information with their thinking critically about it. Most of those who think this way tend to think in terms of Bloom's taxonomy. Hence, critical thinking then is viewed as going beyond "knowledge" acquisition. Knowledge acquisition is viewed essentially as lower order memorization and recall, while "processing" is viewed as going beyond recall to "internalization".

Professor H thinks of critical thinking as of primary importance in his instructional objectives. He identifies his concept of critical thinking as explicit and a product of his own thinking (as well as theory). He says he distinguishes critical thinking skills, traits, and values (though his subsequent answers do not support this claim). According to him, his students do not come to class with well-developed intellectual standards, but that it is "of primary importance" that they acquire such standards and learn thereby to assess their own work. He claims that students in the program graduate with a good level of critical thinking ability as well as a good level of ability to foster critical thinking in their future students.

His responses to the open-ended questions, however, are vague and suggest that he hasn't in fact thought much about critical thinking. He explains his concept of critical thinking as follows: "Critical thinking is analyzing an event before a decision is made." He says that "almost all" of his instruction is based on critical thinking because "as long as it is not knowledge acquisition, it is critical thinking. Students analyze and draw their own conclusions."

When asked what critical thinking skills are most important for students to develop, he says, "The skills of analysis and recognition of multiple perspectives and then picking out the appropriate action."

When asked how he would assess the extent to which another faculty member was or was not fostering critical thinking in their classes, he says "Do they go beyond recall to have the students analyzing and putting it back together to make a decision on their own?"

When asked for his personal conception of intellectual standards, he says "Are they using all the information? (Are they considering) multiple viewpoints?"

His understanding of basic critical thinking terms is vague. He explains the difference between an assumption and an inference as follows: "An assumption is something that takes place automatically. In an inference you are going in some direction." Concerning the difference between an inference and an implication, he says: "An inference is more biased. An implication is sounder judgments, something that would follow a chain of events." (Note, he is unaware that inferences can be valid or invalid, well or poorly supported, and an implication to thought follows whether or not we ever act upon it—and hence need not be related to any chain of events).

Strong Profiles of Faculty Interview Responses

Profile J (26): Professor J thinks of critical thinking as of primary importance in his instructional objectives. He identifies his concept of critical thinking as a product of one or more theories of critical thinking to which he explicitly subscribes. He does not distinguish critical thinking skills, traits, and values. According to him, his students graduate with a good level of critical thinking ability and a good level of ability to foster critical thinking in their future students.

His responses to the open-ended questions, however, are relatively clear and elaborated. He cites Paulo Friere and John Dewey as fundamental influences in his thinking about critical thinking. He says his main goal is the "empowerment" of students. He says he strives to model critical thinking with his students in a variety of ways, including evaluating various aspects of the course with the students (e.g., what structures being used are working and which are not having their designed effect). He is especially concerned with the intellectual and linguistic development of students and in encouraging students to begin to take charge of their minds and their lives. He develops special strategies to use in helping students to read critically and he challenges the students continually to examine their own presuppositions, as well as the presuppositions of the status quo, of society, of schooling—not excepting his own instructional design.

Rather than focus on covering information, Professor J helps students to learn skills of finding and assessing information. He concentrates his effort on key concepts which help students assimilate new information. He wants students to discover different modes of thinking that enable them to question dominant sources of information. He wants students to develop a critical understanding of the social context of education and often has students discuss the ultimate purpose of education. Gaining perspective, learning new frames of reference, questioning assumptions, evaluating information for its relevance to their values, involving students in more "authentic" modes of assessment—these are central goals and emphases.

Professor J has a well-elaborated conception of intellectual standards. He emphasizes students clarifying their views, evaluating relevance, identifying implications, accurately recognizing presuppositions, determining the coherence of views presented, adhering to the rigors of the scientific method with its goals of accuracy and precision, evaluating reasoning for its validity, and striving for soundness in judgment.

Profile K (25): Professor K thinks of critical thinking as of primary importance in her instructional objectives. She says her concept of critical thinking is explicit and a product of one of more theories of critical thinking to which she explicitly subscribes. She cites Matthew Lipman as a fundamental source of theory. She does distinguish critical thinking skills, traits, and values.

According to her, students do not come to class with well-developed intellectual standards but she thinks they do graduate with a good level of critical thinking ability and a high good of ability to foster critical thinking in their future students.

Her responses to the open-ended questions are relatively clear and well-elaborated. She defines critical thinking as effective problem solving. She fosters it by systematically confronting students, contradicting them to get them to think. She models alternative views, plays devil's advocate, and holds students responsible for their thinking. Hence, though she is a "constructivist" she does not assume that students will automatically construct knowledge simply because they are actively engaged. She believes they must experience careful cultivation within an environment in which they are systematically challenged. She believes in "whole-hearted responsibility." Students must own their decisions and be accountable.

She designs her classes so that students must evaluate each other's work. She uses a case study approach, but one in which students critique other students on their case studies. She uses lecture to present theory, but then students are forced to critique their own understanding of the theories and apply them to their cases. She focuses 40% to 50% of class time on interactive activities, but she holds students responsible for a level of performance in those activities. She designs ways to hold students responsible to do their assigned reading so that they are prepared for the in-class work.

She argues that students must continually go back and forth between experience and theory, and between thinking and reflecting on where that thinking is coming from. She argues that students must become conscious of their own theories and what they are based on. Theories must be considered with their objections.

Professor K's conception of intellectual standards is framed in the context of the above remarks. Students must express and defend their views, hear objections and answer the objections, hear other views and learn from those views. They must consider alternatives and check their reasoning to make sure it is logical. They must also check their information sources.

Professor L (18): Professor L is important as a rare example of a professor whose answers regarding critical thinking reflect intellectual humility. She explicitly admits that her knowledge of critical thinking is limited. She tries to make critical thinking primary in her classes, but she freely admits that she has only her own critical thinking intuitions to go on.

In her view critical thinking is the ability to define a problem and develop a solution to it. It includes recognizing strategies that are effective, using criteria for "correct" performance, and then assessing their own performance. Concerning reconciling content coverage with fostering critical thinking, she says that if you give students the material so fast that they are not able to learn it, then coverage makes no sense. She gives a good example from volleyball. She says it would do you no good to hear lectures on volleyball if you are not able to use them effectively in performance of the game.

Concerning the component skills of critical thinking, she freely admits that she has never studied critical thinking intellectually, and so "I'm not sure how to explain it." Concerning her personal conception of intellectual standards, her refreshing answer is "This is something I haven't thought about." (The strength of this profile is in the intellectual humility that it displays. This is a professor who is clearly ready to learn.)

Professor M (92): Professor M thinks of critical thinking as of primary importance to his instructional objectives. He thinks of knowledge, truth and sound judgment as not fundamentally a matter of his own personal preference or subjective taste. He does not distinguish between critical thinking skills and traits. He was one of the few faculty members in the study to state that the students in his department develop only a low level ability to think critically.

Professor M's responses to the open ended questions were relatively clear and elaborated. He sees critical thinking as "being able to reach the sensible conclusions on the basic of logic and evidence, the ability to perceive contradictions...to attempt to resolve them." He says that on a typical class day he focuses on "presenting problems to students as opposed to conclusions."

In terms of the critical thinking skills he thinks are the most important for students to develop, he says they most need to develop the ability to seek and evaluate evidence, to use logic to reach defensible conclusions. Furthermore he says that they must be able to evaluate positions of their own and others, "to go beyond superficial understandings of reality."

Professor M says that he places strong emphasis on helping students develop philosophical underpinnings of their eventual teaching procedures through a critical thinking approach. He goes on to say that he wants to students to "approach teaching as an intellectual task as opposed to a technical one.

One of his primary objectives is to help students develop their ability to gather relevant points of view when dealing with broad, complex issues. Furthermore, he expresses the view that teachers should not present students with "finished answers." Rather they should help students construct their own meanings by teaching them to think through issues in a critical manner.

In focusing on the philosophy of education, he presents the key concept as "a logically consistent interrelated set of principles about the nature of knowledge, learning, and teaching that generates practical solutions for the every day problems of teaching." He makes it clear to students that they are responsible for forming their own philosophy, for determining the principles they think are important which will guide what they do in the classroom.

Some questions he uses to guide their thinking are:

- "What are the proper aims of education? (Not, what works? But, what purposes are worth working for?)
- What knowledge is worth knowing (teaching)?
- Who should decide what knowledge is worth knowing?
- What is an educated person?
- What kind of relationships should teachers establish with students?
- To what extent should teachers prepare students to be agents for change?
- To what extent should they prepare them to 'fit it'?"

Before students write answers to these questions, Professor M leads a discussion which explores all points of view relevant to the issues embedded in them. In these discussions, he tries to persuade them of each of the varying points of view. Then after exposure to these differing views, they write their philosophy of teaching, pointing out principles they believe are important in good teaching, and support their positions through reasoned judgment.

Professor N (104): Professor N thinks of critical thinking as of primary importance to his instructional objectives. He says that his concept of critical thinking is largely explicit in his thinking. Furthermore, in his concept of critical thinking he explicitly distinguishes critical thinking skills from traits.

His responses to the open ended questions are relatively well elaborated. He describes his concept of critical thinking as gathering evidence, evaluating evidence, evaluating the sources of evidence, defining and dissecting the argument or thesis of any given piece of writing for its logic, identifying the points of view and question at issue, and evaluating the strengths and weaknesses of an argument. Professor N says that critical thinking involves being aware of one's value judgments and having the willingness to evaluate the evidence before coming to a conclusion.

Professor N argues that "content without critical thinking is empty content." He believes that "content without the ability to evaluate it is content that will be mastered only for the length of the course." On the contrary, he says that teachers must organize content so that it is presented logically and so that students some to understand the connections between ideas.

In his world history class, he encourages students to think critically about evidence, and what evidence reveals. In this class he uses multiple "primary sources" of information, dating from the time under investigation (e.g. Epic literature, pyramid tombs, Plato's Republic). He provides students with questions they should think through as they read and investigate the information, questions such as "What was the purpose of the author, or what was the purpose of a particular practice? What can this fragment from the past reveal about the culture under investigation? What pieces of information are relevant and why?

For his exams, students are asked to develop and then compare arguments on both sides of an issue. They are to determine why certain arguments are more persuasive than others. He says that through his exams, students must demonstrate their ability to consider all points of view which are relevant to an issue, and to document their positions through reasoning.

Professor O (45): Professor O considers critical thinking as having primary importance to her instructional objectives. She says that critical thinking is explicit in her thinking, and that it is largely a product of one or more theories of critical thinking. She distinguishes critical thinking skills and traits in her concept of critical thinking.

Her responses to the open ended questions, and to follow-up interview questions, were clear and relatively well-elaborated. She understands critical thinking as learning how to think at an in-depth level, to be able to identify and think about problems, situations, and resolutions in a precise and focused manner. She also says that critical thinking means carefully assessing alternatives, figuring out the pros and cons of each. She adds to her definition that critical thinking involves applying reasoning and logic to problems and circumstances in a critical, disciplined and thorough manner.

To develop the critical thinking abilities of her students, she has them select a topic to analyze related to a complex problem in education. She then has them critically analyze the different sides to the issue, think through the implications of the possible solutions to the problem, and then come up with recommendations. They are then to turn in the final product (paper) as well as make a presentation to the class which focuses on the process they went through in reaching their final conclusions or recommendations. Furthermore, she says that she tries to combine informal lecture with group discussions, where there is "a lot of give and take." She says that she believes strongly in using Socratic questioning to "draw students out."

Professor O requires students to develop their own philosophies of education throughout the course, by focusing on questions such as "What is the ultimate purpose of education? Who is to be educated? Is everyone to be educated? Or are only a privileged few to be educated? She asks students to answer these questions, providing their reasoning for each answer. She asks them to consider alternative ways of answering the question. In preparation for writing their philosophies of education, Professor O asks students to take on roles with respect to particular complex questions related to education, and then debate the issues with one another. She often asks them to take a point of view which differs from their own and to debate from that position.

In her classes, professor O requires students to routinely critique each others work. She does this by having them exchange papers and review one another's papers. She provides guidelines for the standards they are to focus on. Students are to use standards such as: What are the key questions in the paper? How well organized is the paper? How specific are the details? How in-depth are the ideas explored? To what extent are the ideas well thought through? How understandable are the ideas?

Conclusions and Implications of the Study of Faculty Knowledge and Teaching Practices

Critical thinking has become an honorific phrase in the minds of many teacher educators, such that they feel obliged to claim both familiarity with it and commitment to it in their teaching. The survey results suggest that few faculty members in teacher preparation have had in-depth exposure to research on the concept. Most appear to have only a vague understanding of what critical thinking is and what is involved in bringing it successfully into instruction. Critical thinking is commonly confused with active involvement in learning, which overlooks the need for intellectual standards to ensure that active involvement does not lead to active "mislearning". Appeals to terms from Bloom's Taxonomy (i.e. analysis, synthesis, evaluation) are often taken to demonstrate knowledge of critical thinking. Even faculty in the California State University, which has a formal policy on critical thinking course-work as a baccalaureate requirement, are apparently largely unfamiliar with inherent features of this policy, including the "definition of critical thinking" and the specification of minimal conditions for instruction in it.

In virtually all departments, faculty members who participated in the study uncritically assumed that instruction in critical thinking takes place—without any effort to verify this assumption. In the interviews, in fact, we found no evidence of any systematic efforts that have been made to assess instruction for critical thinking within any of the schools of education studied. What is more, there is little understanding of how to assess it among those faculty respondents—should schools of education desire to do so. Since professors in schools of education assume that they understand critical thinking and how to teach for it, and that they are already successful in teaching their students both, it follows that it may be difficult to produce substantial changes in teacher preparation programs in these areas.

It is clear from the results of the study that we are very far from a state of affairs in which critical thinking is a hallmark of instruction in teacher preparation programs. Present instruction is likely to produce teachers who, on the one hand, are confident that they understand critical thinking and know how to teach for it, but who, in point of fact, understand neither. If prospective teachers are learning from their professors, then many of them no doubt equate critical thinking with active involvement or "cooperative learning." Other teachers probably believe that acquaintance with the terms of Bloom's Taxonomy or Howard Gardner's theory of multiple intelligences is equivalent to understanding critical thinking. Like the faculty, some prospective teachers surely equate it with an emphasis on learning styles or with concept maps or some other tool or facet or dimension of learning.

Other teachers will equate the whole of critical thinking with some component part of it. Some will emphasize multiple points of view, and take that to be the whole of it. Others will emphasize recognizing one's assumptions. Some teachers will emphasize questioning information sources. Others will emphasize analyzing concepts. But few will have a comprehensive sense of the whole concept, or a realistic idea of how to cultivate it while teaching the content of a subject or discipline.

Given the information gathered in this study, it is highly likely that most of those certified to teach have, given present instruction, little understanding of what reasoning is, what assumptions are, what inferences are, what implications are, or what it is to reason with intellectual discipline within a subject field (i.e. historically, biologically, psychologically, etc.). Based on the findings of this study, it is unlikely that many prospective teachers are learning about the basic structures of reasoning. Students studying history, biology, and mathematics will consequently not recognize that historians, biologists, and mathematicians make assumptions, develop specialized concepts, reason to conclusions, make interpretations of data, trace implications and consequences, define problems, concerns, and issues, and think within a disciplinary frame of reference or point of view. Future teachers who are studying English, physics, and chemistry will not recognize that thinking clearly, accurately, and precisely -- or that thinking deeply, broadly, and logically -- are equally important intellectual criteria in every subject.

Unless the present circumstances change, candidates for teaching credentials will continue to lack insight into the fact that moral issues and problems require as much disciplined reasoning and clarity of definition as does reasoning in any other domain. Prospective teachers will graduate, in short, without strong foundations in intellectual perspective and discipline.

It also is likely that we are now training teachers who not only have little understanding of critical thinking or how to teach for it, but who confidently think they do. The end result is that California's K-12 classrooms are places in which many teachers and students lack explicit knowledge of how to reason in disciplined ways about serious subjects and questions. In the absence of that understanding, one can expect a drifting toward intellectual relativism (i.e., toward the view that all answers sincerely believed and defended are equally good since, as far as they can see, there is no final way to intellectually assess competing answers other than by degree of active involvement in their defense). The survey results suggest that subjectivity of response, subjectivity of grading and intellectually undisciplined answers are likely to be unconsciously encouraged in our K-12 classrooms. Open-mindedness will be confused with the willingness to accept everyone's answer to a complex question as equally "right" (for them).

If we are interested in teachers trained in California having a reasonable grounding in the rudiments of critical thinking based on a rich, substantive concept of it, or at least a minimalist, baseline concept, then we have a major task facing us, not the least of which is persuading the majority of the faculty that they do not already know what they confidently assume that they do know.

Part II
A Study of Critical Thinking in Teacher Education: Exemplary Practices in Courses and Programs

The ultimate purpose driving this study is the determination of policies that ensure the teaching of critical thinking in K-12 education. The immediate purpose is the determination of the extent to which students in their teacher preparation courses are presently being taught in such a way as to develop: 1) student understanding of, and skills in, critical thinking, and 2) student knowledge and ability to teach their future students so that their students become at least minimally proficient in critical thinking. The study assumes that, except in rare cases, only those who are actively taught to think critically will think critically, and that only those who have learned to think critically and value it will be able to effectively teach it to others.

The first phase of our study gathered and interpreted data about present practice in teaching for critical thinking in courses taken by students in California teacher preparation programs. From these data we inferred some serious deficiencies in present practice.

The second phase, is focused on the documentation of commendable and exemplary practices. We assembled examples in a number of ways, the first of which (stage one) was from California colleges and universities with approved teacher preparation programs. The second stage consisted in follow-up interviews of those with strong responses in the first interview. Since neither of these approaches provided us with the richness of example that we had hoped for, we focused on a national search (stage three), one that concentrated on those who had participated in critical thinking professional development. The final stage of our search for exemplary practice consisted in a random selection from one exercise at a National Academy on Critical Thinking .

Stage One: Direct Solicitation of Exemplary Practices from All Campuses with Approved Teacher Preparation Programs. In late January of 1996, the Commission's Executive Director sent a letter to all Deans of Schools of Education and Deans of Colleges of Arts and Sciences, asking that faculty be encouraged to submit examples to the Commission of program design, course design (including model syllabi), assessment of teaching for critical thinking, and teaching strategies (model assignments, tests, and assessment tools, including those which facilitate student self-assessment). In response to this solicitation, a total of 27 sets of materials were received from individual faculty throughout California. All examples submitted were reviewed carefully by senior staff at the Center for Critical Thinking during April and May.

Stage Two: Follow-Up Interviews of Strong Profiles. Interviews were conducted with a number of faculty interviewed during Phase One who were most specific, clear, and plausible about how they approached critical thinking in the classroom. In the follow-up interview we focused in-depth on classroom teaching practices and also invited the submission of concrete details which provide the fullest possible understanding of how the individual professor sought to enhance the critical thinking of students. The follow-up interviews confirm the fact that the initially stronger interviews were based on some depth of understanding (this is not surprising in that it shows that those who are able to explain their approach initially were also able to support their approach with intelligible, illustrative details).

Stage Three: Solicitation Among Faculty Members Who have Undergone Professional Development in Critical Thinking. There were 390 total individuals contacted for this study. They were selected from those individuals who have attended either 1) The International Conference on Critical Thinking and a workshop on critical thinking, 2) two workshops on critical thinking, or 3) The National Academy on Critical Thinking.

A solicitation of information concerning classroom teaching practices was made of those who had participated in professional development activities focused on critical thinking--at least one in-depth workshop on critical thinking and/or participation in one conference on critical thinking. We found that those who have done professional development on critical thinking were better able to give a detailed and plausible account of how they approach it in their classrooms.

This solicitation produced a much higher percentage of responses (65 out of 390 responded), and the quality of the responses were higher, in general, than the quality of responses in our solicitations in 1) and 2) above.

Stage Four: Selections from Workshop for University Faculty. Examples were selected of an initial class design from a hands-on session of the National Academy On Critical Thinking. In this exercise, faculty had 40 minutes to develop a conception of a class focused on the thinking essential to the content of a course, highlighting one organizing idea and describing the main features of a "typical" day.

As in our solicitation to those faculty who have participated in critical thinking professional development, this aspect of our study produced examples of work strongly suggestive of exemplary teaching practice and lends credibility to the notion that motivated faculty, with a reasonable degree of professional development, can begin to redesign courses by focusing on the thinking essential to the content itself.

Let us now look at the results of our search for exemplary practice in teaching for critical thinking at the post-secondary level.

Stage One: Direct Solicitation of Exemplary Teaching Practices from Campuses with Teacher Preparation Programs

This part of the study included a systematic request for exemplary practices. A total of 152 letters were sent to Deans of Schools of Education and Deans of Arts and Sciences at all universities that have teacher education programs. Out of an estimated base of approximately 4000 faculty involved in teacher preparation at the institutions that received the request, twenty-seven individuals responded.

A Brief Overview of Submissions

As noted previously there were relatively few programs/syllabi submitted as a result of the solicitation. And much of what was submitted was too sketchy to enable us to fully assess its adequacy. Nevertheless, several ways in which critical thinking can be brought effectively into subject matter instruction were suggested. Below is a sampling of some of the ideas submitted. It is to be understood that in no case were the researchers able to assess the degree to which any of the submissions accurately described actual practice. Often the description merely "whets our appetite" and we wish we could directly observe instruction so that we could judge in what depth the design is followed.

(1) Designing Critical Thinking into Music Instruction. (California State University, Sacramento, Department of Music). In this submission, a philosophy of music instruction is articulated which places critical thinking at the heart of the program: "Competence in decision-making requires that the future music educator have a broad level of musical understanding as well as the ability to think critically about music."

> "In solo performance, students must learn to use critical thinking to make interpretive and expressive decisions, in which they consider the theoretical, historical, technical and aesthetic aspects of the score in forming an overall concept of a work studied. They must then compare that "sound ideal" to their playing. Out of this dialectical mode of experience, students develop a mode of self-assessment that contributes to their becoming life-long learners."
>
> "In ensembles and conducting, students are challenged in small and large ensembles to make decisions that determine their contribution to rehearsal and performance. Likewise, informed musical judgments are the essence of conducting. The conductor must make independent interpretive decisions, first when studying the score and then on the podium. In advanced conducting, students are required to demonstrate knowledge and conceptual understanding of the music they conduct. They must assess form, dynamics, style, tempo, mood, nuance, articulation, and phrasing..."
>
> "In theory, critical, creative thinking and problem solving are essential components of success in both analysis and composition. Through analysis, students develop the ability to make perceptive dissections of complex musical structures, and to understand the interrelationships of many hierarchical levels within a single musical composition. Analytical techniques develop students' abilities to thoughtfully evaluate new music as it is encountered...Analysis and compositional projects foster a way of thinking about music that serves the musician-teacher throughout life."

(2) Critical Thinking in Home Economics. (California State University, Sacramento, Department of Home Economics). In this submission, there is no general philosophy of infusion of critical thinking into instruction. Instead there are a variety of examples of particular projects in which critical thinking plays an essential role.

There is an example of a consumer service project, in which "the student is asked to seek information on how to assess a particular consumer service and use that information in developing a questionnaire designed for gathering information on which to base an assessment of the service. The student is then asked to use the information gathered to present an analysis of sources of the consumer service selected..."

There is an example of an individual research project: "the directions for this assignment clearly indicate that this project requires critical thinking. Students are required to identify and use valid sources of information to learn about a consumer issue or problem. They are then required to develop alternatives for resolving the issue and arguments for and against each alternative...Their papers must be accurately documented."

(3) Critical Thinking in the Departmental Philosophy of a Teacher Education Program. (California Lutheran University, School of Education). In this submission, a philosophy of a teacher education program is articulated which calls for a critical thinking component in all assignments: "...we attempt to foster students' progress through ... stages by integrating reflective analysis into course assignments. For example, in all components of methods and student teaching, each assignment carries a requirement for a critical thinking exercise. This may consist of a paragraph or two written by the student as a self-evaluation or an oral processing with feedback." Self reflection is also included in a multi-phase strategy for developing and assessing lessons: "Self-Reflection: (What was the) most important part of the plan? How did it go? What was strong? What would I change? What did I learn from the experience?"

(5) A Syllabus Outlining the Organization and Primary Topics of an Introduction to Logic Course. (University of San Diego, Department of Philosophy). A traditional approach to the improvement of critical thinking at the post-secondary level is found in college logic courses. There, formal or informal logic texts are used and the students learn to identify, analyze, and assess arguments for their "validity". In this submission, a syllabus is provided which purports to accomplish this end. The crucial question raised about such courses is whether or not the skills focused on (in logic courses) are in fact transferred by the student into their work in other courses and in their life. It is likely that the quality of the transfer is very much a function of the precise way a given course is taught. If students learn to routinely distinguish assumptions, inferences, and implications, and develop a sensitivity to the need for evidence, the importance of conceptual analysis, the significance of point of view, as well as a commitment to intellectual standards such as clarity, accuracy, precision, relevance, and logicalness then such courses are doing their appropriate job.

(6) A Syllabus for a Women's Study Course Entitled "Feminist Approaches to Inquiry". (University of California, Davis, Women's Studies Department). In this submission a course design is presented which emphasizes the "critical study of gender and the critical study of race, ethnicity, sexual and national identities, and class". It explores "the assumptions and strategies that different feminists employ", the degree to which "different kinds of feminists break with traditional assumptions about how we know what we know". The class is described as focusing on the active discussion of readings, including "regular submission of intellectual journal entries", and a an "8-10 page paper" in which students develop a reasoned position on a key issue in the course. A crucial point in assessing such a course for its impact on the critical thinking of the students would be whether or to what degree the students are developing conscious intellectual standards they can use to assess the reasoning presented on any given issue. Most students unfortunately have no clear understanding about what reasoning is nor how to go about assessing it. When presented with conflicting reasoning, they usually defend the reasoning that defends the conclusions that are closest to their own beliefs--irrespective of the quality of that reasoning. We were unable to assess from the syllabus how this problem is addressed in this course.

(7) A History of World Civilizations Course. (Pacific Union College, Department of History). In this submission, four central goals are articulated relevant to critical thinking; they are to develop the following : 1) "the ability to gather information efficiently and critically", 2) "the ability to think critically about what is heard or read," 3) "the ability to form judgments which are consistent with the evidence;", and 4) "the ability to communicate, in spoken and written form, those judgment clearly and cogently". One assignment in the course stands out above the others as designed to foster critical thinking, a 1200-1500 word essay on the issue "Was Athens under Pericles a democracy as described in his famous Funeral Oration?" The students are provided with conflicting historical sources on the issue and they are required to develop a reasoned historical judgment that takes into account these conflicting sources.

(8) A Syllabus for a Foundations of School Mathematics Course. (Pacific Union College, Department of Mathematics). In this submission, a course design is presented which focuses on "the logic and structure underlying school mathematics." The course is designed to help the students take command of their mathematical thinking, for the student must "not only perform calculations and solve problems but also show why the procedures used are valid and appropriate. " "The student will be able to examine and judge the validity of alternative mathematical approaches to problem solving as well as alternative algorithmic methods." The student must also demonstrate the ability "to articulate the essential difference between mathematical proof and evidence obtained from inductive reasoning."

(9) Seven Management and Business Administration Course Syllabi. (Pacific Union College, Business Administration & Economics Department). In this submission, seven course syllabi are provided. The courses are designed with the goal of helping the students think strategically, to think as managers, to think economically, etc... Much of the course work is organized around case studies in which students must analyze complex problems and develop well-supported thinking to back-up their conclusions.

(10) Math and Science Program Standards. (California State University, Northridge, School of Science and Mathematics). This submission from the School of Science and Mathematics cited several of the Commission's Program Standards as being relevant to critical thinking. Two examples follow.

> Standard 4 is entitled "Mathematics as Reasoning" and emphasizes the need for students to be required "to demonstrate a variety of reasoning skills," the student must be able to "follow complicated chains of logic very closely." Often, "the student needs to take some of the theory developed in the textbook and apply it to new situations. Each of these problems is a mini-research project in its own right, and in the course of solving such problems, the student learns to make conjectures, look for examples that might illustrate these conjectures or search for counter-examples that would disprove them," stretching "the student's reasoning capacities as the student learns to follow and absorb logical arguments as well as to construct new ones."
>
> Standard 7 is entitled "Thinking Processes and Shared Values in Science." This standard emphasizes "the need to engage students in the use of scientific thinking processes." They emphasize the close connection between scientific thinking processes and "procedures employed by rational thinking persons approaching and solving "non-scientific" problems." It is clear that scientific thinking is understood in this program as sound critical thinking applied to scientific problems. They add: "One of the strengths of the School of Science and Mathematics has always been our emphasis on individual undergraduate research projects. Most of our science majors as juniors and seniors do at least one semester of research with a faculty member. Most students truly blossom in this environment. They learn, with minimum guidance, how real science is practiced--indeed, they do it. Many of them present their work at professional meetings and at the annual Sigma XI Symposium and have their work published in journals. They quickly learn that not all experiments are successful, but they solve problems, they develop an enthusiastic, yet disciplined, approach to laboratory work. They now really know what scientific investigation is like and develop a deeper understanding and appreciation for the shared values of science: the insatiable curiosity, the dedicated open-mindedness, the need for careful and accurate observation and the reason behind the need for accuracy and precision as well as repetition in all measurements. These students can pass along their skills and understanding to others." This standard implies a commitment to the regular assigning of problems that require realistic scientific reasoning in accordance with clear-cut intellectual standards (such as accuracy, precision, verifiability, logic, relevance, etc.).

Stage Two: Follow-Up Interviews with Strong Profiles Among Initial Participants in the Faculty Survey

Professor Angus Dunstan

Professor Angus Dunstan, faculty member at California State University, Sacramento, distinguished himself among study participants because of his emphasis on deeply probing questions in the classroom, and his focus on the relationship between language and thinking. According to Professor Dunstan the questions one asks ultimately determine the direction and quality of one's thinking. He expresses an active commitment to embody this belief in daily classroom practices. In his classes, for example, Professor Dunstan says that he asks probing critical thinking questions and encourages students to ask probing questions, both with respect to what they read, and what they write.

Furthermore, Professor Dunstan expresses a commitment to help students explore the relationship between language and thinking. He describes critical thinking as a matter of taking language very seriously and thinking carefully about how we use language. He goes on to say that he encourages students to pay attention to the language they use and read. He says that when they do this, and ask significant questions that relate to what they read and hear, they are using critical thinking in an important sense.

Professor Dunstan displays a high degree of intellectual humility in a number of ways. He admits on the outset, for example, that critical thinking involves being open to criticism. Furthermore, he is one of the rare individuals in the study to state that he believes that students in his department graduate with a low level of critical thinking ability. Moreover, in the follow-up interview, he elaborates on the difficulties involved in practicing the art of teaching so that students are meaningfully engaged in peer review. For example, in his writing class, he has students critique one another's papers, but he readily (and refreshingly) confesses that this is something that he does not do often enough. During the first half of each semester, each draft of their papers has to be reviewed by and responded to by another student in writing whereby the reviewer points out areas where he or she is not clear. Professor Dunstan admits that, too often, he takes over the role of critiquing when he perceives that students are not doing the critiquing very well. He confesses that there must be a better way to handle the critiquing problems students experience so that they maximally benefit from the process of peer assessment. Furthermore, he states several times during the interview that his participation in this research project has raised his awareness regarding the need to be more explicit in teaching for critical thinking.

With questions at the heart of instruction, Professor Dunstan states that he both models questioning which is deeply probing and encourages students to ask probing questions as well. He strives to bring critical thinking into everyday course work by helping students develop the habit of asking "hard follow-up questions," of themselves and others, questions such as: "What is the consequence of this? Where's the evidence? " In addition, he routinely asks such questions as "Why do you think this? Where do you see that? What do you base that on? Can you give an example? So what? What are the implications of this?" He encourages students to be skeptical, and "not to let anything go at face value." Furthermore, he teaches them to support their statements with well-reasoned thoughts, to back-up their generalizations with evidence.

Professor Dunstan says that he helps students begin to think seriously about the power of questions on the first day of each semester by introducing students to what he refers to as the "idiot question." He describes the idiot question as the question that everyone would want to ask but they would feel like an idiot for asking it. He models the kinds of questions he has in mind. They are always simple questions such as "What is the difference between men and women?" (which may be an appropriate question when dealing with a particular story in a literature class, but that by itself seems like an "idiot question)." He states, "once you start asking these questions, you often get at details which you miss if you don't take the time to do this." According to Professor Dunstan, better critical thinking lies in paying really close attention to the details that people often miss because they think their questions are trivial.

In his classes, Professor Dunstan, in order to help students consider situations and experiences from varying points of view, states that he routinely asks "simple" questions such as "How would this story have been different if the main character had been a man instead of a woman?" In addition, he asks students to figure out why things happen a certain way. He extends this to students' writing, teaching students to ask themselves, almost after each sentence they write, "Why? Why do I say that? What is the point that I am getting at here?" Similarly, in his literature classes he routinely asks questions such as, "Where do you get that idea from? Where does that idea or judgment come from? Point to what a character says or does...Tell me where in your reading it becomes clear that (so and so is true)."

Professor Dunstan discusses how he regularly fuses questions with other instructional strategies to teach for critical thinking. For example, he states that:

- While reading aloud in class, he routinely stops and asks students to write down an answer to a question he poses which relates to the literature passage, and then focuses on the different interpretations that students have made. He asks, "How is it possible for us to read the same text and to have these different responses to it?" In this way he focuses both on interpretation as well as point of view.

- In his writing classes he frequently asks students to think about the assumptions they are making about the reader, pointing out the fact that they often make assumptions that are not justifiable.

- He tries to teach students to respond to each other's writing (in a critical way), as they work in dyads in a peer review process. He asks them to routinely stop and explain to their partner what they don't understand. He encourages them to ask one another questions such as "What did you mean in this section of the paper? Could you clarify this for me?"

- In helping students think critically about their writing, he states, "I will read a student's essay aloud, then pause regularly and ask the students what they think is coming next. He tries to draw their attention to the fact that a text sets up certain expectations as to what will come next. He does this again to show how students make assumptions (that are not justified about what the reader is thinking), as well as how they often don't follow up on ideas in their writing.

- In addition to asking questions (to help students think critically), he tries to make the basis of discussion the questions that students ask. He says that part of encouraging critical thinking is encouraging students to ask deeply probing questions. To model the kind of questions he wants his students to ask, after the student reads a literature passage aloud, he will routinely stop and ask, "What is going on here? Why did this character say this?" Professor Dunstan says that most of his questions are "genuine questions" that he has at the moment. He often makes comments such as "This is a question I have. Can any of you answer it? This is what I had trouble with when I was reading this. Can you explain it?" He wants students to see that this is what critical reading entails. This is the mark of a good reader. He says, "if you are not doing this you are not engaging as critically or thoughtful as you could be."

- He also feels that it is important that students understand that "there are frequently several ways of looking at a character's motivations." He encourages them to consider alternative interpretations.

- In helping students learn to ask "thoughtful" questions, he asks them to keep a reading response log, so that they frequently stop while reading and write down the questions they have at any given point in the reading.

- In his children's literature class, he has students go to elementary classes and read stories to children, to question the children to determine what details they notice and pay attention to. He says that students find that the younger children pay more attention to details in the story than the older children. He states that by focusing on these details, one is led to more interesting questions, to questions that he calls the "doorways into critical thinking."

- In his advanced composition classes, Professor Dunstan finds that the peer review is "absolutely crucial...learning how to read someone else's writing attentively, to ask important questions, to pay attention to lapses in prose. The students tend to be very forgiving in that way, and unforgiving of minor errors." He says he has trained himself to be forgiving of the minor errors and unforgiving of lapses in logic. He says that students are somewhat appalled (when others don't understand what they have written, saying things such as "well you know what I meant)."

Professor Bernie Troy

Professor Troy, a faculty member at California Polytechnic State University, San Luis Obispo, states that he consistently attempts to help students think more critically about how they interpret events and situations, to help them come to appreciate the value of fairminded thinking, and to help them students learn to think more logically. It is in these three overlapping areas that his practice appears to be exceptional.

The primary vehicle for teaching critical thinking that Professor Troy expresses involves having students adopt a position, then validate their positions with reasons. He then asks them to take the opposite position and validate that position with reasons. To vary this approach somewhat, he often places students on each side of an issue, then he asks one student to state his or her position. He then asks the student on the opposing side to state his or her interpretation of the opposing student's position. Then the first student is asked to state whether the opposing student fairly stated his or her position.

During this discussion, he says that he encourages students to focus on the implications of the issues. He asks them questions such as "if this were true, what would be the implications? If we did this what would happen? What evidence do you have that this might happen? Has this happened anywhere else?"

Basing his views on Glasser's book, Schools Without Failure, Professor Troy expresses the belief that students must be intellectually and personally engaged in class discussions. He says "first you must personalize issues so that students will be interested in the discussions and speak from personal experience. Then you try to turn the table by asking questions such as, `What if this isn't true? What proof do you have that it is true?'" He says that he does this in order to get students to adopt thoughtful positions, positions that they hold critically.

Professor Troy states that he incorporates fundamental ideas from Gestalt learning theory, which he says suggests that "the purpose of education is to make sense out of things, and that you cannot give people meaning. It is the constructivist approach to critical thinking. The mind must be an active agent. Part of my job is to stimulate and provoke students. We are almost like PE teachers, trying to get students actively engaged."

Included in his daily class is emphasis on content-related questions which he says that he uses to stimulate student thinking. Students are expected to support their answers with evidence and reasoning. Some examples are:

- Is teaching a profession or not?
- Should we revoke tenure laws or not?
- What have been the historical purposes attributed to maintaining public schools during colonial times, the early days of the republic, mid-nineteenth century, early twentieth century, post-Sputnik era, and currently? What is the purpose of schools?
- What should be taught in schools?
- What will be the status of ethnic and cultural minorities in the schools in the next generation?
- Who should set the curriculum?
- What are the limitations to local financing of schools? Of state financing? Of federal financing?
- What is categorical aid? Should it be reduced or eliminated? Present funding guidelines result in higher per student support for students in urban schools in California. There is a move afoot in the legislature to shift much of that money to suburban and rural schools. Is this a good move?

Professor Gary Macy

Professor Macy, a faculty member in the Department of Theological and Religious Studies at University of San Diego, expresses a strong commitment to holding students responsible for their thinking in class and in all related course work. Based on an article he authored, he believes that higher education institutions must make a serious commitment to academic excellence because they have a fundamental responsibility to provide the critical analytic and evaluative skills students need for success in the work place. Thus he sees the problem of the lack of critical thinking in colleges and universities as linked to the problem of academic mediocrity. He believes that academic criteria must be made clear, demanding, and enforced. According to Professor Macy, if students do not meet the standards set in a class, they should fail. What's more, he believes that higher education institutions must seriously challenge students to "stretch themselves to thinking critically and writing clearly." He says that only those students challenged to develop their minds will have the intellectual skills to succeed in the workplace. He believes that these skills are gained only when students come to know what good work is, when they believe they can do it, and when they have the experience of doing it well.

Professor Macy states that he strives to embody these beliefs in a number of ways in the classroom. For example, he says that he routinely engages his students in critical thinking using Socratic questioning; asking them to explain concepts, then following up their explanation with further questions. He expresses the importance of continually probing their thinking in order to hold them responsible for what they say. He asks questions such as "What do you mean by ...? Once a statement is clarified, he asks students whether they agree with what was said. If they disagree, he asks them to elaborate on their differences, so that students learn from each other's thinking.

In order to help students learn how to be clear, he describes how he routinely asks them to explain a concept to him as if he knew nothing at all about the subject. Moreover, he says that he regularly presents problems to students, then asks them to come up with solutions to the problems, using some sequence of logical reasoning. He questions their thinking until they come up with a coherent argument. Furthermore, he describes how he routinely presents alternative interpretations and solutions, pointing out to students errors in their arguments.

Professor Duane Campbell

Professor Campbell, a faculty member at California State University, Sacramento, has made a contribution to the literature on critical thinking through his recent book (co-authored by Manning Marble), Choosing Democracy: A Practical Guide to Multicultural Education. This book emphasizes the importance of helping students critically analyze the problems inherent in racism, classism, gender discrimination, prejudice, poverty, and school failure. Furthermore, it provides practical strategies and examples for teachers to use in encouraging students to deal with complex issues involving multiple points of view.

Coming from a social constructionist point of view, authors of the book argue that multicultural education is necessary for survival of democracy. In addition, the book is intended to help teachers become aware of their own cultural frame of reference and to learn a multicultural perspective to teaching.

Included in the book is a chapter on the importance of bringing critical thinking into instruction. Contained in this chapter are overlapping definitions of critical thinking, including one expressed by Beyer, "Our graduates should be able to make well-reasoned decisions, solve problems skillfully, and make carefully thought out judgments about the worth, accuracy, and value of information, ideas, claims and propositions." To add to this definition, the authors quote Richard Paul as stating that the

process of critical thinking involves "a passionate drive for clarity, accuracy, and fair-mindedness, a fervor for getting to the bottom of things, to the deepest root issues, for listening, sympathetically to opposite points of view, a compelling drive to seek out evidence, an intense aversion to sloppy thinking, inconsistent application of standards, a devotion to truth as against self-interest--these are the essential components of a rational person."

Also included in the book are examples of lesson plans which help students consider issues from multiple points of view. For example, the authors encourage teachers to "integrate lessons on evidence, cause and effect, stereotypes...into the curriculum. To do this, they suggest that students in grades 3 - 6 view the film Dances With Wolves. Then teachers are to have one group of students write a description of the point of view of westward expansion of European Americans, while the second group writes a description of the point of view of Native Americans (of this expansion). Each group is to support their point of view with evidence. In a similar way, teachers in grades 6 - 8 are encouraged to have students compare the experiences of European immigrants with the experiences of Asian and Latino immigrants in the 19th century and present. For grades 10-12, teachers are encouraged to provide students with ethnic and women's history timelines, then divide the students into groups. Each group is to select a period of US history, and then compare the treatment of Native Americans, Latinos, Asians, African Americans, and women using information on the timelines (in the appendix) and in their textbooks. Students are to consider important omissions in the textbook, assumptions authors of the text make when, as well relevant points of view to the issue when preparing their analysis.

Stage Three: Direct Solicitation of Faculty Members Who Participated in Critical Thinking Professional Development

Stuart Keeley, Bowling Green State University

Comment: Among its many strengths, Professor Keeley's approach is characterized by an explicit understanding of critical thinking principles and how those principles can be infused into a course structure. For example, the principle that questions, rather than answers, are the driving force in thinking is clearly an emphasis in his course.

(1) The main courses I teach are . . .

Abnormal Psychology, Evaluating Social Controversies, Psychopathology

(2) The basic concept of critical thinking, as I present it in class, is . . .

I use a set of question asking skills (see Asking the Right Questions), plus a set of critical thinking disposition and values (cited in Paul's Critical Thinking).

(3) I design my instruction so that critical thinking plays a central role by . . .

- de-emphasizing memorizing of facts and emphasizing questioning and the personal construction of knowledge.
- requiring students to read materials on critical thinking, depending on the course (e.g. for Abnormal Psychology, they read my text, Asking the Right Questions in Abnormal Psychology, plus short sections from Paul, Critical Thinking; For Evaluating Social Controversies, they read Browne & Keeley, Asking the Right Questions, Plus Damer, Attacking Faulty Reasoning, plus brief sections from Paul, Critical Thinking).

- building a critical thinking ethic and expectation into the syllabus
- designing frequent homework assignments that require the application of critical thinking skills
- emphasizing active discussion in class, both large group and small group, with an emphasis on critical thinking skills
- designing exam questions that require the application of critical thinking skills
- requiring students to generate critical thinking questions of their own as frequent homework assignments
- requiring students to converse in reasoning paragraphs (i. e., stringing together statements in reasoning form) in class, rather than in sentence fragments.

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

The entire class effort in teaching Evaluation of Social Controversies is to help students internalize critical thinking skills, dispositions, and values. The texts are Asking the Right Questions, and Attacking Faulty Reasoning, and these are supplemented by essays and media materials concerning social controversies. Throughout the semester, critical thinking skills are modeled, followed by students practicing them. By the end of the semester they are expected to be able to ask the questions emphasized in Asking the Right Questions, as they respond to essays on social controversies. The entire emphasis in this class is on the "how" of learning, rather than the "what." The class includes much small group discussion.

(5) I regularly emphasize critical thinking in all of the following ways . . .

Making it clear from the beginning of class the following value preferences (where appropriate):

- Questions over Answers
- Complexity over Simplicity
- Ambiguity over Certainty
- Filter over Sponge
- Long-Term Goals over Short Term Goals
- Active Construction over Encyclopedia Recording
- Deep Meaning over Surface Meaning
- Learner Orientation over Finisher Orientation
- De-emphasizing memorization of facts
- Encourage disagreement
- Emphasizing need to "give reasons"

Sinah Goode, Texas Woman's University

Comment: Professor Goode's approach is highlighted by her effort to infuse critical thinking across her program. Moreover, she explicitly strives to redefine the student/teacher role so the teacher functions as coach while holding students responsible for self-assessment.

(1) The main courses I teach are . . .

Kinesiology, An Evolving Discipline introductory freshman level course, Measurement and Evaluation in Kinesiology senior level course, Physical Education in the Elementary Schools junior/senior level course, Teaching and Learning Styles graduate course (pedagogy), Curriculum in Physical Education graduate course (pedagogy), Systematic Observation in Physical Education graduate course (pedagogy)

(2) The basic concept of critical thinking, as I present it in class, is . . .

"Critical thinking is reasonable and reflective thinking that is focused upon deciding what to believe and do (Ennis)."

(3) I design my instruction so that critical thinking plays a central role by . . .

I design my instruction so that critical thinking plays a central role by incorporating the concept throughout the curriculum.

We, as a faculty, have determined that critical thinking is integral to lifelong learning. We begin in the introduction class by presenting the concept of critical thinking. The introduction course is used to define critical thinking and practice the application throughout the course. We also work very hard to redefine the role of the teacher and student so that quality thinking is the process used in the class. I must admit changing student's perspectives on the roles of the teacher and the student is one of the most difficult challenges we have met. Despite this, we attempt to present the value of thinking and emphasize developing relevance for each individual. Throughout the course the student is involved in thinking and the evaluation of the quality of his/her thinking. The emphasis on critical thinking is continued throughout the students' course of study. Throughout my courses I have almost eliminated the lecture format. I have also significantly changed the evaluation process. The bulk of class work revolves around forming and answering questions in different topic areas and the student as a major player in the assessment of his/her work

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

Below is an example from the introduction class and one from a senior level class.

During Kinesiology, An Evolving Discipline, I introduce the concept of levels of thinking (Bloom) and build critical thinking into that discussion. After a variety of practice sessions on thinking critically the students begin writing a research paper addressing a specific issue in ethics. For example, the student might choose to investigate questions such as "Should an athlete use drugs to enhance performance?" or "Should whites and members of minority groups receive identical treatment in schools?" The student forms the question of his/her choice and, with approval, begins the process. They research the question using at least 10 documented sources which must address a variety of perspectives on the topic. Throughout this time the students assess their own work based on a series of self-assessment questions and the elements of reason (R. Paul).

I also communicate with each student via e-mail at the beginning of the writing (and throughout the semester) as to the questions they would have to answer first before they could begin to answer the major question. Periodically, the students will discuss their findings with a partner and assess the quality of their thinking to that point. After completion of the writing the instructor evaluates the paper. Throughout the entire class the student takes a major role in the evaluation of his/her work. The above project is in the initial class for a degree in Kinesiology and begins a series of projects that introduce the student to the world of Kinesiology. Critical thinking is involved in the process throughout the entire semester.

As a student progresses through the curriculum the class structure changes. For example, as a senior a student would take Measurement and Evaluation. The content of the class involves the process inherent in answering a measurement question particular to the field of Kinesiology. This semester the class began working on addressing the question "Is inclusion working?" The question about inclusion is one that was brought to the class by the Adapted Physical Education Director of a local school district. She challenged the class to see if they could begin to look at this issue. There is little concrete data to adequately answer this question and she voiced her frustration. The class determined the first step was to identify what questions would have to be answered before we could attempt to answer the inclusion

question. The students generated the list of questions and then divided the task and began to research the topics.

Throughout the semester students presented this information and then discussed the implications. Included in the process was a discussion with teachers in the public schools and an observation of a physical education class. The class determined some tests that could be used to assess some of the goals set by the district. The final class period was a slide presentation, made by the students, to a representative of the school district about what we had found to this point. The students also prepared reports which will be used by the next class to take the project to the next level.

(5) I regularly emphasize critical thinking in all of the following ways . . .

- critical thinking is defined
- higher level questions are asked
- each project requires student evaluation as a major part of the process
- many tests are open book and require higher level thinking skills
- students debate issues
- discussion of predictions for future are part of class with emphasis on "why" the student supports his/her prediction.
- students are accountable for the "why" of their actions
- students prepare lessons that promote deductive and inductive reasoning
- students participate in a workshop on how to critically think
- student's lessons are video-taped and evaluated by the students
- students are encouraged to create new approaches
- students write some of the test questions
- limiting lecture to no more than 20% of the class
- using "hands-on" projects to promote the understanding and relevance use of group work

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Jerry Cederbloom, University of Nebraska–Omaha

Comment: One strength of Professor Cederblooms' approach is his recognition of the distinction between active learning and critical thinking and his regular use of small group exercises. Another strength is that reasons are not only required, they are assessed.

(1) The main courses I teach are . . .

The main courses I teach are (in philosophy)—critical reasoning, modern philosophy, epistemology, theories of justice, business ethics, justice and punishment. I also teach autobiographical writing (a nonphilosophy course).

(2) The basic concept of critical thinking, as I present it in class, is . . .

a. looking at reasons given in support of a point of view, and
b. evaluating those reasons.

(3) I design my instruction so that critical thinking plays a central role by . . .

I design my instruction so that critical thinking plays a central role by making each class meeting a series of activities rather than a series of subjects to be covered. Even though not all activities involve critical thinking, it is certainly the case that no passive learning is critical thinking, so I avoid at all costs having students fall into passive learning. Examples of critical thinking activities are mentioned below.

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

The best example of more successful integration of critical thinking into my class instruction is small-group exercises in which a problem must be solved, a choice made, a point of view advanced; and the group must develop and present reasons in support of the solution/choice/point-of-view. I try to have at least one such exercise in each class session.

(5) I regularly emphasize critical thinking in all of the following ways . . .

(see 4 above for the main way), also, by regularly discussing with students how and whether they are able to transfer the ideas they are learning in class to thinking in their everyday lives.

Mark Weinstein, Montclair State University

Comment: One of the many strong points of Professor Weinstein's approach is his focus on complex, long-term problems and tasks with explicit criteria and standards at each stage of the process.

(1) The main courses I teach are . . .

Undergraduate and graduate courses in Philosophy of Education. These are core courses for graduate students in our M.Ed. concentration in critical thinking. I also teach a graduate course in methods of research.

(2) The basic concept of critical thinking, as I present it in class, is . . .

The basic concept of critical thinking, as I present it in class, is the concept articulated by Lipman (focus on judgment, relying on criteria, sensitive to context and self-correcting). This articulation is embodied through academic tasks--that is complex, long term assignments (housed in appropriate classroom practices) that require critical thinking for their completion. For example, in my undergraduate Philosophy of Education course, students write a sequence of papers that build upon each other by responding to philosophical texts in an increasingly complex way. They are required to analyze a text (such as the Meno), and then identify and contrast main themes. In the class we focus on the ideas of many philosophers and other theoreticians (from Plato to Piaget). Students also read contemporary texts through a critical philosophical lens (such as Hirsch's Cultural Literacy). In addition, students evaluate the appropriateness in terms of goals and procedures of four case studies of democratic schools (Using Apple and Beam, Democratic Schooling, ASCD). Finally students compile a scrapbook of newspaper and magazine articles collected over the semester to construct a ten page analysis (with recommendations for change) of a contemporary issue using the various philosophical perspectives learned in class as a lens for evaluation.

(3) I design my instruction so that critical thinking plays a central role by . . .

I design my instruction so that critical thinking plays a central role by developing appropriate complex tasks; modeling critical thinking through whole group discussion in class; holding students responsible for their thinking during group discussion; furnishing and applying explicit criteria for all tasks, including standards for discussion.

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

The elaboration of complex tasks (for example in my graduate course in Philosophy of Education, students read standard texts from the writings of thinkers such as Plato, Rousseau, Dewey, Greene and Hooks). Students then write response papers for each text. These papers are included in an ongoing

journal from which they read to begin each class. Students understand from the beginning that these are preliminary drafts of a comprehensive paper they will turn in at the beginning of the semester, where the issues in the texts are integrated into a personal philosophy of education developed by each student and appropriate to his/her future teaching context.

(5) I regularly emphasize critical thinking in all of the following ways . . .

Careful planning; high standards (students are required to do B work); supportive environment that shows my deep commitment to the issues of the course and requiring a similar commitment from students; focus on dialogue and root questions; use of modeling of critical thinking skills and principles; opportunity for students to exercise critical thinking skills and dispositions; clear and warranted criteria for evaluation shared and discussed with students and supported by teacher feedback.

David Lee Rubin, University of Virginia

Comment: One of the strengths in Professor Rubin's approach is his explicit use of the "peer editing protocol" which features an intellectually disciplined process with explicit intellectual criteria (clarity, depth, justifiability).

(1) The main courses I teach are . . .

The Reading and Writing of Texts, Survey of 17th- and 18th-century French Literature, The Lyric, Baroque and Classical French Literature, and graduate courses on the same topics.

(2) The basic concept of critical thinking, as I present it in class, is . . .

The basic concept of critical thinking, as I present it in class, is systematic questioning to ascertain or improve clarity, justifiability, and depth of one's own reflections and those of others.

(3) I design my instruction so that critical thinking plays a central role by . . .

My course design involves a three-period orientation in critical thinking. This is essentially the introduction, explanation, and practice in the use of a "checklist of questions" based largely on a critical thinking protocol for grading student papers. Critical thinking fundamentals in the checklist are then used as guidelines for assessing how the students perform (for example, how well they perform in drafting, peer-editing, revising papers, writing critical abstracts of their own works, and drawing up questions and follow-up comments for use as feedback for other students after they have presented their work to the class). The interim grade report is also based on key points in the check list in evaluating the papers' "formal analysis" (peer editing and abstracts), and collegiality (engaging presenters in critical dialogue and responsiveness to questioners' initiatives).

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

Students contend that the peer editing protocol is the most useful tool in my kit. Perhaps they are right. To me the most productive method I use for bringing critical thinking into the classroom is through the notes-and-queries sheet they must fill out with questions and follow-ups as they read and hear their colleague's papers. The questions and follow-ups must be asked and submitted for grading. The results are very good. Listening is engaged and critical, student dialogue is probing and fruitful, and classes are active, focused, and intellectually satisfying.

(5) I regularly emphasize critical thinking in all of the following ways . . .

Question 5 is answered in number four above.

Paul F. deLespinasse, Adrian College

Comment: One strong point of Professor deLespinasse's approach is his emphasis on conceptual analysis and command of language. His highlighting of the difficulty of achieving clarity of thought and the importance of speaking precisely.

(1) The main courses I teach are . . .

American National Government, The "Logic" of Racism, Political Classics, Law and Society, Recent Supreme Court Decisions, and (in the Computer Science department) Programming in Basic (service course), and Pascal (first professional-level course).

(2) The basic concept of critical thinking, as I present it in class, is . . .

The basic concept of critical thinking, as I present in class, is conceptual acuity:

(a) I point out to students that many of the most important words used in political and legal discourse are ambiguous in that they have several, often conflicting, meanings. A non-political example I always use in class is the concept "door." I show students that door can refer to the opening in the wall through which we can go. It can also refer to the object we use to block up an opening in the wall so we can not go through it. I elaborate this idea by saying, "If student Jane is observed to walk through a "door" in the first sense of the term, does it make any sense to castigate student John when he cannot walk through a "door" in the second sense of the term? I indicate to students that normally we have no problem with the ambiguity of the word "door," because it is clear from the context in which it is used which meaning is intended.

(b) I quote here from the instructor's manual to my textbook for college-level American National Government classes (Thinking About Politics: American Government In Associational Perspective, N.Y: D. Van Nostrand, 1981):

"For some years--in an effort to help students understand what we are trying to do--my introductory class syllabus has stated the following course objectives:

(b1) To increase your conceptual acuity and ability to think systematically about politics.
(b2) To expand your understanding of the basic elements of the American political system and of the world context in which it exists."

The stress on conceptual acuity in these stated objectives is most deliberate. I have found that the most straightforward way to pursue this objective is to force students to memorize definitions of a few key terms and to use these terms consistently in the way they have been defined. (This is not the road to instant popularity with all students. When Wesley N. Hohfeld employed this technique at the Yale Law School the seniors in a couple of his courses became very upset. 'Most of them signed a petition addressed to President Hadley asking that his appointment not be extended.' But later Hohfeld received letters from former students at Stanford and even one (that I personally read) from a man who had signed the petition at Yale, a man who later became a judge of the U.S. Court of Appeals, expressing to Hohfeld the benefits that discipline in thought and expression had brought him in his profession. [Arthur L. Corbin]

Every body of knowledge has at least a few basic words that students had better understand in the fullest possible sense. For the physicist, "force" must equal mass times acceleration. Likewise, "dyne" must mean one gram-centimeter per second per second. Accountants must know that assets are equal to liabilities plus owners' equity (capital) and must be able to classify particular transactions into the proper categories. Music theorists must know the difference between a second inversion and a secondary dominant. Political science is no exception to this general rule.

Not only should students be forced to memorize definitions, but they should be forced to use the defined terms consistently in the way they have been defined. It does nothing for our thinking if we define a term one way, abstractly, and then turn around and use it to mean something else. A few of the definitions used in TAP [Thinking About Politics]--for example, the definitions of "associations" and "sanctions"-- are not identical with the ordinary usage of these terms. The student should be made morbidly aware that conclusions about "associations" in the sense that they are defined in TAP do not necessarily apply to "associations" as other people use the term.

(3) I design my instruction so that critical thinking plays a central role by . . .

I design my instruction so that critical thinking plays a central role by emphasizing thoughtful class discussion rather than lecturing.

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

Last fall in my introductory American National Government class I asked two students if they were in favor of or opposed to affirmative action. One said that she was in favor, the other said that she was opposed. I then asked the rest of the class if these two students disagreed with one another. Everyone thought that they did, indeed, disagree. I then proceeded to ask some clarifying questions to each of the two "disagreeing" students. It transpired that, like the word "door," "affirmative action" has at least two very different meanings:

affirmative action sub 1: encourage firms, etc., to cast their nets more widely in recruiting applications for jobs, enrollment, etc. The firms will make it widely known that they will not hold an applicant's race against them. This is an effort to counteract the disinclination of minority people to even apply, based on the expectation that it is wasted effort no matter how good they are. (A "self-defeating prophecy!). The idea is to hire or interview the people who seem to be the best applicants on a non-racial basis.

affirmative action sub 2: in the effort to promote proportional "representation" of a minority race in a workforce or student body, engage in "reverse discrimination," quotas, "renorming", and the like.

The student who was opposed to "affirmative action" was opposed to it in the second sense, but favored it in the first sense. The other student, who favored "affirmative action," was in favor of it in the first sense, but opposed it in the second sense. Whatever the merits of their positions, they did not in fact disagree with each other.

I have described this conversation several times more recently with other classes to make the point that one should not jump to conclusions about whether we disagree (or, for that matter, agree) with someone else without looking into the details a bit first. The students seem to find this example both interesting and illuminating.

(5) I regularly emphasize critical thinking in all of the following ways . . .
See answers above.

James Michael Craven, Clark College

Comment: There are many strong features of Professor Craven's approach. These include his emphasis on each of the dimensions listed under 2) below.

(1) The main courses I teach are . . .

Macroeconomics, Microeconomics, Intro to Economics and Economic Geography

(2) The basic concept of critical thinking, as I present it in class, is . . .

- comparing and contrasting essential assumptions and elements of contending paradigms
- process and systems modeling and analysis
- delineating and evaluating data sources and inductive methods
- identifying and examining logical fallacies and examples of their use in rhetoric
- analysis of superficially appealing yet faulty deductive reasoning
- delineating and analyzing use of contrived syllogisms for purposes of rhetoric
- examining and weighing linear unidirectional versus non-linear and multi-directional theories of causality
- identifying and testing implicit as well as explicit assumptions in rhetorical and deduction
- differentiating bias versus "subjectivity" and claims of non-bias versus "objectivity"
- delineating and examining cross-cultural differences and similarities in approaches, sources and habits of reasoning
- differentiating correlation versus "causality" and methods of establishing and testing "causality"
- uses and misuses of inductive and deductive devices and methods of exposition for rhetorical purposes m. "logical extrapolation" and "reductio ad absurdum" as rhetorical and implication-examination devices
- delineating, comparing and contrasting essential themes, rhetoric, metaphors, analogies and allegories in literature, film and other media-fiction and non-fiction
- uses and misuses of metaphors, analogies and allegories
- uses and misuses of mathematical expositions
- uses and misuses of stylistic grammar mechanics, syntax, punctuation ,etc. (communication skills)
- cross-cultural communication skills and sensitivity to uses and meaning of idioms, aphorisms, etc.

(3) I design my instruction so that critical thinking plays a central role by . . .

My instruction involves continual Socratic questioning and impromptu in-class exams (e.g., having class spontaneously critique a film in terms of the essential arguments presented, rhetorical devices employed, presence and use of logical fallacies, essential theme, presence or absence of contending perspectives and data, etc). My instruction also involves process and systems modeling (having students connect through cause/effect diagrams and concept mapping some essential concepts in widely diverse text chapters (e.g., how are concepts in chapter 6 connected through cause and effect with concepts in chapter 26?); mock debates. I also have students who are "pro" on a certain issues write a paper taking the "con" position and vice versa. Furthermore I give extra-credit for published op ed pieces in the local newspaper.

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

This is an example of one of my typical multiple choice questions (yes critical thinking can be taught via multiple choice questions also):

Given only the following pairs of variables and ignoring feedback effects, which of the following pairs of variables would be considered "inversely" related according to traditional economic theory?

- degree of economic concentration and degree of market power
- research and development expenditures as % of GDP and social rate of productivity
- rate of excess growth of money supply and overall rate of inflation
- extent of social instability and rates of various crimes

Note in the above example all of these pairs of variables are normally directly related; note also some of these relationships are microeconomic and some are macroeconomic; note the choice "none of the above" is not given; my students understand that there may be questions that have no correct answer, in which case they are to add option "e" and write in an example of pairs of variables that are "inversely" related.

I also use questions in which there are four variables given and students are asked to arrange them in order of independent, intervening and dependent variables (assuming only those variables and ignoring feedback effects) and then they are asked to incorporate feedback effects and to illustrate causality:

Change Demand or Supply---> Change Price---> change quantities demanded or supplied versus
l <---------- Change Expectations
l (future price or profits)
l l
V l
Change Demand/Supply--->Change Price--->Change Qd/Qs

(5) I regularly emphasize critical thinking in all of the following ways . . .

See answers to questions above.

Beth D. Sattes, Appalachia Educational Laboratory

Comment: One of the salient features of Professor Sattes' approach is her incorporation of the traits of critical thinking (intellectual humility, intellectual responsibility, etc.) into her instruction, as well as her original use of discussion guided by a "postulate."

(1) The main courses I teach are . . .

We teach adults (teachers, mainly) and use critical thinking as a subject and a process for instruction. Several teachers have adapted the process for use with their students--one teaches environmental science at Campbell County (VA) high school; others incorporate critical thinking into elementary classrooms (with integrated curriculum.)

(2) The basic concept of critical thinking, as I present it in class, is . . .

We incorporate the traits of critical thinking and the elements of reasoning into a model for action research called "Collegial Investigations." The investigation is basically a 4-part design: whole group discussion (using the elements of reasoning); collecting new evidence or looking at old data with an open mind; analysis of data in small groups; and whole group discussion (again, using the elements and the "new" data).

(3) I design my instruction so that critical thinking plays a central role by . . .

The discussion is guided by a postulate. After individual reflection by teachers within a faculty, the elements are introduced and used during the discussion. Having clarified the purpose and questions at issue, defined some key concepts, and thought about assumptions and points of view, the group members are asked to think about what evidence might help them resolve what they believe to be true about the postulate. Then the group learns about five different "investigatory" roles:

- the philosophers (who critically read literature on the topic);
- the surveyors (who design and administer a survey or interview);
- the analysts (who look at existing data that may support or refute the postulate);
- the storytellers (who think of personal stories and collect some from others, again, looking for evidence that would refute or support the postulate and help to answer the questions at issue); and
- the people watchers (who might shadow a student throughout a school day or watch people in public places--anything that might help them gather data about the postulate).

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

See numbers two and three.

(5) regularly emphasize critical thinking in all of the following ways . . .

See numbers two and three.

A. Earl McCain, Weber State University

Comment: One of the strong points of Professor McCain's approach is his emphasis on students generating arguments which support and refute positions taken, and the habit of forming and justifying conclusions based on the content of arguments which must meet the criteria of adequacy and congruence with an analysis of the problem/issue. Another is his use of case studies as a context for problem solving in real world situations.

(1) The main courses I teach are . . .

Social Studies Concepts for Elementary Teachers, Teaching for Thinking.

(2) The basic concept of critical thinking, as I present it in class, is . . .

Critical thinking is largely an analytical process composed of numerous component subskills and that creative thinking is a synthetic process which is also composed of various subskills. Ultimately, the complete thinking operation is a combination of analytic and synthetic processes. Thinking is not reserved for the gifted and talented; anyone may improve their facility for good thinking.

(3) I design my instruction so that critical thinking plays a central role by . . .

I design my instruction so that critical thinking plays a central role by placing students in small group activities in which they analyze case studies descriptive of those concepts and skills on which the courses are founded. Tests are designed to require student analysis rather than recitation of memorized information. Term projects are problem/issue-related resolutions which require the generation of arguments and the development of conclusions.

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

(a) term paper which offers a resolution for a current problem [Spring 1996, a flat tax proposal] requiring students to analyze the condition upon which the proposal is based, to generate arguments which support and refute the resolution, and to form/justify a conclusion based on the content of the two arguments which must meet the criteria of adequacy and congruence with the problem/issue.
(b) Case studies used to provide a content context for students to analyze the real or fictional behavior of people involved in problem solving, the organization of institutions, or the processes of socialization.

(5) I regularly emphasize critical thinking in all of the following ways . . .

(a) Socratic discussion in the classroom
(b) small group processing and discussion/presentation of case study materials
(c) individual group reading/writing assignments

Linda Clark, Spokane Falls College

Comment: One distinguishing characteristic of Professor Clark's approach is that of holding students responsible for creating structures that aid students to teach each other, while yet maintaining an intellectually disciplined approach. Asking students to refer to basic structures of thought (information, conclusion, inference, assumption, implication) when they are discussing ideas is a powerful way to help students to discipline their thinking.

(1) The main courses I teach are . . .

Introductory courses in education and special education which include lab/lecture in learning disabilities, behavior disorders, mental retardation, and behavior management.

(2) The basic concept of critical thinking, as I present it in class, is . . .

The basic concept of critical thinking, as I present it in class, is the ability to use critical thinking skills such as point of view, assumptions, seeing consequences/implications, etc. to think about ways to be flexible and adjust to the "future" which will require our students to do jobs that may not even have been developed or imagined yet.

(3) I design my instruction so that critical thinking plays a central role by . . .

I design my instruction so that critical thinking plays a central role by having the students engaged in designing the syllabus for the class, working in groups to present the information they research, using the reasoning standards for their self-assessment and for peer assessment of curriculum development and encouraging them to answer the question "how could this have been improved?"

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

(a) The students work in groups for presentation of assigned material. They have to decide what material to present, how to locate media and resource speakers, how to develop ways to involve their peers in the learning process. They also develop an assessment form to receive feedback as to how their presentation could have been improved.
(b) Students in the laboratory classes are assigned to field sites where they have to work with students who are having problems learning. They have to learn how to identify the problem the

child is having, how to develop, modify or locate curriculum to meet the child's needs and how to work with the supervising teacher. As a result, they learn to identify the areas of study they need to meet the needs of their students.

(5) I regularly emphasize critical thinking in all of the following ways . . .

(a) Asking students to identify what they learned from video presentations, guest speakers, peer presentations and classroom discussions.
(b) Thinking through processes verbally for them to model how I think when examining material
(c) Asking them to use the elements of reasoning when discussing and presenting assigned reading material.
(d) Asking students to determine the multimedia demonstration of their learning objective to meet the class criteria.

Lawrence A. Parker, The Ohio Center for Critical Thinking Instruction

Comment: One of the salient features of Professor Parker's work is his emphasis on "dialogical" discussions on issues of significance, while holding students responsible to follow through the implications of their own thinking.

(1) The main courses I teach are . . .

Critical Thinking for Adults, Critical Thinking Instruction for Teachers, Logic, Philosophies

(2) The basic concept of critical thinking, as I present it in class, is . . .

The basic concept of critical thinking, as I present it in class, is simply: think for yourself. There are, of course, meaningful ideas implicit in this statement, such as, among others, the following:

- Personal Commitment to the tenets of and, especially, the "doing" of critical thinking whenever necessary. This disposition is, at its barest foundation, a commitment to one's self;
- Self-responsibility for one's own thoughts, beliefs, ideas, judgments, decisions, actions and emotions formulated, chosen and accepted, knowingly, by one's self;
- An understanding of the breadth of and limitations to one's knowledge and an appreciation for the overall quality of that knowledge;
- Observance of and adherence to the Processes of Critical Thinking: Inquiry, Information Gathering, Collation and Correlation, 'Dynamic Systems' Analysis, Judgment and Decision making, Correction, and Reflection throughout.

(3) I design my instruction so that critical thinking plays a central role by . . .

I design my instruction so that critical thinking plays a central role by focusing the experience of learning upon each individual student. Most students are uncomfortable with this, preferring someone else to be responsible for their work and the success (or failure) of the learning process. Here the instructor must facilitate by bringing the process back into the student's experience whenever involvement is avoided or neglected. I always stress the development of intrinsic motivation which requires a withdrawal from the stress on extrinsic motivation to which most students are accustomed. In addition, I teach for self-assessment and a willingness to challenge fallacious extrinsic authorities.

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

I have always been a strong believer in the use of media materials (books, video tapes, audio tapes, articles, art works) to present ideas and topics for discussion. I think that it is less important 'what'

the object or topic is; changes in the 'what' usually only result in changes in the content of the discussion, not the quality, although emotional topics are often an exception. More important seems to be 'how' it is presented, and this depends upon the preparedness of the facilitator, not only in knowing of and being capable of doing critical thinking, encouraging it in others, but also in the facilitators knowledge of the students/individuals involved in the discussion. An able facilitator should function in part as an igniter or catalyst for self-sustaining discussion.

An experience which stands out in my mind was an introductory session with a graduate (700-level) class of professional educators. After a brief introduction to critical thinking (definitions, goals, processes, etc.) I gave them a reading selection and started a discussion on a topic which developed naturally out of part of the story. Within 5 minutes, I could have walked out of the room and the discussion would have continued without me, independently: the participants were experiencing for themselves the doing of critical thinking. They learned more from that experience, for themselves, than I could have ever 'taught' them by 'talking' about it.

In this way, I have used material from Monty Python (adding some humor, of course!) to the writings of Ayn Rand and Isaac Asimov, and most everyone and everything in between. There is very little which cannot be brought into the classroom, and used in some way as the basis for a dialogue which actively utilizes critical thinking processes. This is the kind of experience for which teachers teach; interestingly, in that we are all capable of doing critical thinking and encouraging and facilitating critical thinking in others, this is also an experience which is available in our day-to-day living and interactions with others.

(5) I regularly emphasize critical thinking in all of the following ways . . .

- by asking probing questions which require analysis and an extension of the students' thinking into the realm of implications and consequences;
- by encouraging meaningful discussions in the classroom involving the exchange of ideas, the philosophical examination of those ideas and a critical evaluation of those ideas;
- by ensuring, as a facilitator, that those discussions are respectful, dignified, and open-minded.
- And by not letting students 'off-the-hook'; I hold them ultimately responsible for their learning, their questioning, their own assessment: doing critical thinking is the object of the course and it does not allow for partial efforts; neither do I. Neither should any of us.

Mel Manson, Endicott College

Comment: One of the highlights of Professor Manson's design is his use of critical thinking and intellectual standards and how he brings these to bear on controversial issues so students engage in reasoned judgment rather than a mere subjective exchange of "opinion."

(1) The main courses I teach are . . .

Introduction to Sociology, Social Problems, Racial & Ethnic Relations in America, Urban Sociology

(2) The basic concept of critical thinking, as I present it in class, is . . .

The basic concept of critical thinking, as I present it in class, is the "elements of thought in reasoning" and the "universal intellectual standards."

(3) I design my instruction so that critical thinking plays a central role by . . .

I design my instruction so that critical thinking plays a central role by incorporating the importance of reasoned thought in the evaluation of sociological theories and in the consequences for social policy and

actions based on these theories. These elements are stressed in the writing of my course objectives formed in the student syllabi.

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

The best examples of successful integration of critical thinking into my class instruction is focused on the use of peer evaluation of student oral and written work.

(a) In my *Introductory to Sociology* classes, students prepare for oral presentations done in a panel format on library research concerning issues facing our major social institutions. The presenters evaluate their sources in an annotated bibliography and the "audience" question assumptions, and conclusions of the presentations.
(b) In my *Social Problems* course, students write several short critical analysis papers on current concerns related to the lecture topics, e.g., the tobacco industry and advertising, current judicial limitations on affirmative action, consequences of domestic terrorism. The students break into small groups of 3-5 members and first orally present their arguments. They exchange their papers and then each student evaluates, in writing, the paper using the elements of thought and universal standards. A discussion of these evaluations than follows.
(c) In my *Race Relations* course, students read essays from opposing viewpoints and evaluate these in terms of the elements of reasoning found or not found in these essays. Review papers are written and discussed. (Green Haven Press's At Issues text on Ethnic Conflict was used last semester).
(d) Similar exercises are done in the *Urban Sociology* class using the Annual Editions Volume of readings, *Urban Sociology* and their critical thinking review form.

(5) I regularly emphasize critical thinking in all of the following ways . . .

- in my own lectures, pointing out the basis for my inferences;
- reviewing student papers for well founded, logical, and clear presentations;
- in reviewing new courses and programs presented to the curriculum committee which I chair.

James B. Sauer, St. Mary's University

Comment: In many ways Professor Sauer's summary of his approach represents a paradigm of the heart of a course focused on control taught through critical thinking structures and strategies. Here are some of the features: (1) his courses all are centered on "organizing ideas" which provides for highly integrated instruction, (2)his students are regularly requested to distinguish "good reasoning" from "flawed reasoning," (3) his students must regularly assess their own work "through self-monitored learning," (4) he highlights basic intellectual structures as well as fundamental intellectual standards.

(1) The main courses I teach are . . .

Philosophy of Morality, Social Philosophy, Environmental Philosophy, Economic Philosophy

(2) The basic concept of critical thinking, as I present it in class, is . . .

The basic concept of critical thinking, as I present it in class, is independent, self-monitored, self-regulated thinking that consistently distinguishes good reasoning from bad or flawed reasoning, that is willing to make judgments of truth, and to support such judgments with adequate evidence, openness to alternative perspectives, consideration of assumptions, attention to implications, and thinking which deals with objections.

The concept of critical thinking is presented in the first class as the syllabus is introduced. My syllabus models critical thinking skills and dispositions.

(3) I design my instruction so that critical thinking plays a central role by . . .

I design my instruction so that critical thinking plays a central role by being the organizational key to every course. That is, I teach for critical thinking by designing critical thinking skills and dispositions into every class activity from assigned readings and lectures to small group activities and class discussion. The presentation of the content is done through critical thinking skills to help students derive the insights that constitute the course rather than presenting the insights as the content. What this means is that I convert contents to insights and then design activities which will lead the student to derive the insight from the data, to test the insight, and then to affirm what they have learned in the process/activity.

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

(a) "Promoting Self-Critical Thinking Through Self-Monitored Learning
Every course includes a self-assessment component in which students justify their final grade in relation to three goals and five key questions they chose to examine at the beginning of the course. Both goal setting and question identification are structured activities based on my syllabus presentation and the introductory course lecture. Periodically through the course using different kinds of activities students reflect on and report progress on their goals. The final project is an essay in which students gather evidence based on their work throughout the course to support a final grade evaluation.

(b) Critical reading and writing (Philosophy of Morality Course)
This is a sophomore course in which students are introduced for the first time to primary philosophical texts. In addition to teaching critical reading through modeling and small group activities, I have developed a series of worksheets that lead students through the basic skills of critical reading such as identifying conclusions, implications, assumptions, argument evaluation and the like. These worksheets which are graded on a pass-no pass basis are linked to critical writing exercises. Students report increasing confidence with critical thinking skills through these worksheets/ essays. I have confirmed both skills and disposition gains using the California Inventory of Critical Thinking Skills/Dispositions.

(c) Outcomes Assessment: Upper Division Philosophy Courses
I took the lead in developing a department outcomes assessment in upper division philosophy courses using critical thinking criteria based assessment. This assessment is providing the basis of a substantial revision of the philosophy curriculum to include more critical thinking design in all philosophy courses.

(5) I regularly emphasize critical thinking in all of the following ways . . .

(a) Syllabi for all courses emphasize the development of critical thinking skills and dispositions. This permits me to introduce critical thinking in relation to the content of the course from the first class meeting.
(b) I use critical thinking criteria to evaluate all student writing. I have designed an "evaluation" framework of ten criteria which are applied to all student writing. All my courses are effectively writing intensive. There are regular presentations on critical writing in all courses. I provide samples of excellent and poor critical thinking as reflected in student writing in that course.
(c) All assigned reading emphasizes the use of critical thinking skills in appropriating the text. No text is assigned only for its content or information transfer.
(d) My courses are designed not for information transfer but to lead students to derive insights and to make judgments about their insights. Some of the activities which encourage this are:

(d-1) Regular use of Socratic questioning in class discussions
(d-2) Use of Socratic questioning in small group activities
(d-3) Active listening skills (e.g., summarize the speaker, agree, disagree, modify the speaker activities)
(d-4) Point-Counter-point activities
(d-5) Timed essay quizzes (e.g. Summarize a position, offer an objection, what is assumed, etc.) rather than content quizzes.

(e) Considering positions (e.g., a moral theory) using critical thinking skills rather than lecturing a position.

(f) Emphasizing the importance of offering reasons for a position (justification) in all evaluated activities (papers, quizzes, exams, projects).

(g) Providing a clear statement of evaluative criteria in the syllabi which incorporate critical thinking criteria joined with a regular revisiting of the criteria after assignments are returned.

Stage Four: Selections from Work Turned in at a Critical Thinking Workshop for Postsecondary Faculty Members

General Commentary for All Examples Below

The purpose of this exercise (developed during a national academy on critical thinking) was not to provide a full account of how critical thinking was going to be integrated into a given class, but rather merely to begin to think through the content of a class as a mode of thinking--rather than as a mass of statements to be delivered in didactic lectures rotely memorized by students. It is based on the premise that the major goal of all classes should be the fostering of a particular mode of disciplined thinking. For example, the most important goal of all math classes should be to teach mathematical thinking, the goal of all history courses to teach historical thinking, of all biology courses to teach biological thinking, and so forth. The participant instructor was to name the class or subject, then to "name" the thinking that was essential to it, then to begin to form a general plan for how he or she would aim to systematically foster the thinking essential to the subject, and then to reconceive a "typical" day in the classroom, to make sure that "thinking within the discipline" was in fact the plausible end-product of the design.

The participants were encouraged to think of themselves as talking directly to the students in articulating their "organizing idea." Some of the language used therefore is conversational in nature. They were also encouraged to develop a central organizing idea which would be initially intuitive to students and into which all content could later be interwoven. For example, part of the goal was to end up with an organizing idea which the students would find intelligible from the outset and which they could more or less immediately begin to use in learning the content.

What follows indicates some good "first steps" in this process by participant professors. They illustrate the fact that when faculty take the time to rethink their subjects and focus on the goal of making disciplined thinking their fundamental emphasis, they can make good strides toward that end in a reasonably short period of time. What then must follow is a good deal of thinking through of the details of the design. Nevertheless, without this preliminary thinking through of the thinking essential to content, it is unlikely that such a re-design will ever occur.

The template for this rethinking is as follows:

Class or Subject
Organizing Idea
Basic Plan
A Typical Day

Professional Writing (for Counselors)

Organizing Idea

The purpose of this course is for you to learn to think like a professional writer. You will learn how to use the intellectual standards of clarity, precision, depth, breadth, accuracy, relevance, and logicalness explicitly in your writing. You will learn to check your assumptions about your readers to see if they are justifiable. You will learn to think about your writing with a highly critical mind, so that you can develop the habit of continually improving it.

Basic Plan

You will learn how to write more effectively and efficiently. You will learn to ask such questions as: What do these terms mean? Do they change for different audiences? What do authors typically change for differing audiences? Who will you write to concerning . . .? Who will be your audience (peers, clients, general public, etc.)?
You already make/have successful writing strategies, but you also have some ineffective/inefficient strategies. For example... this course will help you test different strategies and select the ones that work best for you. Our standards for making decisions about effective writing will be based on: clarity, precision, depth and breadth, and logic.

A Typical Day

We will discuss ways to effectively perform some writing task. For example, we will learn how to write coherent paragraphs, clear sentence structures, etc. You will then in groups/pairs discuss some writing you've created and receive detailed feedback from your partner/group about it's clarity and effectiveness. Then as a class we will take some examples from the groups/pairs and discuss them, noting both strengths and weaknesses and trying to develop alternative structures or better choices in regards to the clarity, logic, depth, etc. of the paper. By developing a critical perspective on your writing and other's writing, you will also develop a sense of what patterns create good/bad choices and your writing time to produce a quality product will be reduced.

Commentary

One important strength of this description is that it begins the process of helping students to think like a writer and to use that thinking to systematically improve what they write.

Psychology of Human Development

Organizing Idea

To Think Psychologically: All of you have been and are thinking psychologically all of your lives whether you know it or not. We are going to practice that mode of thinking more actively and explicitly and with conscious effort. Your questions, responses to questions raised, and listening all

should be directed toward the main goal of the course; i.e., "to think psychologically." You should continually be asking yourself: "Am I now taking charge of the psychological dimension of my thought?" Before you took this course you thought psychologically without assessing your thought. Now you are going to do so while systematically assessing it.

Basic Plan

- Student oriented course
- No lecture by the instructor
- Writing assignments daily and asking all to complete the assignments with no room for excuse
- Small group work to practice many examples of building good/positive interpersonal relations
- Student self-evaluation
- Group (of 4 or 5's), evaluating each others papers

A Typical Day

- Collect prior written assignments
- Two minutes spent going over comments, questions, suggestions
- Five minutes spent by instructor going over the agenda of the day and introducing one new topic
- Students in dyads engaging in the first exercise based on the first topic introduced
- Back to the large group and asking for general comments, etc.
- Second topic of the day is introduced by the instructor and same steps as above repeated
- Students are asked to indicate what significant points were introduced, discussed, and if any unclear areas remain
- Summary by the instructor

Commentary

One important strength of this description is that it explicitly states the intellectual standards and classroom activities that will be used so assess student work. One weakness is that it gives us no guiding metaphor or intitial concept to use in conceptualizing "thinking psychologically."

Poetry

Organizing Idea

To Think and Work Like a Poet: Poetry is an expression of ideas, emotions, and/or experiences in language that is fresh and alive and in a variety of structures and forms that can be taught and learned. In this course, you will learn to think like a poet, to use language poetically. You will learn how language can be manipulated to form powerful poetic ideas and concepts.

Basic Plan

Language "comes alive" when we break out of conditioned modes of thinking and feeling and discover the world and ourselves with fresh vision. We can become like children and see and experience as if we were seeing it for the first time. In this course, I will organize activities and exercises to help you see—and then to write—in fresh new ways. In this course, you will learn models of poetic structures, forms and strategies for expressing your ideas. I will teach you to put together powerful nouns, verbs, adjectives in poetic form.

A Typical Day

On a typical day, you will bring your own poetic writing to class to read and share either in pairs or small groups. We'll talk about what works and why it works. We will put successful efforts on the overhead, and discuss how the language is fresh, clear and alive, and how reading it makes us see and feel in a new way. We'll look at models of writing by contemporary poets—and we'll invite them to class, to talk with us about their poetry, and how they approach their work. We'll look at models of poetry of people from other times and centuries—and how their experiences and culture shaped their work. Our best efforts will be gathered into individual books of poetry which you will illustrate or enhanced graphically in your own style. Those final books—along with a number of short papers—will be evaluated for the final grade.

Commentary

This description provides an intelligible organizing idea to use in conceptualizing poetic thinking, the utilization of language in "fresh" and innovative ways. Of course, the students will require much modeling of this concept before it begins to become truly intuitive to them.

Biology

Organizing Idea

To Think Biologically: Biology is the logic or study of life forms. To understand biology is to understand the interdependence of all life forms. As a human being, you require other life forms for nourishment, shelter, tools, companionship, security, medicine, and possible aesthetic beauty. In other words, your life depends on the availability and health of other life forms.

Basic Plan

In this course you will be learning to think, observe, experiment, hypothesize, evaluate, and analyze as a biologist. Remember, the quality of your life is directly dependent upon the quality of health and viability of the life forms we share the planet Earth with. I would venture to say that all of you have already had experience thinking as a biologist. What life forms are you familiar with? How do you know it was alive? How do you know if your survival is dependent upon it; or if you should protect yourself from it? These are a few of the many biological questions we will focus on.

A Typical Day

- Each day you will be observing, hypothesizing, reading, thinking, analyzing, writing, and constructing biological systems.
- You will work individually, in groups and as a class.
- As you work you will be comparing and contrasting various systems; comparing and contrasting life forms; assessing your own work as well as the work of your peers.
- Analyzing research conclusions in the field of biology.
- The general pattern is: theory, study, and apply.
- Experiments in 4-2-1 model talking, thinking, learning within biology.

Commentary

Apart from emphasizing content as a form of thinking, this description argues for the significance of the course and attempts to relate it to the lives of the students, both important things to do if the student is to take the course seriously.

College Algebra

Organizing Idea

Algebraic thinking is thinking arithmetically with unknowns. There is a logic to algebraic thinking. To learn to think algebraically, you will be engaged in reading problems, interpreting problems, drawing sketches and/or diagrams of problems, and then writing equations to solve the problems. Thus, throughout the course, you will be developing your ability to solve problems using algebraic thinking.

Basic Plan

- Read the problem
- Model the problem
- Solve the problem
- Justify the method used in solving the problem

A Typical Day

- Present a problem
- Individually read the problem and interpret the problem
- Randomly call on students to give their interpretation
- Individually model the problem by drawing a sketch, diagram, etc.
- Form groups of two to compare to models
- Randomly call on students to discuss their model
- Individually write an equation
- Randomly call on students to give their equations
- Individually solve the equations
- Form groups of two to compare the solutions
- Randomly call on groups to give their solution and method of arriving at the solution
- Have each student turn in at the next class meeting a written interpretation of their method of problem solving.

Commentary

Whereas algebra is traditionally taught as a set of rules to be followed, this description effectively links algegraic thinking with general problem-solving techniques which should help the students to transfer some of what they are learning to the learning of other subjects. The design rightly emphasizes the students' responsibility to independently interpret problems, develop models for them, and justify their proposed solutions.

Algebraic Structures

Organizing Idea

This course is designed to teach you to think analytically within an algebraic structure. Throughout the course, you will be learning to think algebraically through analysis of sets and binary operations. This will be done through learning to restate algebraic problems in your own words, learning to determine relevant information needed to solve problems, learning to identify strategies which can be used to solve problems, and learning to determine steps needed to solve problems.

Basic Plan

In this course, we:
(a) Analyze sets and binary operations that fall into one of three categories (groups, rings, fields);
(b) Major question: what are the conditions under which any two given groups, rings of fields will be considered structurally the same?;
(c) Outline and constantly model a problem solving approach that can be used to think about and solve problems in this course; modeling done by instructor and students;
(d) Move from simple to complex, building on previous math understanding and experience *[Example]* I discuss how we classify a) the set of integers under the operation of addition; b) the set of integers under the operation of subtraction; c) the set of integers under addition and multiplication; and the set of real numbers under addition and the non-zero reals under multiplication. I use properties of groups, rings, and fields but without overemphasizing formal definition of these structures.
(e) Individual and group problems and projects involving applications will be given regularly and graded to determine accuracy of interpretation/representation of relevant information, relevance of framework (strategy) selected to solve problems, preciseness, and breadth of answer.

A Typical Day

Short lecture on sets, binary operations, and an algebraic structure or concept. Students will form two groups of four each to solve problems. Working in small groups, students will be asked to discuss 1) restatement of problem (verbal and symbolic), 2) relevant information and concepts, 3) strategies to solve problem, 4) steps in solution that lead to an answer or answers. Group leader will share summary of their thinking as outlined in 1-4 with class and turns in one copy of group work. While students are working, I walk around or sit behind them to listen to work, ask questions if needed. The format of the 75 minute class which meets twice per week is a short lecture followed by group or individual work, discussion, lecture, etc.

Commentary

As with the previous description, this description calls upon the student to make sense of problems, as opposed to relying on a mechanical procedure. It also emphasizes the student's role in determining what sort of information is relevant to a given problem. This contrasts with the traditional approach to algebra in which the relevant information is provided by the textbook or instructor.

Two-Dimensional Design (College Entry Level)

Organizing Idea

The purpose of this course is to help you learn to think visually and create designs through critical observations as artists and designers do. You are already consumers of designed objects and therefore have had a lot of practice as a consumer deciding whether you want to buy a product based on many of the principles that we address all semester.

Basic Plan

Throughout the course, we will be thinking visually through critical observation to: recognize, analyze, and evaluate two-dimensional structure and designed works of art.

A Typical Day

There will be one or a combination of the following:

- Presentation and group discussion, with visual examples, of a single or several formal organizing elements or principles of design and how they are used presently and historically in all visual expression.
- Group and individual activities where we learn to recognize and evaluate design decisions.
- Group and individual analyzing activities in oral, written, or verbal form where we pull apart works of art.
- Presentation of a problem that you will solve through visual example that allows you to explore the use of these elements and principles.
- Individual preliminary designing that will break out into whole group or small group interaction sessions of analysis or evaluation of your design in the redesigning process.
- Critique: where we hang our work on the "crit" wall and go beyond analysis to evaluation of your working art (or we will sometimes evaluate historical examples) through oral and written critique in small groups or as a whole class. In critique we will pay special attention to evaluating our assumptions and interpretive judgments. We will look for clarity, accuracy, logic, and depth in thinking.

Commentary

In addition to presenting the content as a form of thinking, this description emphasizes the role of individual and group evaluation and analysis using important intellectual standards (clarity, accuracy, logic and depth).

Personality

Organizing Idea

In this course you will learn to think like a personality theorist. The fundamental thrust of the course is for you to learn to think deeply about personality development. To help you do this, you will learn to take the perspective of each of several important personality theorists.

Basic Plan

We will consider five major theories that have emerged to explain personality and personality development. You will think through each of these via writing, questioning, and various focused activities. Not all theories lead to the same sorts of questions, and so do not lead to the same answers. Ultimately you will be able to evaluate the relative usefulness of these theories.

A Typical Day

Part of the class period will be spent with students criticizing written assignments that the students have brought to class. This part will be conducted in groups of four students. Note that students will assess each other's papers. The rest of the class period will be spent with the instructor engaging the class in an exploration in the thinking of the various theorists. Through a question and answer format, you will learn the assumptions and implications of a particular theory. This knowledge will form the basis of the next written assignment.

Commentary

One chief strength of this description is its emphasis on the student's role in thinking within a point of view. This contrasts with the typical approach in which students are told about various theories but are given little or no experience actually applying those theories to a range of problems to discover the relative strengths and weaknesses of each theory.

General Introduction to Biology

Organizing Idea

The purpose of this course is for you to learn to think biologically. The idea is to gain deep understanding of the nature of biology not just to memorize facts. In this course, you will learn that biology involves a growing body of knowledge, and that you can understand the logic of how that knowledge evolves over time.

Basic Plan

The basic plan for the course is to routinely analyze the process of acquiring biological knowledge, while learning useful biological concepts. Students will be responsible for learning how biological knowledge changes over time, and how biological "truths" come about. We will learn how biological hypothesis are formed. In addition, we will learn about the assumptions that biologists make, the questions biologists ask, the types of experiments biologists engage in, and the various interpretations biologists make.

A Typical Day

Students will be given an assignment to read and analyze; these will include textbook readings, literature reports (excerpts from journals) and own work obtained through lab exercises. Each will prepare for next class by written interpretation of the

- Questions being asked
- Hypothesis made
- Assumptions made (as well as alternatives)
- Evidence reported and used, and what could have been added
- Explain how evidence bears on hypothesis analysis

Groups will be randomly assigned at start of class. Such groups will work on a group report. Random students will be called upon from groups to report. Other groups can be called on for explanation of what is said (terms and concepts).

Commentary

Each element of this description presents the content as a form of thinking. In the traditional approach biology, students are presented almost exclusively with the products of biological thinking . This description, in contrast, emphasizes the process by which biological knowledge is arrived at, and not the mere products of that process.

Introductory Philosophy

Organizing Idea

In this course, you will come to learn to think like a philosopher. You will learn about the variety of questions that philosophers ask, and the differing assumptions from which philosophers begin their thinking. You will begin to develop your own philosophies on specific questions we will focus on, and you will learn to support your ideas with sound reasoning.

Basic Plan

- Not expecting immediate answers. Instead, assuming that inquiry itself is of value
- Expecting careful thinking—i.e. we want to come to the best answers we can come to and be able to differentiate between a strong and a weak answer.
- Determining questions underlying other questions
- Use some answers from the past to model how we might answer these questions
- Differs from other classes because you will be asked to think critically throughout the course.

A Typical Day

- A question of the day on board
- You'll have read some possible answers for that question
- We'll discuss in small groups or as a class why those answers worked or failed to work.
- You'll write a short paper in which you'll discuss your answers and it's own strengths and weaknesses.

Commentary

The strength in this description consists in its emphasis on the role of questions and the assumptions from which those questions were approached by different thinkers. As in the sciences, students of philosophy are typically presented merely with the products of thinking and are given little opportunity to appreciate the original questions that prompted the thinking or the approach taken to answer those questions.

Special Recognition: The Case of Donald Herrin

Introduction and Commentary

The submission we received from Professor Donald Herrin at the University of Utah was elaborated and detailed so well that we decided that it warranted special commendation. It has all the elaboration reflective of a mind that has deeply thought through the problem of teaching for critical thinking. Of course, we do not present it as perfect. It is clear that Professor Herrin does not think of it in this way. But, nevertheless, it reflects the depth and comprehensiveness of thought which we believe teaching for critical thinking clearly deserves.

In giving this special attention to Professor Herrin, we are not implying that there are not others that we potentially could have highlighted in a similar fashion. Nevertheless, his example is certainly outstanding and warrants being examined closely as an example of one of the comparatively few who has taken teaching for critical thinking seriously, and followed through (in detail) at the instructional design level. Note: we have abbreviated his submission considerably.

Donald Herrin, University of Utah

(1) The main courses I teach are . . .

"Family Belief Systems," "Home Environments," and "Family Ecology," "Sex Roles in Contemporary and Historical Perspective," "Family violence." I am trained as a social psychologist with research and teaching interests in several diverse yet related areas that are represented in the courses I teach: (1) people's belief systems and corresponding views of the world and social policy; (2) the factors that determine how people with different sets of beliefs and values interpret the same or different facts in different and often opposing ways, and the implications of these differences for social and family policy; (3) the physical material and social environments of the home; (4) the relationship between one's egocentrism and sense of entitlement regarding others and one's participation in manipulative, controlling, disrespectful, demeaning, aggressive, violent, and/or abusive behavior towards certain other people.

All of my courses emphasize critical thinking, reading, and writing. My courses are designed to develop the capacity of students to think actively and critically about the particular subject matter or course content and its relevant applications to students and their personal worlds of experience, their families, and their involvements with different groups and institutions in our society. Students study different viewpoints or systems of thinking about the course content because each viewpoint studied enables students to think differently about things they already know as they uncover new content and considerations within the different viewpoints. Course content and activities are intended to have pragmatic applications to day-to-day living as students study the relationships between themselves and their social interactions, beliefs, values, rules, rituals, practices, etc.

(2) The basic concept of critical thinking, as I present it in class, is . . .

In my courses, learned content and knowing something is only a beginning. It is not the only desired end or outcome. Learning to do something with what students know and learn is the other essential desired end or outcome for my courses. In this respect, very little learned content is useful or worth knowing for its own sake.

I define critical thinking as thinking that a person uses to be consciously aware of the important elements of thought that constitute it. It is necessarily self-monitoring and self-reflective. It enables the critically thinking person to articulate the line of reasoning or system of logic the person is thinking within or that one is reading, hearing, or speaking at any given time. I assume that all people are egocentric and self deceived to some degree. I emphasize that thinking about something requires a person to be cognizant of the following elements.

(a) Purpose of the thinking, reading, writing, speaking, listening
(b) Nature of problem, question, issue
(c) Important ideas and concepts
(d) Important assumptions
(e) Substance, data, information, "stuff'
(f) Pertinent opposing or alternative perceptions, viewpoints, interpretations
(g) Relevant recommendations for changes, improvements
(h) Implications of implemented recommendations
(i) Anticipated opposition to recommendations
(j) Strengths and weaknesses of different viewpoints and associated recommendations
(k) Relevance of the thinking, reading, writing, speaking, listening; why it is worth thinking about and/or learning and the difference it makes

Students are encouraged to use a set of basic questions to help them in everything they read, write, and discuss to learn these elements of critical thinking. These questions form a shorthand for the elements of critical thinking emphasized in my courses and the important components for students to include in their personal demonstrations of learning These brief questions are: What's important? Why? How do you know? Who says? Who cares'? What difference does it make to you? HOW should WHO and/or YOU do WHAT about it and WHY? Then what? So what? Now what? These questions help students think more in-depth and depth is what is missing in all of the work done by students in my courses. These questions push students to identify depth of substance, meaning, and the implications of relevant ideas, assumptions, and actions. Students are particularly challenged and fascinated by their efforts to explore the Why? and So what? questions.

(3) I design my instruction so that critical thinking plays a central role by . . .

My emphasis on critical thinking requires students to learn holistically. Thinking, reading, reflecting, discussing, and writing are all necessary components to learning something well enough to do something with it. Students must become familiar with considerable depth and breadth of content in order to establish an understanding for making or suspending informed personal choices, judgments, and decisions within a particular content area.

I have to convince most students that they are the ones who have to do most of the work in making the connections between their lives and what they are learning. They cling to the assumption that learning is the transfer of information from one source to another so they expect someone else to give them these connections. They have a difficult time learning how to involve themselves in their own learning so they will learn to do something personal and useful with what they learn.

Thinking critically is essential for students to understand and mediate their inherent biases, prejudices, and presuppositions. Class discussions are designed and facilitated to show students how to understand and justify their assumptions, perceptions, and beliefs that are relevant to the course of study and what the implications are of what they know and believe for important social and moral issues. Students learn how different conclusions can be drawn from the same data when different assumptions are used to construe the data and interpret the relevant explanations.

My teaching assumes that important values, perceptions, ideas, interpretations, and conclusions are necessarily, pragmatically, and theoretically pluralistic in nature. Students are expected to put their important ideas and perspectives into an arena of competing and oppositional ideas and perspectives so they see how interrelated and mutually informing they are of one another. As this realization takes hold, students come to see opposition as something to understand and use because it can help them better articulate their own viewpoints and the ways of thinking they use and the ways of thinking they compete with.

Students learn that in spite of their self-perceptions, virtually everyone in the class is narrow-minded and biased in ways that prevent them from doing the things that are necessary to acquire an understanding and appreciation of other people with alternative viewpoints and beliefs. I feel an obligation to push students on their values, their ethical reasoning, and their justifications so they learn the importance of taking personal responsibility for being informed, formulating and taking stands, and understanding others and their points of view.

It is important to model for students and other faculty members that learning about learning and teaching is ongoing for me just as learning is for students. I change several things about my course design, readings, activities, and/or assignments each time I teach a course as a result of feedback I receive each term or because of something I find in my ongoing perusal of the research on learning and teaching.

(4) Perhaps the best example(s) of more successful integration of critical thinking into my class instruction is . . .

Each daily reading assignment includes several strategic questions that require critical reading and thinking that students have to respond to in writing before coming to class. I have included below an abbreviated description of such an assignment as it is given to students in their course syllabi with a few comments about intellectual processes (or intellectual standards) that I often include with such assignments.

> *Bring your completed set of responses to the next class meeting. It is imperative that you demonstrate in your writing that (1) you can explain and comprehend important and relevant things from your reading and (2) you can apply your understanding to your own experience. Your responses should emphasize clarity,, depth, significance, and relevance.*
>
> *One of the most important elements of good reasoning to incorporate in all of your work is to read and write with a purpose. What do you intend to do in your writing? What are you working to demonstrate about your learning in "what" you write and "how" you choose to write it? What do you want to accomplish for yourself by the way you do this assignment and what you emphasize? How will you know if you accomplished your intentions?*
>
> *Another essential element of good reasoning is understanding the central concepts and ideas of a particular body of information. I recommend using the following steps. First, define the central concept or idea on its own terms as it is used in the reading. To do this, (A) break down the concept's definition into subparts and explain them; (B) explain how the parts relate to the whole; and (C) explain how the parts are related to the other parts. Second, restate the definition in your own words to communicate your understanding.*
>
> *As you finish this assignment, ask yourself the following questions: Do you feel you have accomplished what you set out to do in your responses? To what degree were you successful in achieving your own purposes within the parameters given you for this assignment?*
>
> *1 From your reading of the "Gender Polarization" chapter in <u>The lenses of gender,</u> select a minimum of four quotes (e.g., sentences, paragraphs) that represent Sandra Bem's most important points (ideas, assumptions, facts, conclusions, etc.) regarding beliefs about women and men.*
>
> *2. For the two quotes/ideas that challenged you the most, carefully analyze (i.e., break down into its important subparts, etc.) and synthesize how each quote/idea helped broaden and/or deepen your understanding of issues relevant to beliefs about women and men that you hadn't seen or considered before (i.e., before you read the particular chapters). Discuss specific examples and connections from your own experience to illustrate the personal relevance of the idea and to help make your explanations clear.*

During the class meeting for which this assignment is due, I divide the class into small groups of three students and have them discuss what each of them determined was the author's most important point and why they chose the point they did. Each group decides which of their points is most important and write some portion of the quote either on the chalk board or on transparency. I ask some of the groups to display their quotes and briefly explain why they chose the particular point. After four to six points have been presented to the class, each group meets with another group to decide which of the different presented points is the most important and why. We discuss these points and our decision processes as a whole class. I ask students to write for 10 minutes on what they have learned during the class meeting in the different activities. I also ask them to identify something that is important to them from the days assignments and discussions that they want to understand more clearly and at a deeper level. This important information gives me a pulse on what students are doing and some idea of the level on which they are working in class. The following questions represent the kinds of items that might be assigned for the next class meeting.

(5) I regularly emphasize critical thinking in all of the following ways . . .

I constantly tell students to constantly monitor and keep track of the important, meaningful, and insightful ideas, thoughts, reactions, reflections, questions, and concerns they come up with during the term. They are to explicitly, consciously, and always read, reflect, reason, and write to obtain and communicate depth in their understanding and inquiry and to work at getting underneath the surface of things by pushing themselves past superficial and shallow levels of understanding. I have to constantly remind students that the following practices warrant 'C' grades or lower: simply state the obvious; just describe things; summarize, report, reiterate, repeat, restate, reword, or rephrase what others have already said; discuss something only in terms of whether or not they agree or disagree with it, approve or disapprove of it, like or dislike it; state as facts, conclusions, assertions, opinions, viewpoints, beliefs, etc. without qualifications and relevant justifications; and finally, treat something complex and problematic as if it were simple, straightforward, self- evident, and one-sided.

I work hard at being consistent in my emphasis on critical thinking and what I do in all of my course-related materials, activities, and assignments. I think of what students need to learn the most—reading, reasoning, and writing critically. My course syllabi, other course explanatory materials, assignments for students, how I evaluate them, the evaluation criteria or standards I use, how I teach what I teach in class, how I present it to students, how I use the physical environment and resources of the classroom I am assigned to use, what I have students do in class and outside of class, what I consciously don't do so I don't reinforce superficial reading, writing, and speaking, are all elements of my teaching that I consciously and constantly think through in order to stay consistent and thereby provide a useful model of critical processes of thought, learning, and teaching.

Part III
Policy Recommendations

Introduction to the Policy Recommendations

In all aspects of education, the old truism that "students cannot learn what teachers do not do" is particularly true about thinking effectively and critically. Research has demonstrated that thinking skills improve as a result of direct instruction by teachers who are proficient at those skills. But direct instruction is not the only medium -- and perhaps not the most important medium -- for fostering the thinking skills of learners. When teachers and students talk and learn about the content of any subject, the thinking that teachers demonstrate to students and elicit from students are powerful contexts for learning to think. In fact, this "indirect approach" is likely to be effective because teachers and learners spend so much time talking and learning about content. Disturbingly, the indirect approach may also produce unwanted effects on students' thinking skills. A "hidden curriculum" of thinking skills may inadvertently work against the goal of learning to think effectively and critically. In this hidden curriculum, students may learn poor habits of thought from teachers who are not effective, critical thinkers in their classrooms -- including teachers in schools and districts in which thinking skills are explicit ingredients of the "intended curriculum."

There are at least three significant ways in which teacher preparation can include learning-to-teach-thinking as well as learning-to-think-about-teaching. Each form of teacher preparation is essential for direct and indirect approaches to K-12 instruction in thinking. First, candidates for credentials can learn to teach thinking skills directly. This ability is likely to "take hold" only if the candidates have previously participated in direct instruction in critical thinking, however. Second, prospective teachers can learn to teach thinking skills in the context of instruction about mathematics, reading, writing, science, history, drama, poetry, etc. For this to occur, their content preparation and their pedagogical training would need to include *applied* instruction in discipline-based thinking. Moreover, future teachers can acquire a view of teaching as a profession that fosters critical analysis of instructional practice and educational policy. How many teachers are likely to become *effective analysts* of schooling or teaching in the absence of systematic instruction in the critical analysis of pedagogy?

It is essential for teachers in California to foster critical thinking among all of the children and adolescents who attend the public schools. For this to occur, those who teach the teachers must have a baseline knowledge of the concept of critical thinking. Those who teach prospective teachers must be sufficiently well-informed about critical thinking to be able to (1) provide direct instruction in thinking skills and concepts, (2) regularly model instruction for critical thinking in their own classroom practices and procedures, and (3) foster a critical perspective about pedagogy itself. The design of teacher education must reflect an explicit critical thinking orientation, so that prospective teachers systematically think through the content of their courses. Prospective teachers need to learn how the design of a course can require and cultivate critical thinking and thoughtfulness--or how a class can fail to do so.

Practical measures need to be taken to ensure that the ideal of critical thinking is not simply left to chance in the preparation of future teachers. At the same time, it is essential that narrow ideologies be avoided; faculties would justifiably resist a mindless incorporation of another "education trend" into courses for prospective teachers. Without prescribing a narrow theory, approach or method for fostering critical thinking among future teachers, California needs to provide incentives and opportunities for teacher education faculties to establish explicit expectations for the critical thinking knowledge and skills of their students. A balanced, comprehensive state education policy would provide encouragement for individual faculty members as well as appropriate mandates for colleges and universities that offer accredited programs of subject matter study and professional preparation for future teachers.

Overview of Five Recommended Strategies to Change Teacher Education

The Commission on Teacher Credentialing and the researchers who independently conducted this study believe that five strategic interventions are essential for critical thinking to be incorporated effectively into the preparation of future K-12 teachers. We must disseminate information about critical thinking instruction that is needed by postsecondary faculty members and administrators. We must provide for faculty professional development by offering appropriate, effective opportunities to learn systematically about critical thinking. We must establish one or more accreditation standards to encourage faculty to systematically teach critical thinking (and how to teach for it) in all programs of teacher education. We must foster the critical thinking skills of future K-12 teachers by addressing their initial preparation, their induction into the responsibilities of full-time teaching, and their ongoing professional development. And we must review all existing teacher certification examinations to determine the extent to which critical thinking concepts and skills are (or need to be) incorporated in the scope and content of those examinations for prospective teachers. Let us look at each of these recommended interventions.

(1) **Information Dissemination**. Teacher preparation faculties and administrators must gain increased knowledge about the exemplary teaching practices of course instructors who have achieved high levels of success in fostering critical thinking in their classes. Model programs and networks of courses in education schools as well as subject matter departments need to be made available to institutions that prepare California's teachers. Implementation of an information dissemination effort must occur concurrently with Recommendations (2) through (5) because they would mutually reinforce each other, thus ensuring the effectiveness of an overall "push" for critical thinking in the schools.

(2) **Postsecondary Faculty Professional Development.** Professional development opportunities in critical thinking must be provided for faculty members who serve in teacher preparation programs. These faculty members should have opportunities to pursue effective, convenient ways to extend and strengthen their knowledge of critical thinking and how to teach for it. While addressing the need for critical thinking knowledge and skill on the part of teaching faculties, professional development opportunities should also focus on institutional change and program development for critical thinking in teacher preparation.

(3) **Accreditation Standards that Focus on Critical Thinking**. Instruction in critical thinking and how to teach for it must be included in teacher preparation programs. For this to occur, the accreditation of professional credential programs must be characterized, at least in part, by periodic analyses of each program's attention to preparation for critical thinking instruction. While allowing institutions to develop their own approaches and emphases, one or more new accreditation standards for critical thinking instruction in teacher education should focus on the multiple values and uses of critical thinking in elementary and secondary school teaching.

(4) **Career-Long Preparation and Reinforcement.** The initial preparation of future teachers will probably not be a sufficient vehicle to ensure, by itself, their proficiency as teachers of critical thinking. To advance the effectiveness of all future teachers to relatively high levels of accomplishment, their initial preparation will need to be supplemented by additional training and assisted practice in their own classrooms. Critical thinking standards and expectations must be built into state policies that govern the induction of beginning teachers, as well as the ongoing professional development of experienced teachers.

(5) **Candidate Accountability in Performance Examinations.** Individual accountability of credential candidates in critical thinking must be established, in order to ensure that this important domain of professional competence is taken seriously by the candidates as well as the faculty members who teach them. Were the prospective teachers to know that they will be held accountable for

learning critical thinking--on the examinations they must pass to earn state credentials--their motivation to learn it would be heightened. Existing examinations for teaching credentials should be reviewed to determine the extent to which the most important concepts and skills of critical thinking are (or need to be) incorporated in them. Valid changes in the current examinations should be pursued, as determined by the recommended review.

Each of these five strategic interventions is described in detail below. The five policy recommendations were derived directly from the empirical findings of the study.

Recommendation One: Disseminate Information to Foster Faculty Awareness of, and Commitment to, Teaching for Critical Thinking

Postsecondary faculties are already hard-pressed to address, in their undergraduate and post-graduate courses, all of the knowledge, ideas, skills and proficiencies that are integral to a university education. What would it take to motivate faculty to seriously consider redesigning some of these classes to put special emphasis on critical thinking? What would it take to motivate teacher education faculty members to study the baseline concept of critical thinking? And to motivate deans and directors of teacher education programs to sponsor faculty professional development opportunities in critical thinking? Once these opportunities are made available, what would it take to motivate many teacher education faculty members to participate in professional development in critical thinking? Given that we are dealing with a substantial, important, and long-term problem, what would it take to maintain a long-term emphasis on critical thinking skills and concepts?

Clearly, there are no simple answers to questions such as these. We are dealing with a complex, multi-faceted problem that itself calls for critical thinking and practical know-how. We are simultaneously dealing with a problem of knowledge, a problem of motivation, a problem of values, and a problem of institutional policy--all bearing on a complex set of deep-seated human behaviors and practices. California can begin to address the problem by disseminating information about critical thinking and teaching, which is needed by postsecondary teacher educators and administrators.

Three Essential Categories of Information to be Disseminated

Altogether, there are seven kinds of information about critical thinking instruction that are not widely available in the teacher education community. The Commission considers the dissemination of three of these forms of information to be essential if we are to foster significant change in teacher preparation. The three essential categories of information about critical thinking instruction are as follows.

- It is essential that we disseminate information about the exemplary teaching practices of faculty members who reach high levels of success in integrating critical thinking into their instruction.
- It is essential that we disseminate information about model programs of subject matter preparation, and that we show how networks of courses can foster critical thinking over extended periods of time.
- It is essential that we disseminate information about model courses and programs in schools of education that successfully integrate critical thinking into classes for prospective teachers.

Four Additional Categories of Information to be Disseminated

Additionally, four other forms of information would be valuable to disseminate, provided that sufficient funds are made available for this purpose.

- It would be important to disseminate information about the problems and obstacles that inhibit critical thinking instruction in the elementary and secondary schools.
- It would be important to disseminate information about teaching for critical thinking within particular disciplines such as mathematics, history and the sciences.
- It would be important to disseminate information about the process that faculties go through as they gradually develop the ability to bring critical thinking successfully into the college classroom.
- Finally, it would be important to disseminate information about model textbooks that offer a concise but systematic emphasis on developing critical thinking within particular disciplines of study.

At present, none of these seven categories of information are readily available in the teacher education community. This section of the report provides one or two examples of information that could be made widely available in each of the seven categories.

Category One: Essential Information about Teaching Practices of Those Who Succeed in Integrating Critical Thinking into Instruction

The Case of Donald Herrin

Teacher education faculties need in-depth accounts of those who are highly successful in integrating critical thinking pervasively into their instruction. For example, it would be valuable for the Commission on Teacher Credentialing to highlight the case of Professor Donald Herrin at the University of Utah. For an extended vignette about Professor Herrin's teaching, see the concluding pages of Part II of this report. Information about Dr. Herrin's teaching practices would illuminate many of the challenges of incorporating critical thinking into collegiate instruction. Dissemination of this information would also foster greater awareness of the qualities and characteristics of college teaching that reflects a genuine commitment to fostering critical thinking among postsecondary students.

Additional Case Studies of Proficiency in Incorporating Critical Thinking into Collegiate Instruction

Teacher education faculties are not likely to be motivated by a single example of instructional proficiency, no matter how exemplary it may be. For the purpose of fostering greater understanding of effective critical thinking instruction on the part of large numbers of teacher educators, fortunately, there are sufficient numbers of excellent practitioners whose teaching styles and approaches could be documented in a multi-faceted strategy of information dissemination. For several such examples, the reader is referred to the case studies that comprised Part II of this report.

To enable the Commission to implement Recommendation One, the Legislature must provide resources for the preparation and dissemination of multiple in-depth case studies of faculty members who have succeeded in reflecting the values and challenges of critical thinking in collegiate instruction. An analysis of the cost of implementing all aspects of Recommendation One appears at the end of this section.

Category Two: Essential Information about Model Programs and Courses of Subject Matter Preparation that Foster Critical Thinking

Another important need is for programmatic information that enables motivated faculties and administrators to see how critical thinking can be incorporated into entire teacher education curricula. The Liberal Studies Program at Saint Mary's College is just such a program, and is included here for illustration purposes.

The Liberal Studies Program at Saint Mary's College of California

"The Liberal Studies Program at Saint Mary's College . . . is grounded in the belief that a liberated mind is free to think critically, articulate an idea, defend a position, analyze problems and develop solutions. Students learn to connect ideas encountered in academic courses--to find common ground between mathematics and religion, philosophy and biology, sociology and foreign language--and to apply these ideas to the world beyond the campus [1995 brochure].

The Program seeks to educate the whole person--to develop liberally educated men and women who through their academic course work and other experiences are prepared--intellectually, socially, ethically--to participate in solving the community and global problems facing our society today. In order to achieve this goal, the Liberal Studies Program strongly and deliberately emphasizes the development of critical thinking skills in its students.

While the concept of critical thinking is defined in a variety of ways by academicians, the Liberal Studies Program places particular emphasis on the following skills:

(1) Ability to read a text carefully and understand its meaning (including distinguishing main points from subsidiary or irrelevant points)
(2) Ability to identify the assumptions underlying an argument or contained in a piece of art.
(3) Ability to articulate, attack or defend a position, using logical reasoning to support a point of view.
(4) Ability to understand perspectives and positions different from—even opposed to—one's own.
(5) Ability to integrate ideas from different perspectives (including different subject fields, community experiences, and), i.e., to identify similarities and differences, and to develop a syntheses based on careful analysis and evaluation of information.
(6) Ability to place ideas in their historical and cultural context.
(7) Ability to integrate theory and practice (praxis).
(8) Ability to develop logically defensible solutions to problems after careful analysis of conditions and weighing of alternatives.
(9) Ability to identify, accurately and with minimum bias, one's own strengths and weaknesses and one's growth and development.

The Liberal Studies Program builds on and extends the critical thinking skills introduced in the Collegiate Seminars, a series of four courses that focus on the great ideas of Western Civilization. All Saint Mary's students take these courses, two courses in their freshmen year, one in their sophomore year, and one in their junior or senior year. In Collegiate Seminar classes, students:

> ". . . meet around a seminar table in small groups so that each person can participate actively in the discussion. The faculty discussion leader formulates questions about the texts in order to challenge the students to develop, through the process of discussion, defensible interpretations of their own. Discussion entails the stating of opinions and the uncovering of assumptions; students present evidence to support their position or to defend it against objections; they respond to other students' views, exposing contradictions and

clarifying ambiguities. Through engagement in such discussion, students are encouraged to read actively and to think critically, as well as develop skills they can use throughout their lives [*Saint Mary's College Catalog: 1995-1997*, p. 51].

In the Collegiate Seminar classes, the faculty leader is a facilitator, never a lecturer or a presenter. Understanding and interpreting the ideas come from careful reading and discussion of the text, never from outside, secondary sources. At least half of the course grade is based on students' performance in discussion--their preparedness for class, their understanding of the text, the quality of their participation in discussion. Students are expected to pose and respond to questions, to seek to clarify meaning, identify assumptions, trace the implications of ideas, relate them to similar ideas, and evaluate their worth. In addition to class discussions, students demonstrate their critical thinking skills in formal writing assignments, where they are expected to provide a defensible interpretation of the text (or texts), articulate a position (thesis) clearly, and support it with relevant evidence, recognizing the existence of different or opposing views.

Most students taking Forum I, the first Liberal Studies course, have completed two of the Collegiate Seminar classes. The readings in Forum are different, including modern, global, and multicultural perspectives not included in the College Seminar canon; and ideas are considered in their historical and cultural context, instead of being analyzed solely on the basis of the text. Moreover, the Forum class is structured to allow the presentation of some ideas by means of short lectures or media. Nevertheless, a strong emphasis on dialectic remains; and much of the class sessions are devoted to students grappling with ideas, engaging in the same critical thinking processes (and developing the same skills) as they had in the Collegiate Seminar courses. Students begin the Forum class, for example, by continuing their exploration of questions from the "Great Conversation," such as: What is the nature of humanity? What is a just society? And what is the relationship between humankind and the divine?

In addition to continuing the skills initiated in the Collegiate Seminar courses, Forum introduces a new critical thinking skill: i.e., in class discussions, in their journals, and in formal papers, students are expected to make explicit connections between ideas they encounter in Forum and those they deal with in their other academic courses, in their community service, and in their engagement with the arts (Note: Students enrolled in Forum or Senior Seminar are required to perform 2.5 to 3 hours of community service each week and to attend at least three artistic events, such as plays, concerts, museums, per semester). The ability to integrate ideas from different perspectives does not come naturally: students are deliberately taught the skill through discussions, through guidelines for and responses to their journals, and through formal paper assignments. For instance, a recent first-paper assignment in Forum reads as follows:

> Why isn't there equality of resources in the United States of America? In addition to an analysis of Gilder, Katz, Murray, and Ryan, your answer should include a discussion of the role of liberty, individual rights and collective (i.e., social and economic) rights, and a perspective of what you think is the appropriate balance between equality and liberty, and between the individual and collective. Please provide support for your perspective.

Students were expected to: "Discuss at least nine out of the 18 articles that you feel shed some light on your critical analysis of equality in the United States. In addition, discuss your service project, the *New York Times*, or other SMC courses and experiences when appropriate." Grading was to be based on the following criteria:

- How well you use the text as a support structure for your points.
- How well you integrate your service project, the *New York Times*, or other SMC courses and experiences into your support structure.
- The depth of your analysis.
- How well the paper is written (grammar, syntax, etc.)

One of the important themes of the Liberal Studies Program is ethnic and social diversity or multiculturalism, including global concerns and issues of gender. The theme requires particular emphasis on the critical thinking skill of understanding (and empathizing with) perspectives and positions different from one's own.

For example, in the Forum class students read an historical overview of race in America, watch the film *The Color of Fear*, and participate in a multicultural workshop led by Lee Mun Wah (the producer of this award-winning film) or a member of his task force. Subsequently the students participate in a tolerance-building simulation entitled *Bafa Bafa* with the international students on campus. These readings and experiences provide students with the impetus to develop an understanding of the "other." The students then proceed to the area of public policy. Keeping their new understanding of the "other" in mind, the students read a pro and a con article on affirmative action and then write a formal paper on whether this public policy is proper. The process of learning the history of race in America, feeling the pain of racism, and tackling a controversial public-policy question allows the students to develop understanding of and empathy for positions different from their own.

Students enrolled in Liberal Studies Forum and in the Senior Seminar participate in biweekly "lab" sessions, where they discuss their community service work and relate it to the readings they are doing for class. For example, in the Forum class, students discuss the nature of humanity by reading Thomas Hobbes, Reinhold Niebuhr, Mohandas Gandhi, and Dr. Martin Luther King, Jr., and by watching videos of the genocide from the Holocaust and Rwanda. While the debate over the various theoretical perspectives on the nature of humanity (i.e., good or evil, violent or non-violent) engages the students, it is when they are asked to apply these theories to their service experience that their critical thinking skills move to a higher level. By integrating theory with practice, students are asked to critique the theories and to develop their own understanding about which theory is the most logical and applicable to the social reality they are observing in their service projects. Thus, it is in the lab where the application of abstract knowledge is achieved.

Students continue this integration of theory and practice in Senior Seminar lab. In this lab, students are required to work in a service-learning project that is at the level of prevention. This activity relates to one of the main texts of the course, which focuses on "systems thinking." In the lab, students apply what they are learning about systems thinking to their service-learning project. In addition, their service-learning project usually provides new insight into systems theory. The service-learning lab, in short, further develops the students' level of critical thinking by asking them to integrate theory and practice.

In the Senior Seminar class, students continue to use the critical thinking skills they developed in the Collegiate Seminar courses and the Forum class, building, for instance, on their exploration of the ideas of Descartes and Galileo by examining the effect of Cartesian thinking, as well as the emerging scientific paradigm (post-Einstein), on the perception of reality and humanity's approach to solving problems.

The emphasis on self-assessment in the Liberal Studies Program requires students to develop the critical thinking skills involved in objectively identifying their personal strengths and weaknesses and evaluating their growth and development. At the end of the Forum course and in the following semester, students write a 3-to-4 page self-assessment, in which they focus on an area of noteworthy growth and development (see copy of assignment.) During the semester before they enroll in Senior Seminar, students take a course called "Assessment & Portfolio"). As part of this course, they write a longer (5-7 page) self-assessment in which they analyze their development over the 2+ years they have been at Saint Mary's in terms of the principal themes or emphases of the Program: the "Great Conversation"(Great Ideas), multiculturalism, critical and integrative thinking, and the arts. The extent to which a student meets the requisites of this assignment--writing clearly and in some depth about their

strengths and weaknesses and the way these affect his or her growth and development--is judged in a formative way by the instructor and other students in the course, who provide feedback to writer. The paper then becomes part of the student's portfolio, read by three Liberal Studies advisors who comprise the panel that interviews the student. Part of the panel's judgment is based on how well the student has succeeded in assessing his or her strengths and weaknesses and identifying how she or he has grown, especially in his or her thinking, during the college years.

Summary: Critical thinking lies at the core of the kind of liberal education that the Liberal Studies Program strives to foster in its students. The examples above are not meant to provide a comprehensive account of the many ways that critical thinking occurs in the Program. Rather, they are intended to show how some of the critical thinking skills that Program faculty deem important are deliberately infused in the courses and experiences of the Program."

The above account of the Liberal Studies Program at Saint Mary's College was provided by Dr. Jerry Brunetti, Professor of Education, Saint Mary's College of California.

Category Three: Essential Information about Model Programs of Professional Teacher Preparation in Schools of Education

Another important need is for programmatic information that enables motivated faculties and administrators to see how critical thinking can be integrated programmatically in schools of education. The approach to critical thinking of the College of Education at Montclair State University, New Jersey, is such a program. It is included here for illustration purposes.

The Montclair State University, College of Education Collaboration for Critical Thinking

The College of Education at Montclair State University, under the leadership of Dean Nicholas Michelli, has developed a multi-faceted long-range set of strategies for integrating critical thinking into the instructional program at Montclair State University. All of what follows below is text taken directly from a resource publication of the Montclair State University Institute for Critical Thinking. The order of the passages have been changed to produce a more compressed account.

Introduction

"Teaching for critical thinking is an important movement that has captured the attention of school districts across the country. Success in improving the performance of students on standardized tests through working with their teachers on critical thinking strategies has been demonstrated. Colleges preparing beginning teachers need to assess their programs to be certain students being prepared are capable of working in settings with a focus on critical thinking."

Statement of Philosophy

"Critical Thinking as an educational ideal is, most fundamentally, commitment to students and teachers as rational and autonomous persons. This implies that students are treated as capable of giving and responding to reasons whatever their developmental level. Creative engagement based on mutual respect and empathy, commitment to logic and truth, and openness to inquiry express this ideal in the classroom."

"Education incorporating this critical ideal results in reflective teachers and students, thoughtful citizens and persons committed to lifelong learning. Students experienced in critical thinking acquire understanding as well as information. Love of learning and wisdom are the results of critical thinking as an educational ideal. Teachers committed to critical thinking are open and growing professionals, creative in the use of curriculum and sensitive to students as individuals. Respect for the subject excellence in good thinking and skill in supporting inquiry are hallmarks of teaching for critical thinking."

"In the curriculum, critical thinking results in deeper understanding of information through the identification and application of criteria appropriate to the context at hand Critical thinking requires the creative use of information, directed by the needs of inquiry and governed by principles of logic, methodology and communication. The dispositions and skills necessary for critical thinking are acquired through critical inquiry in the classroom. They are applied to all aspects of learning and are reflected in independent and creative thought."

"In the classroom, critical thinking engenders an open and supportive environment. Students and teachers are committed to supporting claims with good reasons, identifying and evaluating assumptions and exploring alternative perspectives. Through discussion and cooperative inquiry, students and teachers learn to welcome alternative points of view, to tolerate ambiguity, to face intellectual challenge and to abandon or modify positions in response to valid criticism. Clarity and creativity are valued in classroom inquiry. Acquiring and applying information, solving problems, and evaluating and communicating ideas result from collaborative and individual efforts."

"Aspects of critical thinking must be specifically taught. The goal, however, is to incorporate critical thinking dispositions and abilities into all aspects of the curriculum. In this way students and teachers develop psychological abilities that support the transfer of critical thinking to all aspects of life. Attitudes and skills, intellectual openness and integrity are applied in school and out, resulting in well educated citizens and competent adults."

"Critical thinking in education includes critical assessment, reflecting the special character of critical thinking through the development and use of a variety of appropriate techniques. The assessment of critical thinking takes the entire curriculum into account. Student achievement in basic skills and mastery of the range of school subjects are used as a measure of success in critical thinking."

Definition of Critical Thinking

"Critical thinking was defined as skillful, responsible thinking that facilitates good judgment because it relies on criteria, is self-correcting and is sensitive to context. The definition was extended to include reflective inquiry and creativity and sees critical thinking as involving both dispositions and abilities. The definition has proved especially powerful because of its utility in the analysis of ideas within the content of the disciplines, but also the analysis of the professional judgments teachers make. A given judgment, for example the decision to make a particular assignment in preparation for a lesson, can be analyzed from the perspective of the extent to which it relies on explicit criteria, is subject to self-correction based upon reflection, and is sensitive to the particular context in which the instruction occurs. Further, it is important to note that good judgments do not necessarily lead to good outcomes, but the quality of the outcomes become a basis for further self-correction and the improvement of subsequent judgments.

Goals of the Teacher Preparation Program

"The Teacher Education Program at Montclair State University incorporates critical thinking as a thematic element to promote (a) a distinct and unified conception of teaching based upon the existing body of professional knowledge, and (b) coherence and articulation among course offerings and clinical experience The faculty and students seek:

(1) To achieve a climate which promotes inquiry, objectivity, open-mindedness and respect for diverse viewpoints.
(2) To establish a "community of inquiry" as a context for intellectual exchange and rational thought.
(3) To explore the consequences of critical thinking for teaching and learning.
(4) To model critical thinking dispositions and abilities.
(5) To understand methods appropriate to teaching "for", "of", and "about" critical thinking and to acquire skill in their application.
(6) To understand how critical thinking can be integrated within and across the disciplines.
(7) To participate in sequenced and developmental clinical experiences beginning early in the program, and providing practice in teaching for critical thinking.
(8) To empower teachers and students to be autonomous and critical thinkers in school and society.
(9) To provide public schools with teachers committed to critical thinking who possess the requisite knowledge and skill.
(10) To develop and implement a framework for evaluation which incorporates the principles of critical thinking."

The Critical Thinking In the Schools, Teacher Education Project

"The Critical Thinking In the Schools, Teacher Education project, is part of a larger effort in critical thinking at the College and builds on the base of work in the field done through the Institute for the Advancement of Philosophy for Children and Its Philosophy for Children Program as well as Project THISTLE: Thinking Skills in Teaching and Learning. The College's Philosophy for Children Program, under the direction of Matthew Lipman, has gained art international reputation for its work for the last fifteen years involving the use of philosophy and reasoning with language to develop children's thinking ability. The project works primarily with in-service teachers, training them to use a series of philosophical novels written for children as vehicle to develop critical thinking abilities. In addition graduate level initial certification program using Lipman's approach is offered by the School of Professional Studies. Several College faculty working in the undergraduate teacher education program have also worked in Lipman's program. Lipman has reported success In raising the scores of children taught through the program on tests of reasoning ability (Shipman. 1983)."

Project THISTLE

"Montclair State University faculty involved In Project THISTLE (Oxman & Michelli 1989) have worked with more than 300 Newark public school teachers since 1979. Project THISTLE consists of a sequence of six coordinated graduate courses, totaling 18 graduate credited with extensive classroom follow-up and supervision. These courses are designed to improve the curriculum development and teaching ability of participants so that critical thinking, conceived of in this project as higher order skills, is infused into the regular curriculum of the schools. Oxman (1984) found significant gains in the reading comprehension of students of the Newark teachers who participated in the project. Her conclusion's suggest that, "cognitive growth and improvement in reading ability will occur simultaneously to the degree that meaningful intellectual activity-reflective thinking-occurs in our classroom." More than a dozen faculty working in the regular undergraduate teacher

education program have worked In Project THISTLE since its inception, and most continue to do so. Thus there was a core of faculty at the College who believed that the development of higher order thinking skills--whether called critical thinking, reflective thinking, or problem solving--was an important educational goal. The School of Professional Studies has sought a vehicle to extend the extensive experience with in-service teachers in this area to the undergraduate program."

A Required Course in Critical Thinking For Teachers

"A decision with some risk was made to develop a course in the teaching of critical thinking as part of the undergraduate curriculum. The goal of the project and the Institute for Critical Thinking is to infuse teaching throughout the curriculum of the teacher education project and, indeed, throughout the College curriculum. Until that happens, a course with a focus on critical thinking is necessary, but its very presence may cause faculty to rely on that course and engender reluctance to modify other aspects of at least the teacher education curriculum. To counter this possibility, workshops with teachers of the subject area methods courses, taught in the major departments of the students, have been undertaken in earnest in the 1988-89 academic year. Key faculty from the School of Professional Studies have begun meetings with small groups of teachers of methods courses from across campus.

The objectives of the course are:

(A) Students will model the skills of good teaching: including modeling, goal setting, problem posing, wait time, quality responding and peer interaction, transfer and metacognitive awareness.
(B) Students will model strategies for challenging students to engage in appropriate, complex thinking processes within their subject areas. Individual and small group problem solving, the consideration of values, "thinking aloud," and "Thinking Journals".
(C) Students will develop lesson/unit plans appropriate for their subject areas that include effective instructional processes (especially evaluative measures), concern for transfer of thinking to other areas and metacognitive awareness.
(D) Students will assess the strengths and weaknesses of their own thinking and set goals for self-development. Students will able to assess the strengths and weaknesses of another person's thinking and draw conclusions for future development.
(E) Students will demonstrate knowledge of the nature (including specific skills/dispositions), causes, developmental aspects of, environment for, models and strategies for and rationale for teaching thinking.
(F) Students will be able to identify, analyze and evaluate the nature of good thinking in themselves and others and draw appropriate conclusions for future development."

The Future: Institutionalization and Evaluation

"A commitment has been made to institutionalize and continue key elements of the project. These are:

(1) Assuring that students graduated from the program are competent to teach for higher order thinking/critical thinking within the subject areas they are certified to teach.
(2) Assuring that faculty are sensitive to teaching for critical thinking and evaluate the performance of students within that context.
(3) Placing students in schools within clinical districts in which there is a sensitivity to teaching for critical thinking.
(4) Selecting clinical adjunct faculty in cooperation with clinical districts who have been identified by both the University and districts as outstanding teachers and who have participated in training programs designed to improve teaching for critical thinking.

(5) Involving clinical adjunct faculty and school district administrators in the policy decisions affecting the teacher education program."

Conclusion

"The Montclair State University Model represents a collaborative effort with public school districts designed to enhance the ability of the University to select the best cooperating teachers, designated as clinical adjunct faculty, involve public school teachers more systematically in policy formation for the teacher education program, and to incorporate teaching for critical thinking in its teacher education curriculum as well as within the curricula of the clinical districts."

Category Four: Important Information that Documents the Problems of Critical Thinking Instruction in Elementary and Secondary Schools (K-12)

In addition to dissemination of the three essential categories of needed information for postsecondary faculties and administrators, it would also be valuable and important for the Commission on Teacher Credentialing to distribute four other kinds of needed information, subject to the availability of sufficient resources to do so. The Legislature should enable the Commission to distribute research information that reveals the inadequacy of instruction in teacher preparation programs over the last twenty years or so. For example, consider the summary of research developed by Mary Kennedy (1991) and published in the *Phi Delta Kappan*.

Summary of Research Findings

First Finding: . . . national assessments in virtually every subject indicate that, although our students can perform basic skills pretty well, they are not doing well on thinking and reasoning. American students can compute, but they cannot reason . . .. They can write complete and correct sentences, but they cannot prepare arguments . . .. Moreover, in international comparisons, American students are falling behind . . .particularly in those areas that require higher-order thinking . . .. Our students are not doing well at thinking, reasoning, analyzing, predicting, estimating, or problem solving.

Second Finding: . . . textbooks in this country typically pay scant attention to big ideas, offer no analysis, and pose no challenging questions. Instead, they provide a tremendous array of information or 'factlets', while they ask questions requiring only that students be able to recite back the same empty list.

Third Finding: Teachers teach most content only for exposure, not for understanding.

Fourth Finding: Teachers tend to avoid thought-provoking work and activities and stick to predictable routines.

Conclusion: "If we were to describe our current K–12 education system on the basis of these four findings, we would have to say that it provides very little intellectually stimulating work for students, and that it tends to produce students who are not capable of intellectual work.

Fifth Finding: . . . our fifth finding from research compounds all the others and makes it harder to change practice: teachers are highly likely to teach in the way they themselves were taught. If your elementary teacher presented mathematics to you as a set of procedural rules with no substantive rationale, then you are likely to think that this is what mathematics is and that this is how mathematics should be studied. And you are likely to teach it in this way. If you studied writing as a set of grammatical rules rather than as a way to organize your thoughts and to communicate ideas to others, then this is what you will think writing is, and you will probably teach it so . . .. By the time we complete our undergraduate education, we have observed teachers for up to 3,060 days.

Implication: "We are caught in a vicious circle of mediocre practice modeled after mediocre practice, of trivialized knowledge begetting more trivialized knowledge. Unless we find a way out of this circle, we will continue re-creating generations of teachers who re-create generations of students who are not prepared for the technological society we are becoming."

Category Five: Important Information about Teaching for Critical Thinking Within Particular Disciplines

It would also be valuable for the Commission to distribute information about the importance of teaching for critical thinking in the context of content-based instruction that is widely included in the curriculum of elementary and secondary education. One such example -- in the subject of mathematics -- is presented next for illustrative purposes only. If sufficient resources could be made available, the Commission could develop and disseminate similar examples in additional subject areas such as science, literature, history, government, music, art, language study, composition, health and physical education.

The Work of Alan Schoenfeld in Mathematics Education

Alan Schoenfeld, the distinguished mathematician, is an excellent illustration of how educators and scholars can document both the failure to teach students how to think effectively in a particular discipline and the manner in which critical thinking can be used as an effective tool to rectify that failure. As Schoenfeld (1985) has put it, "I believe that most instruction in mathematics is, in a very real sense, deceptive and possibly fraudulent." He supports this claim by citing research into how students are actually taught and how the way they commonly think through problems in math in a formulaic and robotic way. He cites many cases in which it can be demonstrated that even advanced students of mathematics have fundamental misconceptions that result from the superficial ways in which they have been taught to think. Here is one (out of many) such cases:

"I taught a problem-solving course for junior and senior mathematics majors at Berkeley. These students had already seen some remarkably sophisticated mathematics...I gave them a straightforward theorem from plane geometry (required when I was in the tenth grade). Only two of the eight students made any progress on it, some of them by using arc length integrals to measure the circumference of a circle. Out of the context of normal course work these students could not do elementary mathematics (pp. 28-29)."

He describes the basic pattern in math instruction that leads to the problem of low level mathematical thinking even among math majors: "In sum, all too often we focus on a narrow collection of well-defined tasks and train students to execute those tasks in a routine, if not algorithmic fashion. Then we test the students on tasks that are very close to the ones they have been taught. If they succeed on those problems we and they congratulate each other on the fact that they have learned some powerful mathematical techniques. In fact, they may be able to use such techniques mechanically while lacking some rudimentary thinking skills. To allow them and ourselves to believe that they "understand" the mathematics is deceptive and fraudulent."

In a video tape interview for PBS on Critical Thinking and Mathematical Problem Solving (1990), Alan Schoenfeld expresses his commitment to the premise that all of the considerations relevant to critical thinking are crucial to sound mathematical thinking (critically examining and monitoring our purposes, the way we phrase problems and questions, the information we access and how we interpret it, the concepts we use and how we understand them, the assumptions we make and whether we are able to identify them, our ability to see implications of our thinking and to shift our point of view). What is more, he is keenly aware of the need to utilize distinct intellectual criteria in thinking

mathematically--attending to clarity, precision, accuracy, relevance, depth of analysis, breadth of thinking, and consistency.

He is also keenly aware of the fact that mathematics needs to be taught in such a way as to help students see that the basic moves they make in thinking through math problems are relevant to thinking through non-mathematical problems.

He cites the work of Harold Fawcett's geometry classes at Ohio State University Laboratory School, in which Fawcett:

> sought to develop in his students "an attitude of mind which tends always to analyze situations, to understand their interrelationships, to question hasty conclusions, to express clearly, precisely, and accurately non-geometric as well as geometric ideas" Among his goals for students were that in situations sufficiently important to them, his students would: ask that important terms be defined, require evidence in support of conclusions they are pressed to accept; analyze the evidence and distinguish fact from assumptions; recognize stated and unstated assumptions; evaluate them; and finally, evaluate the arguments, accepting or rejecting the conclusion. Moreover, they would do so reflectively, constantly re-examining the assumptions behind their beliefs and that guide their actions (pp. 37-38).

The spotlight needs to be put on the work of scholars like Schoenfeld who, as above, are systematically exploring the seminal role of critical thinking in the thinking of the disciplines. Those who are teaching prospective teachers in those disciplines need to take into account such research in designing their classes and in teaching prospective students how to design their future courses.

We must also call attention to those teaching faculty who are articulate about the process they are going through in developing the ability to design college classes so as to foster critical thinking in their students. Here we have in mind documenting the personal process of self-development which enables faculty to appreciate the power and importance of intellectual humility in facing the problem.

Category Six: Important Information that Documents the Developmental Paths of Faculty Members Who Commit Themselves to Instruction for Critical Thinking

It is extremely challenging for college or university faculty members to be faced with the prospect of changing their instruction to incorporate critical thinking. For those who have been teaching many years, this prospect is particularly daunting. It would be valuable for them to learn about the changes that some of their colleagues have made in order to accomplish this transition in their professional work. To achieve the goal of offering critical thinking instruction in a wider array of courses and programs for prospective teachers, it would be important for the Commission to assemble and disseminate cases that demonstrate how individual faculty members have developed as they committed themselves to instruction for critical thinking. One illustrative example of such a case study follows.

The Example of Theresa Beckie, College of Nursing, University of South Florida

Professor Theresa Beckie, from the University of South Florida College of Nursing is one such case. We see in Professor Beckie's experience a living example of the power of intellectual humility in action.

Professor Theresa Beckie was asked in June of 1995 to work on the task of implementing critical thinking into instruction at the college of nursing. As she puts it:

> "...I am a novice in critical thinking. I was handed the task of implementing critical thinking into our new program last June, one year ago. I had never heard of the term, nor of the work of the Center For Critical Thinking. Fortunately, my associate dean had been to the international conference on critical thinking and gave me all her materials, several books, and some contacts to talk to. I spent from June-August immersed in critical thinking and I embraced it whole-heartedly. I attended the international conference on critical thinking last year and absorbed all that I could. I came home terrified but with great enthusiasm, some very good material, and I put together some course descriptions in two weeks. Some strategies worked extremely well and others did not. I expected much of myself and the students that first semester...The faculty were very pleased with my efforts and believed that they could see the difference in the students compared to previous years. What frustrated me was how quickly the students could revert to their old habits and ways of thinking. Sometimes I just wanted to feed the information to them rather than have them work through thinking about it. I don't know if they fully understand how nursing content is the **thinking** essential to the profession... I am committed to continue my efforts throughout my career to implement critical thinking into instruction. I've only just begun! I have held well-attended workshops for our faculty so that they may reinforce what I am attempting to do in my classes. There has been great enthusiasm among my colleagues. However, implementing critical thinking is a very time consuming and very hard work for both faculty and students. Some of the older, tenured faculty resist change, even though intellectually they see the merit of doing so."

Because Professor Beckie had the intellectual humility to recognize that she did not explicitly know what critical thinking was and the intellectual perseverance to commit herself to learning, she was able to make remarkable progress in a relatively short period of time (one year) and to make a significant contribution to the restructuring of the nursing programs at the University of South Florida. By coming to internalize a substantive concept of critical thinking she was able to "sift through those textbooks which purport to incorporate critical thinking into the material" and discern which ones are not really fostering critical thinking but are only using critical thinking terminology "as a marketing device." But these texts are, in fact, "devoid of any real critical thinking."

Professor Beckie redesigned her classes with the notion that all courses in nursing should be courses in learning to think like a professional nurse and therefore that all "content" is essentially that which the students must "think their way through." She now begins every course introducing the concept of studying so as to think through content.

She has redesigned her classes so as to introduce concepts and essential theory through cases: "Every basic nursing concept that I introduce involves case study writing assignments. They work on the case study prior to coming to class and we then discuss the case and I hand out additional class activities which they have not seen prior to coming to class. The group discussions have been extremely beneficial to promoting disciplined thinking in the students...I would like to teach the students how to critique each other's work next year. I did not feel confident in doing this last fall because I didn't think they had the skill to do this yet."

She emphasizes intellectual standards of clarity, precision, accuracy, relevance and logicalness: "I constantly refer to the universal intellectual standards in each class--in relation to students' written and oral communication. We incorporate systematic questioning of reasoning into all our discussions

(What is our goal? What is the central problem or issue? What information do we need? How should we interpret the data? Can we infer this? Should we assume that? What is implied by this? From what point of view should we look at this?). The students sometimes get frustrated that we don't "cover all the material in class time" which in turn frustrates me because they don't yet "get it!"

And though Professor Beckie has clearly made significant progress ("I have to say that the writing ability of my students has improved immensely"), she is still very much aware of how far she has yet to go: "Sometimes it is like the blind leading the blind. I am just learning too. But I am committed to the struggle with implementing critical thinking. I have so much to learn and so much skill to gain and I want it all now!"

Professor Beckie displays the two traits essential to progress: intellectual humility and intellectual perseverance. The point is that until we are willing to admit that there are fundamental problems in instruction, we cannot solve those problems. Until we admit that students are not, by and large, learning to think through the content that they are studying, we will not redesign instruction requiring them to do so in order to pass. The result will continue to be a kind of massive professional self-deception, in which we systematically create the illusion of students deeply learning content (though we continue to see the dominance of class designs and pedagogy which makes rote memorization an effective tool of success in school).

The result for students of this deceptive form of instruction is sometimes, but only rarely, apparent to the student afterwards. Consider this rare admission from a teacher with a Master's degree in physics and math, with 20 years of high school teaching experience in physics:

> "After I started teaching, I realized that I had learned physics by rote and that I really did not understand all I knew about physics. My thinking students asked me questions for which I always had the standard textbook answers, but for the first time it made me start thinking for myself, and I realized that these canned answers were not justified by my own thinking and only confused my students who were showing some ability to think for themselves. To achieve my academic goals I had to memorize the thoughts of others, but I had never learned or been encouraged to learn to think for myself."

Category Seven: Important Information about Exemplary Textbooks that Foster the Incorporation of Critical Thinking in Content-Based Instruction

Like all other university students, prospective teachers give much attention to course textbooks, which affect the quality and effectiveness of their education profoundly and extensively. Course instructors who are oriented to the value and importance of critical thinking can begin to select textbooks accordingly. Toward this end, it would be valuable for the Commission to be able to disseminate information about textbooks in each discipline that foster the inclusion of critical thinking activities in university courses for future teachers. To illustrate how such "case studies" would look, an example is provided in the discipline of economics.

Donald Millman's Textbook in Economics

A new textbook on economics entitled *Economics: Making Good Choices*, was written by Professor Donald Millman (1996) at Itasca Community College, who conceived and wrote his text after attending critical thinking workshops for faculty on teaching content as a mode of thinking.

As Professor Millman puts it in his preface: "My goal is to help students to learn economics as a way of thinking. Brevity and a continuing focus on critical thinking are the book's main distinguishing features... Frequently, our brightest students maximize grades in economics by cramming great

quantities of definitions and graphs into short-term memory, then regurgitating them on tests with little comprehension of economic logic" (p. xiii).

He recognizes explicitly the problems of traditional textbooks:

> "Most textbooks for introductory classes are one-volume encyclopedias crammed with hundreds of definitions, hundreds of "factlets," and scores of graphs and charts. Attempting to read one of these encyclopedias is a mind deadening experience."

He also recognizes the solution. Critical thinking must not be treated as an "add-on," but as a way of mastering the content, a special way of using it: "Economics is a powerful way of thinking, and this textbook is designed to help you understand and apply economic logic" (p. xxi).

The result is that critical thinking--understood in this context as disciplined economic thinking--is integrated throughout the text. The student learns to think critically about the goals and objectives of economics, about the issues and problems it raises, about the information it gathers and how it gathers that information, about the concepts that are used to organize and interpret the information, about economic assumptions and implications, and about what it is to look at something from an economic standpoint. The student also learns the importance of formulating economic thinking clearly and precisely, about checking facts and figures for their accuracy, of monitoring thinking to ensure that it stays relevant to the problem at hand, of dealing with the complexities of a problem, of being open to multiple viewpoints, and making sure that one's thinking is logical throughout.

We have a long way to go before most textbooks shift to a critical thinking standpoint. But the dissemination of specific information about exemplary textbooks could lead to reforms in that direction, particularly if the information was provided at no cost to faculty members whose courses are part of the preparation of prospective teachers.

Cost Analysis of Recommendation One

To implement Recommendation One, the categories of information would need to be assembled, printed and distributed by the Commission on Teacher Credentialing. Assembling the information would require the one-time effort of an external contractor, who would be selected on the basis of competitive bids. Overseeing the contractor's efforts and the printing and distribution of information packets would involve personnel costs and administrative expenses. The three sets of cost estimates below are based on detailed analyses of the work that must be completed for implementation of Recommendation One.

On the following page, the detailed cost analysis of Recommendation One shows that the combined cost of an external contractor, state personnel and state administration would amount to $49,000 for production and dissemination of the three essential categories of information. Production and dissemination of the four important (but non-essential) categories of information would cost an additional $61,000. Overall, then, production and dissemination of all seven categories of information would amount to $110,000 in personnel, administrative and contractor costs. Recommendation One could be implemented in one fiscal year, and funds would be needed only during the implementation year. All funds for implementation of Recommendation One should be drawn from the State General Fund.

Cost Analysis of Recommendation One

Workload Related to Recommendation One: Seven Categories of Information to be Disseminated	External Contractor Costs	State Personnel Costs	State Admininstrative Costs
Dissemination of Information Category One: Cases of Faculty Members Who Teach Critical Thinking	$ 11,000	$ 6,000	$ 1,500
Dissemination of Information Category Two: Model Programs of Subject Matter Preparation for Teachers	9,000	5,000	1,250
Dissemination of Information Category Three: Model Programs of Professional Preparation for Teachers	9,000	5,000	1,250
Overall Costs of Developing and Disseminating the Three Categories of Essential Information for Faculty	*29,000*	*16,000*	*4,000*
Dissemination of Information Category Four: Scope of Critical Thinking Instructional Problems in K-12 Grades	9,000	4,500	1,000
Dissemination of Information Category Five: Studies of Incorporation of Critical Thinking in Specific Subjects	10,000	4,500	1,000
Dissemination of Information Category Six: Examples to Document the Changes Made by Given Instructors	10,000	4,500	1,000
Dissemination of Information Category Seven: Exemplary Textbooks that Foster Critical Thinking	10,000	4,500	1,000
Overall Costs of Developing and Disseminating the Four Additional Categories of Valuable Information	*39,000*	*18,000*	*4,000*
Total Costs of Recommendation One (Categories 1-7)	*68,000*	*34,000*	*8,000*

Recommendation Two: Professional Development in Critical Thinking for Teacher Preparation Faculty Members

If graduate and undergraduate faculty who are involved in teacher preparation are to incorporate an emphasis on critical thinking into their instruction, then appealing opportunities should be provided for professional development in critical thinking. Effective professional development must not only provide a baseline conceptualization that is fully in keeping with the traditional purposes of critical thinking, but it must also show how critical thinking can be integrated into the teaching of all subject areas and disciplines. It must enable faculty to begin to reconceptualize the design of their instruction so as to bring greater intellectual quality, intellectual discipline, and intellectual standards into the heart of instruction. Professional development opportunities should not advocate any particular definition of critical thinking. Rather, they should encourage faculties to integrate core concepts of critical thinking into their particular disciplinary specialties according to their own preferred "definitions" or definitional emphases. As explained previously, many definitions of critical thinking are compatible with a baseline, minimalist concept (see the section entitled *No One Definition of Critical Thinking Will Do* in Part I of this report).

In what follows, the Commission on Teacher Credentialing and the principal research investigators suggest the basic principles and vision behind the design of such professional development for faculty.

Some Basic Principles for Faculty Professional Development

(1) Professional Development Should Focus on Content as a Mode of Thinking. Critical thinking is best cultivated when college courses are designed so that rote memorization "doesn't work," when explicit attention is routinely given to thinking about content, and when thinking is essential to success in the courses.

Critical thinking can transform students as learners. Passive recipients of information can become active producers of knowledge. Disciplined reasoning can be substituted for short-term memorization. Students must learn to *reason through* the content of the curriculum, instead of trying to commit to memory bits and pieces of it for a test. All content can be transformed into networks of understandings. When students complete their schooling, they should be "armed" with broadly-based intellectual standards that they can use whenever they think--independent of the context in which the standards were initially learned.

History courses should focus on systematic practice in historical reasoning, math courses on systematic practice in mathematical reasoning, biology courses on systematic practice in biological reasoning, sociology courses on systematic practice in sociological reasoning, etc.

(2) <u>The Basic Concepts of Critical Thinking Should be Used as a Bridge Between All Disciplines</u>. Irrespective of the subject students are studying, they should be able to ask basic questions *about* their thinking and about the thinking in the textbook. They must routinely ask themselves:

What is the ***purpose*** of my thinking?
What am I taking for granted; what ***assumptions*** am I making?
What precise ***question*** am I trying to answer? What ***problem*** am I trying to resolve?
What ***concepts*** or ideas are central to my thinking?
What ***information*** am I using?
How am I ***interpreting*** that information?
Within what ***point of view*** am I thinking?
What ***conclusions*** am I coming to?
If I accept the conclusions, what are the ***implications***?
What would the ***consequences*** be, if I put my thought into action?

Irrespective of what subject students are thinking in, they must strive to check their thinking against basic intellectual criteria. They must routinely ask themselves:

Is my thinking **clear** ?
Is my thinking **accurate**?
Is my thinking **precise**?
Is my thinking **relevant** to the issue or questions?
Is my thinking responsive to the **complexities** of the question or problem?
Is my thinking sufficiently **broad-minded**?
Is my thinking **logical**?

When questions such as these become prominent in a prospective teacher's undergraduate and post-graduate education, they become a powerful set of tools for making sense out of knowledge, and for understanding the dynamics of knowing in all subjects and disciplines.

(3) <u>Instructors Should Unify Instruction Around Basic Organizing Ideas</u>. If the thinking that is essential to the content is emphasized--historical, economic, biological, chemical, geographical, psychological, sociological, philosophical thinking--then the students need "intuitive" concepts that enable them to begin to internalize these modes of thinking. For example, instructors could introduce the field of sociology by showing students how they are influenced by their peers and other social forces--that the clothes they wear, the language they use, and the ideas they have are very much a product of "group think." Students would then realize that this influence is a sociological phenomenon, and that all groups have some degree of influence on the thinking of their members. Pointing to examples in gang behavior could also provide highly intuitive insights of the power of sociological influences on thinking. From this sort of introduction, instructors could then begin to connect other concepts in the course to the organizing idea--that humans, being highly social animals, are strongly influenced by the groups that they participate in. In this example, as in a multitude of others, basic ideas from within a discipline become organizers for subsequent information and ideas in the discipline, which is an important characteristic of instruction that emphasizes critical thinking.

(4) <u>Courses Should be Conducted So Professors Continually Model the Thinking They Want, Engaging Students in That Thinking, and Holding Students Responsible for the Thinking They Do</u>. Professional development should itself foster this instructional approach among teacher preparation faculty members.

Behind professional development for critical thinking lies a vision of education that reflects the historical agenda of critical thinking. It is suggested, but only "suggested," in the following "imaginings."

Imagine a university in which all students were regarded in all of their classes as thinkers, with all subjects taught as modes of thinking. Imagine all instruction focusing on intellectual work with the use of common structures of reasoning and common standards for assessing intellectual work. Imagine all students held responsible to document and assess their own learning. Imagine all instruction dramatizing the power of questions in driving and disciplining thought. Imagine all teaching focused on deep understandings rather than wide "coverage." Imagine faculty frequently modeling reasoning in front of the students. Imagine students learning how to put and pursue questions, how to broker solutions, and how to reason through a variety of theoretical systems. Imagine students reading, writing, and talking their way through all subjects. Imagine students internalizing a deep grasp of the organizing ideas of a variety of subjects. Imagine reasoning being taught with the same intellectual discipline in all instruction, independent of the subjects being covered. Imagine no "soft" subjects, no "pushover classes," no irrelevant coursework. Imagine students perceptibly seeing their ability to reason and solve problems growing from semester to semester. Imagine the study of new fields and subjects becoming more attractive and accessible to students because of their growth as independent learners. Imagine students seeing wider and deeper applications of reasoning to problems in their lives. Imagine students becoming more and more intellectual in orientation as they advance from year to year. Imagine students graduating as lifelong learners excited by the power of learning and internally motivated to continue it for the rest of their lives.

This vision of critical thinking in education is virtually synonymous with widely-held visions of the purposes of education itself. Professional development opportunities for teacher preparation faculty can build on these widely-held visions of educational excellence by providing tools and strategies for their implementation. Expanded incorporation of critical thinking skills and concepts in teacher preparation courses and programs can be fostered effectively because they coincide with the reasons why many faculty members in education pursue teacher preparation as a discipline of practice.

Recommended Plans for Faculty Professional Development in Critical Thinking

The Commission on Teacher Credentialing should be authorized to sponsor intensive Critical Thinking Institutes for teacher preparation faculty members, administrators, and cooperating teachers. If this recommendation is adopted, the Commission would invite teams of critical thinking experts to develop specific plans for Critical Thinking Institutes at three levels of advancement: Initial Institutes, Intermediate Institutes, and Advanced Institutes. Then the Commission would sponsor the delivery of these institutes at regional centers throughout California, at times and locations that would be convenient for potential participants.

Institutions with accredited programs of teacher preparation would be encouraged by the Commission to send "teams" of faculty participants to the Critical Thinking Institutes. In the case of the Initial Institutes, colleges and universities would be encouraged to send as many as ten faculty members, ten supervising teachers, and two institutional administrators. Education faculty and administrators would be encouraged to participate in the Initial Institutes; so would those with responsibility for the subject matter preparation of teachers at the same campuses. During subsequent phases of the effort, smaller teams of highly motivated faculty members would be invited to participate actively in Intermediate Institutes and Advanced Institutes in each region.

Critical Thinking Institutes would not consist primarily of explanatory lectures, although some formal instruction would be included in each institute. Institutional teams would bring examples of course syllabi and other materials, including course textbooks and student writing assignments, to the institutes. They would also bring videotaped episodes of classroom instruction at the participating institutions. Each institute would include substantial time for institutional teams to work with Critical Thinking Mentors on the materials and episodes from the institutions. In these work sessions, the highly-trained mentors would demonstrate and encourage critical analysis of the instructional

materials and episodes for the purpose of developing strategies and encouraging commitments to incorporate critical thinking into courses and programs for future teachers.

Additional work sessions at the Intermediate Institutes and Advanced Institutes would focus on the design of programs (series of interconnected courses) in which learning to think critically and teach for critical thinking would become significant themes of the programs. In prior efforts at faculty professional development in California, these strategies have proven to be highly effective in bringing about sustained institutional change and systemic improvement of instruction.

Cost Analysis of Recommendation Two

The Commission recommends an appropriation of funds to support the costs of instruction and administration of the Critical Thinking Institutes. State funds should be appropriated to underwrite the training and selection of institute faculty and mentors, the delivery of institutes at three levels of instruction, and the Commission's administrative costs. The Commission estimates that these costs would consist of $80,000 for institute faculty and mentors, $16,000 in state personnel costs, and $4,000 in state operational expenses (including overhead and indirect costs), for a total appropriation of $100,000 over the course of two fiscal years (consisting of $50,000 in each of the two years), which should be drawn from the State General Fund.

The Commission is not recommending the appropriation of state funds to support the costs of participant travel to attend the Critical Thinking Institutes. These costs, including lodging, meals and transportation expenses, would be supported by the participating institutions and/or the individual participants. Consequently, these participation costs are not included in the recommended appropriation of $100,000 in two fiscal years.

The Commission considers the recommended appropriation of $100,000 for faculty professional development to be the minimum amount needed for this significant initiative. In the event that $200,000 could be invested in the initiative from the State General Fund, the level and extent of participation could more than double. With the expanded appropriation, larger numbers of institutions could participate in the Intermediate Institutes and the Advanced Institutes. As a consequence, larger numbers of future teachers would experience greater depth in their preparation for critical thinking instruction in the elementary and secondary schools. This variation on Recommendation Two would cost $100,000 in each of two successive fiscal years.

Recommendation Three: Establish Strong Accreditation Standards for Teacher Preparation in Critical Thinking

Dissemination of needed information (Recommendation One) and professional development for teacher preparation faculties (Recommendation Two) would establish new conditions that would *enable* teacher education programs to change. Armed with new kinds of information related to critical thinking, and having acquired strong skills and abilities as critical thinkers, teacher preparation faculties would have increased *capacities* to prepare their students to be teachers of critical thinking in elementary and secondary schools. These capacities are urgently needed, which is why the recommendations to disseminate information and provide for faculty development have been presented as our first two policy recommendations.

It would not be sufficient, however, to develop increased *capacity* to prepare teachers to incorporate critical thinking into their instruction of K-12 students. By itself, increased capacity is not a secure assurance that the preparation of teachers for critical thinking instruction will improve materially or extensively. Additional measures are essential if education policymakers are to assure elementary and secondary school students and their families that future teachers will experience preparation that is highly effective in the crucial domain of critical thinking.

Practical measures need to be taken to ensure that the ideal of critical thinking is no longer left to chance in the preparation of K-12 teachers. Policymakers must establish *expectations* that can be carried out and monitored tangibly and periodically, so the essentials of critical thinking will be included in the preparation of teachers at every accredited institution.

In the course of re-structuring the requirements for teaching credentials (as a result of SB 1422), the Commission should consider establishing *four kinds of expectations* to teach critical thinking. First, the Commission should expect institutions to teach prospective teachers to think critically in the course of common, general discourse. Second, there should be expectations about learning to think critically within each of the subjects that prospective teachers study (e.g. history, mathematics, government, science). Third, the Commission should expect prospective teachers to know how to design instruction so that, once they become teachers, they foster the critical thinking of their students. Finally, new teachers should enter the profession with "habits of mind" that include critical reflectivity about their own teaching. Each kind of expectation is discussed in turn.

Teaching Prospective Teachers to Use Critical Thinking in General Discourse

To be effective teachers of critical thinking, classroom educators need to be critical thinkers themselves. A teacher becomes a critical thinker by learning to do so regularly and habitually. Development as a critical thinker requires some direct instruction followed by ongoing practice. Proficiency as a critical thinker is prerequisite to achieving any of the remaining levels of attainment in critical thinking (below). By itself, however, this proficiency is not sufficient to ensure that teachers will think critically within their disciplines of study, or in their classrooms, or in relation to their pedagogical practices.

For the reasons suggested above, the Commission's *Standards of Program Quality and Effectiveness for Teacher Education Programs* should give general attention to the need for institutions to foster general critical thinking skills and habits among those students who intend to become teachers. Because the teacher's general critical thinking skills are not the Commission's primary area of concern, however,

this expectation should be reflected among the many other "factors" that the Commission considers during the accreditation of teacher education institutions and programs.

Teaching Prospective Teachers to Use Critical Thinking in the Disciplines of Study

Critical thinking can be contextualized in a variety of subject areas, but only when courses in those subjects are taught so critical thinking is pervasive. If we want students to think critically within the domain of history, then their history courses have to emphasize critical historical thinking. If we want students to think critically within the domain of geology, then their geology courses have to emphasize critical geological thinking. If we want students to think critically within the domain of speech and rhetoric, then their speech courses have to emphasize critical thinking in speech and rhetoric. In short, critical thinking needs to be fostered as an integral element of study in each and every academic domain.

The Commission has recently completed a long-term effort to establish new *Standards of Program Quality and Effectiveness* for the subject matter preparation of teachers in each content area of the school curriculum. Based on the alarming results of the present study, it would be important for the Commission to re-examine its subject matter preparation standards. A broad-based panel of experts in critical thinking within the disciplines should be commissioned to determine (a) the extent to which critical thinking concepts and skills are already represented in the new standards, and (b) the specific changes that need to be made by the Commission in each set of standards for the purpose of fostering the practice of critical thinking by future teachers in each curriculum content area.

Teaching Prospective Teachers How to Design Instruction to Foster the Critical Thinking of Their Prospective Students

To design instruction to foster critical thinking, certain preconditions must be established: (1) teachers must think critically themselves in everyday life and in the subjects they teach; (2) teachers must value critical thinking; and (3) teachers must experience having their own thinking similarly cultivated. Teachers who do not think critically cannot effectively foster the critical thinking of students. However, it does not follow that a teacher who thinks critically will automatically be effective in cultivating his or her students' critical thinking.

The Commission needs to establish a clear expectation that prospective teachers learn how to design classes so their students must think systematically through the content areas. Prospective teachers who are to teach literature, for example, should be expected to demonstrate their competence in designing courses, units, and classes in which they model critical literary thinking in front of the students, engage the students in critical literary thinking (on their own), and hold the students responsible for assessing their own critical literary thinking (and that of others). The same must hold for students preparing to teach reading, mathematics, writing, chemistry, history, etc.

Currently the Commission is engaged in a comprehensive review of teaching credential requirements, with the assistance of an advisory panel of experts in teacher preparation. As a result of this review, the Commission expects to make substantial changes in its *Standards of Program Quality and Effectiveness for Teacher Education Programs in California*. In the course of making those changes, the Commission should incorporate much greater attention to learning to design K-12 instruction that fosters the critical thinking of children and adolescents. A similar critical thinking training requirement (Criterion 20) was recently established for all nursing programs nationally in the *Criteria and Guidelines for the Evaluation of Baccalaureate or Higher Degree Programs in Nursing* (National League for Nursing, 1991). Increased attention to critical thinking needs to characterize the

Commission's *Standards* for teacher education programs that offer the Bilingual Crosscultural, Language and Academic Development (BCLAD) Emphasis, and for programs that offer credentials without this emphasis.

Two significant modifications to current program standards need to be considered by the Commission. First, the current standard for the "cognitive outcomes of teaching" should be replaced by a standard that is explicit about critical thinking in content areas. Second, there is a need to introduce a "conceptual framework" standard for teacher education accreditation which includes the development of a knowledge base in critical thinking and critical inquiry. To accomplish these changes, the Commission should confer with some of the teacher education practitioners whose work was cited as exemplary in Parts I and II of this report. A small panel of these practitioners should be commissioned to review the existing *Standards* and recommend specific ways to incorporate greater attention to critical thinking in them. These efforts to modify the accreditation standards should proceed concurrently with the dissemination of information (Recommendation One) and the provision of faculty development opportunities (Recommendation Two). Once the three recommendations have been carried out in tandem with each other, the Commission should implement the revised *Standards* through its rigorous system of accrediting teacher preparation institutions and programs throughout California.

Teaching Prospective Teachers to Think Critically and Reflectively about Their Teaching

Teaching is a profession that is deeply concerned about the ongoing professional development of its practicing members. Many professional growth options, opportunities and expectations have been developed for current teachers. Relatively few of these options, opportunities or expectations focus on critical thinking as a "habit of mind" that fosters a teacher's own professional development.

Most educators who specialize in teacher professional development acknowledge the significant role of self-motivation in the realization of authentic professional growth. While external influences such as collegial consultations and profession-wide requirements often contribute to a teacher's motivation to improve, intrinsically-based motivations must also bear on the teacher's pursuit of professional development if it is to be effective. Recognizing these principles of professional development, many specialists emphasize the importance of *reflection* on one's own pedagogical practices as a powerful tool for the growth and improvement of those practices.

Critical thinking skills and concepts represent an extensive range of *tools* that promise to foster the professional development of teachers. It is not sufficient, therefore, for beginning teachers to be critical thinkers, or to know how to foster critical thinking in their students. An additional value of critical thinking in a teacher's preservice preparation is its potential for supporting that teacher's ongoing development once s/he begins to practice the profession of teaching. For this to occur, the teacher's initial preparation should emphasize the significant role of critical reflection in the everyday practice of pedagogy itself.

Previously, we emphasized that courses in the content areas (mathematics, government, physics, etc.) must focus on critical thinking if we want prospective teachers to think critically about each content area of the school curriculum. The same basic principle of critical thinking also applies to courses in pedagogy. If we want teachers to think critically about their own pedagogical practices, then critical thinking and reflection must be prominent themes of each course in curriculum, instruction, the foundations of education, and practice teaching. This emphasis on thinking reflectively and critically about pedagogy is a significant application of critical thinking that goes beyond learning how to foster the critical thinking of K-12 students.

Again, the Commission's accreditation standards for teacher preparation programs should give attention to the important goal of fostering, in each teacher's intellectual life, a critical reflectivity

about teaching itself. As a habit of the teacher's own mental experience, it would come into play when the teacher reads professional journals, engages in collegial dialogues, observes the work of other educators, and assesses her own work with students. It is difficult to imagine a more powerful set of tools for ongoing professional development than the critical reflectivity that already characterizes the pedagogical practices of many outstanding teachers. To foster this critical reflectivity in larger numbers of future teachers, the Commission's accreditation standards must focus on it as a thematic strand in the curriculum of teacher preparation.

Cost Analysis of Recommendation Three

Recommendation Three has significant implications for the Commission's operational budget. Implementation of Recommendation Three would require consultations with a small panel of experts in critical thinking; development and review of new standards for teacher preparation programs; publication and dissemination of the revised standards; and training of accreditation reviewers to enforce the new standards consistently and equitably. Pending the advice of its Advisory Panel for the Comprehensive Review of Teaching Credential Requirements (SB 1422), the Commission is prepared to make necessary changes in its accreditation system. Fortunately, the SB 1422 Advisory Panel has examined an early draft of this research report, and has expressed a preliminary intention to address, in its forthcoming recommendations to the Commission, the important role of critical thinking in teacher preparation. Unfortunately, however, the Commission's existing fiscal and personnel resources, which are fully committed to implementation of statutory mandates, cannot be stretched to support the costs of developing and enforcing new standards for critical thinking in teacher education.

A detailed analysis of the workload and fiscal implications of Recommendation Three indicates that its implementation would cost approximately $34,000 in personnel expenses (salaries and benefits), plus approximately $9,000 in operational expenses (travel, facilities, supplies, postage, etc.). For Recommendation Three to be implemented, these resources from the General Fund would need to be added to the Commission's budget during a single fiscal year.

Recommendation Four: Strengthen and Reinforce Teacher Preparation for Critical Thinking Instruction by Creating Career-Long Credential Expectations

It is not likely that future teachers will be able to incorporate critical thinking into their classroom instruction at high levels of proficiency unless their initial preparation in critical thinking is supplemented by further training, study and guided practice in their classrooms.

In recent years, the Commission on Teacher Credentialing has exerted leadership in the creation of "induction programs" that are especially designed for beginning teachers (defined as first-year and second-year practitioners). An induction program includes a thorough orientation to the new teacher's work environment, followed by systematic training in the most challenging aspects of classroom management, student discipline, curriculum implementation and instructional strategies. Each new teacher's induction program also includes individualized activities that are planned on the basis of formative assessments of the new teacher's strengths and weaknesses as a beginning practitioner. In these individualized activities, new teachers are coached and guided frequently by experienced mentors, who are carefully selected and trained for the mentoring role.

To govern induction programs for beginning teachers, the Commission has collaborated with the Department of Education in developing two kinds of standards. A new set of teaching standards, called the *California Standards for the Teaching Profession*, define and describe good teaching practice for all of California's elementary and secondary schools and classrooms. Accompanying the teaching standards are *Standards of Program Quality and Intensity for Beginning Teacher Induction Programs*, which describe the school conditions in which beginning teachers should be expected to grow and learn. The latter standards describe, for example, the quality of orientation, training, formative assessment and mentoring in the induction programs.

To date, these two sets of standards for beginning teachers and their induction programs have (1) given no attention to the role of new teachers as instructors of critical thinking, and (2) given no attention to critical thinking as a domain of knowledge and skill that new teachers are expected to acquire and use. Both of these omissions should be corrected by the Commission as part of a broader effort to incorporate attention to critical thinking skills and concepts in the preliminary preparation, initial induction and ongoing professional growth of future teachers. The two sets of standards for new teachers should be modified to give appropriate attention to critical thinking. When this happens, the levels of critical thinking skill and understanding that new teachers learn in their prior preparation can be expected to improve during the initial years of their professional service in the K-12 schools.

Teachers are required by law to renew their teaching credentials at five-year intervals. The renewal of their credentials is based on completion of "individual programs of professional growth," which are subject to state regulation and local monitoring. The Commission should explore whether individual programs of professional growth for practicing teachers should include specific instruction in critical thinking as well as the teaching of critical thinking in elementary and secondary schools. As teachers' careers unfold, and as they renew their professional credentials after each five-year period, they could be expected to attain increasingly advanced levels of proficiency as teachers of critical thinking to their K-12 students.

Cost Analysis of Recommendation Four

Recommendation Four also has implications for the Commission's budget. Implementation of Recommendation Four would require: (1) consultations with a small panel of experts in critical thinking, teacher induction, and professional growth; (2) development and review of new standards for teacher induction programs; (3) analysis of the feasibility and advisability of including critical thinking in all individual programs of professional growth; and (4) publication and dissemination of the revised induction standards, in consultation with the California Department of Education. Pending the advice of its Advisory Panel for the Comprehensive Review of Teaching Credential Requirements (SB 1422), the Commission is prepared to make necessary changes in the standards for new teachers. Fortunately, the SB 1422 Advisory Panel has examined an early draft of this research report, and has expressed a preliminary intention to address, in its forthcoming recommendations to the Commission, the important role of critical thinking in teacher induction. The Commission's fiscal and personnel resources are fully committed, however, and cannot be stretched to support the costs of developing new standards for critical thinking in teacher induction, or new expectations for individual programs of professional growth.

An analysis of the personnel and fiscal implications of Recommendation Four indicates that its implementation would cost approximately $34,000 in personnel expenses (salaries and benefits), plus approximately $9,000 in operational expenses (travel, facilities, supplies, postage, etc.). For Recommendation Four to be implemented, these resources from the General Fund would need to be added to the Commission's budget during a single fiscal year.

Recommendation Five: Review Teaching Credential Examinations and Include Knowledge and Skill Related to Critical Thinking

Critical thinking must be assessed extensively in teaching credential examinations to ensure that faculty members and prospective teachers take seriously the importance of critical thinking. When prospective teachers know that they will be facing a rigorous assessment of their critical thinking knowledge and skill, their motivation to learn it will be significantly heightened. All existing Commission-sponsored examination programs need to be analyzed to determine (1) the extent to which the current exams assess critical thinking knowledge and skill, and (2) whether a critical thinking component could and should be developed and scored within each of these assessments.

A variety of critical thinking skills should be assessed among prospective teachers. For example, with respect to reading and listening, the Commission could assess the ability to:

- develop an accurate interpretation;
- assess the author's or speaker's purpose;
- accurately identify the question-at-issue or problem being discussed;
- accurately identify basic concepts at the heart of what is said or written;
- determine significant implications of an advocated position;
- identify, understand, and evaluate the assumptions underlying someone's position;
- recognize evidence, argument, reasoning (or their lack) in oral and written presentations;
- reasonably assess the credibility of an author or speaker;
- accurately grasp the point of view of the author or speaker; and
- empathically reason within the point of view of the author or speaker.

With respect to writing and speaking, the Commission could assess the ability to:

- identify and explicate one's own point of view and its implications;
- communicate clearly, in either spoken or written form, the problem one is addressing;
- be clear about what one is assuming, presupposing, or taking for granted;
- present one's position precisely, accurately, completely, and give relevant, logical arguments for it;
- cite relevant evidence and experiences to support one's position;
- illustrate one's central concepts with significant examples and show how they apply in real situations;
- identify, formulate, and take account of alternative positions and opposing points of view, recognizing and evaluating evidence and key assumptions on both sides; and
- empathically entertain strong objections from points of view other than one's own.

With respect to intellectual standards, the Commission could assess the ability to:

- recognize what is clear and what is in need of clarification;
- distinguish accurate from inaccurate accounts;
- decide when a statement is relevant or irrelevant to a given point;
- identify inconsistent positions as well as (relatively) consistent ones;
- discriminate deep, complete, and significant accounts from those that are superficial, fragmentary, and trivial;
- evaluate responses with respect to their fairness;
- prefer well-evidenced accounts to accounts that are unsupported by evidence; and
- distinguish good reasons from bad.

In relation to critical thinking skills and abilities like those enumerated above, the Commission could directly assess the proficiencies of candidates for teaching credentials. To do so would complement the use of accreditation standards to ensure that teacher preparation programs give adequate attention to basic concepts and skills of critical thinking. While the direct assessments of candidates' proficiencies would assure the public that credentials are awarded to individuals who have acquired essential skills and abilities of critical thinking, the enforcement of accreditation standards would assure the candidates that teacher preparation programs offer legitimate opportunities to learn the skills and abilities that are to be assessed.

What is more, a variety of standardized critical thinking tests are available. Virtually all of them, however, use a multiple-choice response format, which limits the assessment to the testing of particular aspects of critical thinking, isolated from each other. This is roughly analogous to testing ballet dancers by having them make individual ballet moves at the "bar"--in contrast to, say, having them dance a scene from Swan Lake. Or, it is like testing basketball players by asking them to do isolated basketball moves outside of the context of a full-fledged game. The Commission and the principal investigators do not recommend the use of multiple-choice response formats to assess the critical thinking skills or knowledge of prospective teachers.

It would be feasible and desirable, however, to assess critical thinking using response formats that are more "open-ended." Among measurement specialists in education, these formats are referred to as "constructed response" formats, because examinees construct their own responses to complex, multi-faceted questions. Teaching credential candidates are accustomed to taking essay examinations in their university courses -- essay exams use constructed response formats. Critical thinking skills and knowledge can be assessed validly and reliably with the use of such formats. In the context of each curriculum subject area (e.g. science, English, social science, mathematics, etc.), this domain of teacher competence could be assessed in the familiar essay format. For each essay question, specific criteria would need to be developed and validated for scoring the responses written by credential candidates. Teams of K-12 teachers and college professors could be selected and trained to grade the candidates' responses by applying the scoring criteria consistently and uniformly.

This approach to the assessment of critical thinking proficiency would be consistent with innovations that the Commission has already implemented in California's teacher certification examinations. In every subject area, the Commission has introduced the use of constructed response questions and problems. On each examination, the Commission has relied on the advice of content experts to focus the open-ended questions and problems on the most important aspects of the disciplines of knowledge. In each subject area, the Commission selected and trained high school teachers and university professors to score candidates' papers by applying criteria reliably and uniformly. In the field of teacher certification testing, the Commission has pioneered the use of constructed response formats, and is satisfied that this innovative approach to teacher assessment serves the purposes of licensure admirably.

Example of a Critical Thinking Essay Examination

To illustrate how the critical thinking proficiencies of prospective teachers could be assessed in an open-ended format, following is a preliminary set of essay questions, which are similar to questions developed by the International Center for the Assessment of Higher Order Thinking, which developed the *ICAT Critical Thinking Essay Test.*

Sample Directions to Credential Candidates. The following questions are designed to assess your critical thinking and problem solving abilities. Your answers will be judged for clarity, relevance, consistency, logic, depth, coherence, and fairness. You are first to read the enclosed article (in which a controversial issue in education is discussed). Before you begin to write, analyze the article in relation to the following questions. After you complete the short-answer questions, then you are to write your

own essay on the issue in which you discuss the strengths and weaknesses of the reasoning in the article. In your essay, be sure to express your own position on the reasoning in the article.

Short-Answer Questions. Once you read the essay and believe you understand it, complete the following short answer questions.

(1) The fundamental purpose of the article is . . . .
(2) The issue that it raises is best stated in the question . . . .
(3) The information that is most relevant to the issue is . . . .
(4) The most important concept in the article is . . . .
(5) One of the most basic assumptions the author makes is . . . .
(6) The most significant conclusion he/she comes to is . . . .
(7) If we were to accept the position taken in the article, the implications are . . . .
(8) The article is written from the point of view of . . . .

Essay Question. Now write your own essay on the issue, which must include your assessment of the strengths and weaknesses of the author's reasoning in the article.

Grading Criteria. When the readers grade your essay, they will be asking the following questions.

(1) Is the question at issue well stated? Is it clear and unbiased? Does the expression of the question do justice to the complexity of the matter at issue?
(2) Does the writer cite relevant evidence, experiences, and/or relevant information essential to the issue?
(3) Does the writer clarify key concepts when necessary?
(4) Does the writer show a sensitivity to what he or she is assuming or taking for granted (insofar as those assumptions might reasonably be questioned)?
(5) Does the writer develop a definite line of reasoning, explaining well how he or she is arriving at his or her conclusions?
(6) Is the writer's reasoning well-supported?
(7) Does the writer show a sensitivity to alternative points of view or lines of reasoning? Does he or she consider and respond to objections framed from other points of view?
(8) Does the writer show a sensitivity to the implications and consequences of the position he or she has taken?
(9) In addition to the questions above, the reader will assess the degree to which your thinking is clear and precise, accurate, relevant to the issue, logical, and fair-minded.

To become proficient at developing the critical thinking of students in K-12 schools, prospective teachers must first be proficient at developing well-reasoned positions on controversial issues in education, and at accurately and fair-mindedly assessing the basic strengths and weaknesses of an author's reasoning on an issue of importance in education. Subject to the findings of a formal validity study, such an approach to the assessment of critical thinking promises to add to the validity of the teacher certification examinations that are taken by many California credential candidates each year.

Cost Analysis of Recommendation Five

To implement Recommendation Five, the Commission would have to appoint small panels of experts to review the existing examinations for the purpose of determining the extent to which each exam already includes critical thinking skills and abilities like those enumerated above. The Commission's professional staff would be required to coordinate the efforts of these panels, to obtain examples of the current examinations, and to render the panels' judgments so the Commission could make decisions about next steps. In each subject area, the staff would need to prepare a written report of the panelists' judgments regarding (1) the extent to which critical thinking skills and concepts are already assessed

adequately, (2) the extent to which additional skills and concepts of critical thinking in the discipline should be added to the examination, and (3) the extent to which existing characteristics of the exam questions or directions are contrary to the goal of fostering the critical thinking of prospective teachers.

Based on the results of the panel deliberations and the decisions of the Commission, the existing examinations for prospective teachers would need to be modified. In this phase of the effort, the small panels of experts would work directly with a contractor who specializes in the development of constructed-response examinations. The panels and the contractor would collaborate in the development of open-ended problems and questions that would elicit the candidates' proficiencies in critical thinking. They would also develop specific criteria for scoring candidates' responses to each question and problem. Then the contractor would be required to field-test the newly-developed questions and problems. The expert panels would need to review the field-test results, and to make changes that may be needed in the exam questions, problems and criteria.

Before the Commission could add the field-tested questions, problems and scoring criteria to the existing examinations, the agency would be required to investigate the validity of these new exam materials. To do so, the Commission's professional staff would have to survey substantial numbers of teachers in each curriculum subject area, who would be asked to judge the "job relevance" of the proposed new exam materials. Finally, additional teachers would have to meet to review the results of the field tests and the validity studies for the purpose of recommending *levels of proficiency* that prospective teachers should be expected by the Commission to achieve in their scores on the critical thinking questions and problems.

If Recommendation Five is accepted by the Legislature, the effort that is described above would need to occur in relation to (1) the broad examination of subject matter knowledge that the Commission currently uses among prospective teachers for elementary schools, and (2) each of the thirteen focused examinations of subject matter knowledge that are currently taken by prospective teachers for the secondary schools in California. A total of fourteen examinations would need to be evaluated.

In the effort described above, the Commission would have to support the costs of the teacher advisors, the contractor, and the professional and clerical staff employees. The Commission would pay the travel and transportation costs of all three groups, in addition to the costs of materials, printing and postage that would be consumed by their work. Professional consulting time would have to be compensated for the contracting firm and the agency's own employees, but not for the expert advisors, who would be expected to contribute their time as concerned professionals.

The Commission estimates that the personnel costs (employee salaries and benefits) of the initial review of fourteen examinations would amount to $34,000, and the direct costs of this initial effort (travel, transportation, materials, printing and postage) would amount to $24,000. For the Commission to complete the initial review of examinations, then, the Legislature would need to appropriate a total of $58,000 from the General Fund during a single fiscal year.

To estimate the remaining costs of the overall effort envisioned in Recommendation Five, the Commission assumes that six of the fourteen examinations would require extensive revisions, and that six others would require moderate revisions. For each of the twelve examinations to be revised in ways that would subsequently be defensible, the Commission would be required to follow the previously-described procedures for the construction, field-testing, validation and standard-setting of new questions and problems in critical thinking. Based on prior experience in the development and validation of new examinations, the Commission estimates it would cost a total of $157,000 to revise the twelve examinations. This estimate consists of projections of $42,000 for direct costs (travel, transportation, materials, printing and postage), $64,000 for contractor costs, and $51,000 for staff compensation (0.75 person years of professional staff time). The Commission could complete the modification of twelve examinations only if the Legislature appropriates, from the General Fund, $157,000 for this purpose during the fiscal year following the initial effort at reviewing all fourteen examinations (above).

Summary Cost Analysis of Recommendations 1-5 and a Recommended Source of Funding

The following table summarizes the specific cost estimates that have been provided for each of the five policy recommendations. The Commission asks that the Legislature provide a special two-year appropriation to support the cost of each recommendation that is to be implemented in practice.

Policy Recommendations	Contract Costs	Personnel Costs	Operating Costs	Total Costs
Recommendation One				
• Dissemination of Three *Essential* Categories of Information (First Year)	$ 29,000	$ 16,000	$ 4,000	$ 49,000
• Dissemination of Four *Important* Categories of Information (Same Year)	39,000	18,000	4,000	61,000
Recommendation Two				
• Minimal Level of Effort (Two Years)	80,000	16,000	4,000	100,000
• Additional Level of Effort (Two Years)	80,000	16,000	4,000	100,000
Recommendation Three (First Year)	0	34,000	9,000	43,000
Recommendation Four (First Year)	0	34,000	9,000	43,000
Recommendation Five				
• Initial Review of 14 Examinations (First Fiscal Year)	0	34,000	24,000	58,000
• Modifications of 12 Examinations (Second Fiscal Year)	64,000	51,000	42,000	157,000
Total Costs of Recommendations 1 - 5				
• *Total for 1-5 with Low Level of Effort on Recommendations One and Two*	*$ 173,000*	*$ 185,000*	*$ 92,000*	*$ 450,000*
• First Fiscal Year of Lowest Effort	69,000	126,000	48,000	243,000
• Second Fiscal Year of Lowest Effort	104,000	59,000	44,000	207,000
• *Total for 1-5 with Full Implementation of Recommendations One and Two*	*292,000*	*219,000*	*100,000*	*611,000*
• First Fiscal Year of Full Effort	148,000	152,000	54,000	354,000
• Second Fiscal Year of Full Effort	144,000	67,000	46,000	257,000

With the lowest level of effort on Recommendations One and Two, the first-year costs of the five policy recommendations would amount to a total of $243,000, and the second-year costs would be an additional $207,000, for a two-year cost of $450,000 as shown in the table. With full implementation of Recommendations One and Two, the first-year costs of the effort would be $354,000 overall. In this scenario, the second-year costs would amount to an additional $257,000, for a total appropriation of $611,000 over two years.

Recommended Source of Funding for the Policy Recommendations

The Commission strongly recommends that implementation of the policy recommendations be funded from the State General Fund (non-Proposition 98). The policy recommendations are designed to improve opportunities for K-12 students to become proficient at the essential skills of critical thinking and problem solving. This purpose motivated the Legislature and Governor Wilson to enact Senate Bill 1849 (Leroy Greene) in the first place. The Commission enthusiastically supports the purpose of SB 1849 because the critical thinking and problem solving proficiencies of future citizens will be indispensable if California is to continue to be competitive economically and have viable participation in civic affairs by millions of its citizens. Given that the ultimate beneficiaries of this effort would be the people of California, the Commission recommends that its costs be supported from the General Fund. The Teacher Credentials Fund exists for the purpose of providing technical licensing services to prospective teachers and other educators, and should not be used to pay for initiatives that are intended and designed to serve the State's broader interests, such as ensuring that future citizens are proficient in critical thinking and problem solving.

Conclusion: Teacher Preparation for Critical Thinking Instruction

The first part of this study demonstrated that there is a serious problem in preparing teachers for critical thinking instruction in California's K-12 schools. The second part of the report identified the causes of this problem, and documented a range of exemplary practices that give us every reason to believe that, in principle, the problem can be solved. Part III provided policy recommendations that, as an integrated set of proposals, offer a unified and plausible strategy for addressing and resolving the problem. At the end of the study, we come once again to the question that we raised at the conclusion of Part I: *Is there an academic and political will to pursue a promising long-range solution?*

It is clear, on the face of it, there is no painless or short-range solution to a complex problem such as cultivating significant changes in the thinking of college professors. No professional group likes to learn that it has not been effective in fostering a basic value and in furthering a goal that is significantly connected to its prestige and its mission. Because of the historical resistance of educational institutions to substantive change, many observers may have valid reasons for being skeptical that the recommended solution can be effective.

Very much alive in the world, however, are deeply-seated structural forces that suggest some reasons for optimism. In the world that is increasingly upon us, societies thrive when they are prepared to deal with the interwoven realities of accelerating change, intensifying complexity, and ever-increasing interdependence. To be prepared to deal with these realities, citizens in any society must be flexible in their thinking and willing and able to routinely and regularly assess and restructure their thinking. Critical thinking, then, is an essential condition for our economic, our social, and our environmental

survival. Fostering proficiency in critical thinking contributes to the adaptiveness and capacity of future citizens to address the challenges of the 21st century. If we ignore the problem described in this report, we ignore it at our peril, for the conditions that require critical thinking will not ignore us, nor our children, nor our children's children. As Paul (1995) wrote:

> What we can be sure of is that the persuasiveness of the argument for critical thinking will only grow year by year, day by day--for the logic of the argument is simply the only prudent response to the accelerating change, to the increasing complexity of our world. No gimmick, no crafty substitute, can be found for the cultivation of quality thinking. The quality of our lives can only become more and more obviously the product of the quality of the thinking we use to create them.
>
> Critical thinking is ancient, but until now its practice was for the elite minority, for the few. But the few, in possession of superior power of disciplined thought, have used it as one might only expect, to advance the interests of the few. We can never expect the few to become the long-term benevolent caretakers of the many.
>
> The many must become privy to the superior intellectual abilities, discipline, and traits of the traditional privileged few. Progressively, the power and accessibility of critical thinking will become more and more apparent to more and more people, particularly to those who have had limited access to the educational opportunities available to the fortunate few.
>
> The only question is how long and how painful the process will be and what we shall sacrifice of the public good in the meanwhile. How many of our citizens will lives unemployed and unemployable in the post-industrial age?
>
> We must sooner or later abandon the traditional attempt to teach our fellow citizens what to think. Such efforts cannot prepare us for the real world we must, in fact, face. We must concentrate instead on teaching ourselves how to think, thus freeing us to think for ourselves, critically, fairmindedly, and deeply. We have no choice, not in the long haul, not in the face of the irrepressible logic of accelerating change and increasing complexity.

Appendix A

Interview Protocol, Coding Sheets, and Solicitation of Exemplary Practices

Interview Protocol

Interview Introduction

"My name is____. I'm calling on behalf of the Commission on Teacher Credentialing. At the outset you should know that: 1) we are tape recording the conversation to use it as data for coding and analysis, 2) your answers will be confidential and your identity anonymous, and 3) the study will not report on individual institutions. The Commission on Teacher Credentialing appreciates your taking time from your busy schedule to respond to our questions.
The interview is designed to gather information from the faculty and administrative perspective for the Commission on Teacher Credentialing regarding the status of critical thinking in the instructional programs of teacher candidates.

You should understand that there are no particular answers we are looking for other than those which give us the benefit of your most accurate and candid views. If you feel that you are in no position to answer any given question (or set of questions) for any reason, we ask that you simply inform us that you lack the requisite information.

There are two sets of questions, the first set are multiple choice questions, the second set open-ended questions. When you give your answer to the open-ended questions, feel free to elaborate on or illustrate them in any way you want. When I ask follow-up questions, I am seeking to make clear what precisely is being asked in the question, since some of the questions can be interpreted in different ways. Feel free to ask me to clarify any question you don't understand."

Interviewee_____ Time_____ Date___

Interviewer_____ Tape Number _____

(If the person elaborates on any of these multiple choice questions put an * next to the question. Also, put the tape counter reader number next to the questions which have been elaborated upon beyond the choices given. Also, mark the start of the open-ended questions from the tape counter reader. Remember to reset your tape counter to zero.)

Background Information Questions

- What courses do you teach most regularly? _____

_____

- What would you identify as your specialty or domain of highest expertise?

_____

- Have you read any articles or books, or attended any conferences on critical thinking in the last 5 years you can mention? _____

(1) How important is critical thinking to your instructional objectives?

(a) of little or small importance
(b) of secondary importance
(c) of primary importance

(2) My concept of critical thinking is largely:

(For those who ask what we mean by "intuitive" the common answer should be, *"By an intuitive idea or concept, we mean one that you use without knowing you are using it and without basing your use on an explicitly formulated theory."*)

(a) intuitive in my thinking, or
(b) explicit in my thinking

(3) My concept of critical thinking is largely:

(If they say "b" or "both", say *"Could you please tell me which theories you subscribe to and/or which theorists you have read."*)

(a) a product of my own thinking
(b) a product of one or more particular theories of C.T. to which I explicitly subscribe

(4) In your concept of critical thinking do you explicitly distinguish critical thinking skills and traits?

a) yes
b) no

(5) In your view, do you think of knowledge, truth, and sound judgment as :

(a) not fundamentally a matter of my own personal preference or subjective taste or,
(b) fundamentally, a matter of my own personal preference or subjective taste

(6) Would you say that your department or school has a shared approach to the teaching of critical thinking or is it left more or less to individual faculty members' discretion to decide whether and how they approach critical thinking?

(a) yes, a shared approach
(b) no, left to individual faculty

(7) **In your view, how important is it for students to acquire sound intellectual criteria or standards to use in the assessment of their own thinking and the thinking of others?**

(a) of little or small importance
(b) of secondary importance
(c) of primary importance

(8) **In your view, how important is it for students to learn how to assess their own work?**

(a) of little or small importance
(b) of secondary importance
(c) of primary importance

(9) **Do you feel that students generally come to your classes with well developed intellectual standards or criteria to use in assessing thinking?**

(If an interviewee asks what we mean by "intellectual standards" the common answer should be: *"By intellectual standards we mean general criteria that one uses to decide what to accept as true or false, reasonable or unreasonable."* You could also say, *"Well, a concern for accuracy is an intellectual criterion or standard essential to science. That is the sort of thing we have in mind, general intellectual criteria that a thinker might use to assess what people assert or claim.")*

(a) In general yes or
(b) in general no

(10) **Which of the following four descriptions best represents your assessment of the degree to which your department's graduates develop the ability to think critically as a result of their course work?**

(If they say "Some students are good and some are poor ", then ask, *"How would rate the typical graduate from your department?"*)

(a) little or no development of critical thinking ability
(b) a low level of the development of critical thinking ability
(c) a good level of development of critical thinking ability
(d) a high level of development of critical thinking ability

(11) Which of the following four descriptions best represents your assessment of the degree to which your department's graduates develop the knowledge and ability to foster critical thinking in their future students?

(If you are asked for a further explanation of the difference between this and the previous question, say *"An individual might be a good critical thinker in their own affairs but not particularly knowledgeable about or skillful in teaching others to think critically."*

(If they say "Some students are good and some are poor ", then ask,*"How would rate the typical graduate from your department?"*)

(a) little or no development of such knowledge and ability
(b) a low level of the development of such knowledge and ability
(c) a good level of development of such knowledge and ability
(d) a high level of development of such knowledge and ability

Beginning of Open-Ended Questions Tape Counter Number: _____

(12) Would you explain to me your concept of critical thinking? Perhaps you could begin by completing the following sentence: "To me, critical thinking is_____"

Follow-up:
- *Could you elaborate further on your conception?*
- *Could you give me an example of your use of critical thinking outside the classroom that illustrates your concept of it? (e.g., as a consumer, as a parent, as a citizen, or in a personal relationship)*
- *In your answer you've mentioned processes such as analysis, synthesis, evaluation, and application. What intellectual standards would you use to distinguish whether or not these processes are being done critically vs. un-critically?*
- *Does your conception of critical thinking involve any traits of mind?*
- *An example of a trait that some might identify is open-mindedness.*

If you do prime by mentioning this trait and value, and you receive an affirmative answer, ask for an elaboration *"How do you teach for this trait in the classroom?"*, to determine whether the traits or values mentioned have actually been thought-through or are simply being rhetorically expressed. (Remember, you are looking here to determine the extent to which an interviewee has developed a clear, elaborated, and substantive conception of critical thinking.)

(13) Is there anything you do on a daily basis in the classroom that you believe fosters critical thinking?

Follow-up Questions:
- *Do you have any other structures that you find particularly effective in teaching your students to think critically about your subject?*
- *How do you emphasize critical thinking within that structure?*

(14) Some faculty feel they have too much content to cover to have much time left for fostering critical thinking. What is your view of this position?

Follow-up Questions:
- *Do you teach or have you taught any courses that require a great deal of coverage, and if so, how do you foster critical thinking in those courses?*
- *Could you please give me an example from the design of your classes?*

(Remember, here we are seeking to see if the interviewee understands how critical thinking can be used as a tool for the deeper understanding of content rather than to see the learning of critical thinking as a distraction from the learning of content/ In other words, a reconciliation occurs when a faculty member discovers that students truly learn content best when they think that content through critically).

(15) What particular critical thinking skills do you believe are most important for your students to develop?

If they hesitate for 5-10 seconds, say *"Is the question clear or do you want some clarification?"*

Follow-up Questions:
- *In your answer you've mentioned processes such as analysis, synthesis, evaluation, and application. What intellectual standards would you use to distinguish whether or not these processes are being done critically vs. un-critically?*
- *Could you give me an example of how you teach critical thinking skills in the classroom?*
- *Could you give me an example of the use of one of those skills in some everyday context, outside of the classroom? (e.g., as a consumer, as a parent, citizen, in a personal relationship)*

If the interviewee asks what you mean by a particular or specific critical thinking skill, answer *"Well, some would identify the ability to assess information for its relevance to an issue* or *the ability to clarify an issue or problem as important component critical thinking skills." "In your view which are the most important component critical thinking skills?"* (Remember that we are seeking to determine here whether the interviewee has thought through distinguishable component critical thinking skills and can explain what those skills constitute).

(16) If you had the task of assessing the extent to which some faculty member was or was not emphasizing or fostering critical thinking through his or her instruction, how would you go about making that assessment?

Follow-up Questions:
- *Could you elaborate further?*
- *Could you give me an example of how you would go about conducting this assessment?*
- *In your answer you've mentioned processes such as analysis, synthesis, evaluation, and application. What intellectual standards would you use to distinguish whether or not these processes are being done critically vs. un-critically?*

Prime if necessary by asking *"For example, would you use classroom visitation? What exactly would you be looking for if you did visit a class?"* If they say, "I would look at their tests and questions," then ask *"What criteria would you use to evaluate your colleagues tests and test questions?"* If they say, "I would look to see if their encouraging students to use their own thinking and ideas," then say *"How would you assess the quality of the students thinking and ideas?"* (Remember, you are looking here to

determine the extent to which a faculty has developed a clear, elaborated, and substantive conception of how to assess another faculty member to determine the extent to which that faculty member was or was not fostering critical thinking in his/her students.)

(17) What is your personal conception of intellectual criteria or standards?

Is the question clear to you? I can give you further clarification if you want.

Follow up Questions:

- *"What qualities do you look for in your students reasoning that tell you whether or not they are reasoning well or poorly?" For example, if you emphasize the importance of being accurate in their thinking, then "accuracy" is a general criteria or standard you value.*
- *In your answer you've mentioned processes such as analysis, synthesis, evaluation, and application. What intellectual standards would you use to distinguish whether or not these processes are being done critically vs. un-critically?*
- *If a student said to you, "what criteria should I use in deciding when to accept or reject some editorial or some position that someone defends?" what advice would you give them?*
- *What intellectual standards do you use to evaluate students' reasoning?*
- *Could you name some and elaborate on them?*

Here is another example to illustrate what we mean by "intellectual standards":
A study was conducted in which elementary students were asked, "There are 26 sheep and 10 goats on a ship. How old is the captain?" 76 of the 97 students "solved" the problem by adding, subtracting, multiplying or dividing. This example illustrates the intellectual standard of relevance. That is, the students did not recognize that the information they were given was not relevant to the question that they were asked.

(If an interviewee asks what we mean by "intellectual standards" the common answer should be: *"By intellectual standards we mean general criteria that one uses to decide what to accept as true or false, reasonable or unreasonable."* You could also say, *"Well, a concern for accuracy is an intellectual criterion or standard essential to science. That is the sort of thing we have in mind, general intellectual criteria that a thinker might use to assess what people assert or claim."*

Last Two Questions To be Used as a Cross-check to Assess Faculty Knowledge of Critical Thinking Concepts

Read the following to interviewees: *"To conclude the interview I have two final questions to help us assess the extent to which there are agreed-upon uses of some terminology frequently found in articles and books on critical thinking. The terms 'inference,' 'implication,' and 'assumption', have been selected as the focal point. Please answer these questions based on your use of these terms."*

(18) How would you explain the difference between an assumption and an inference?

(19) How would you explain the difference between an inference and an implication?

Coding Sheet for Open-Ended Questions

Interviewee _____ Time_____ Date_____

Coder _____ Tape number _____

(12) Concept of Critical Thinking

- Some **vagueness** in answer o
- Some **misconception** in answer o
- **Wanders** from question o
- **Contradiction** in answer (or in relation to another answer) o

(a) **little** or **no** conception
(b) **limited** conception
(c) **elaborated** conception

_____

_____

_____

_____

_____

_____

_____

(13) Description of typical day in class that fosters critical thinking

- Some **vagueness** in answer o
- Some **misconception** in answer o
- **Wanders** from questio o
- **Contradiction** in answer (or in relation to another answer) o

(a) **little** or **no** conception
(b) **limited** conception
(c) **elaborated** conception

_____

_____

_____

_____

(14) Reconciling Covering Content with Fostering Critical Thinking

- Some **vagueness** in answer o
- Some **misconception** in answer o
- **Wanders** from question o
- **Contradiction** in answer (or in relation to another answer) o

(a) **little** or **no** conception
(b) **limited** conception
(c) **elaborated** conception

---

(15) Critical thinking skills that are most important for your students to develop

- Some **vagueness** in answer o
- Some **misconception** in answer o
- **Wanders** from question o
- **Contradiction** in answer (or in relation to another answer) o

(a) **little** or **no** conception
(b) **limited** conception
(c) **elaborated** conception

---

(16) How one would assess the extent to which a faculty member was/was not fostering critical thinking?

- Some **vagueness** in answer o
- Some **misconception** in answer o
- **Wanders** from question o
- **Contradiction** in answer (or in relation to another answer) o

(a) **little** or **no** conception
(b) **limited** conception
(c) **elaborated** conception

---

(17) **Your personal conception of intellectual standards.**

- Some **vagueness** in answer o
- Some **misconception** in answer o
- **Wanders** from question o
- **Contradiction** in answer (or in relation to another answer) o

(a) **little** or **no** conception
(b) **limited** conception
(c) **elaborated** conception

(18) **Difference between assumption and inference**

- Some **vagueness** in answer o
- Some **misconception** in answer o
- **Wanders** from question o
- **Contradiction** in answer (or in relation to another answer) o

(a) **little** or **no** conception
(b) **limited** conception
(c) **elaborated** conception

(19) **Difference between inference and implication**

- Some **vagueness** in answer o
- Some **misconception** in answer o
- **Wanders** from question o
- **Contradiction** in answer (or in relation to another answer) o

(a) **little** or **no** conception
(b) **limited** conception
(c) **elaborated** conception

The interviewee did/did not mention the following:

(1) **basic skills of thought**....such as clarifying the question; gathering relevant data

or information; formulating or reasoning to logical or valid conclusions, interpretations, or solutions; identifying key assumptions, tracing significant implications, entering accurately into alternative viewpoints...

not at all minimal or vague allusion mentioned elaborated

Comment_____

(2) **important intellectual traits of mind**....such as intellectual humility, intellectual perseverance, intellectual responsibility, intellectual integrity, and fairmindedness...

not at all minimal or vague allusion mentioned elaborated

Comment_____

(3) teaching to facilitate **reasoning within the subject**...teaching for historical thinking, sociological thinking, mathematical thinking, biological thinking, scientific thinking, philosophical thinking....

not at all minimal or vague allusion mentioned elaborated

Comment_____

(4) **an emphasis on problem solving**

not at all minimal or vague allusion mentioned elaborated

Comment_____

(5) **the special need for critical thinking today** in virtue of such phenomena as accelerating change, intensifying complexity, and increasing interdependence (or analogous phenomena)

not at all minimal or vague allusion mentioned elaborated

Comment_____

_____

(6) **the need for a greater emphasis on peer and student self-assessment**

not at all minimal or vague allusion mentioned elaborated

Comment_____

_____

STATE OF CALIFORNIA PETE WILSON, *Governor*

COMMISSION ON TEACHER CREDENTIALING
1812 Ninth Street
Sacramento, California 95814-7000
(916) 445-0148
FAX (916) 327-3166

OFFICE OF THE EXECUTIVE DIRECTOR

TO: Deans of Schools of Education
Deans of Colleges of Arts and Sciences

FROM: Ruben L. Ingram, Ed.D.
Executive Director

DATE: January 24, 1996

SUBJECT: Study Examining the Preparation of Teachers for Critical Thinking

The Commission on Teacher Credentialing is engaged in a comprehensive review of teaching credential requirements. An important part of that review includes an assessment of the extent to which teacher preparation programs prepare candidates for teaching credentials to teach critical thinking and problem solving skills in elementary and secondary schools.

We have collected extensive data on present teaching practices in teacher preparation programs with respect to critical thinking and problem solving. A provisional review of data collected documents the fact that the overwhelming majority of those teaching teacher preparation courses cite critical thinking as a primary objective of their instruction.

We are now looking for models of exemplary practice to highlight in our report to the Commission. Among our models we would like examples of program design, course design (including model syllabi), assessment of teaching for critical thinking, and teaching strategies (including model assignments, tests, and assessment tools, including those which facilitate student self-assessment using criteria for sound critical thinking).

We are writing to ask you to facilitate awareness of this solicitation among all faculty engaged in teaching teacher candidates. We should like to have the benefit of the best educational practices and we shall achieve this goal only if the faculty and key administrators are aware of our solicitation and are motivated to provide us with proposed models.

Would you be so kind as to distribute copies of this memo, along with enclosed criteria, to all chairs along with a communication of your own to ensure that this request will become a significant agenda item at all faculty meetings and that all reasonable efforts will be made by chairs to inform the faculty and motivate them to respond? We appreciate your willingness to help contribute to this important study which we believe will become a focal point of significant policy discussions during the coming year.

If you have any questions concerning the scope or purpose of this request, please feel free to contact Dr. Ted Bartell of our staff (916-322-6254) who is coordinating the study on behalf of the Commission. By agreement with the Center For Critical Thinking, the authors of all models accepted will be invited to present their design at special sessions of the 16th International Conference on Critical Thinking at Sonoma State University.

We would appreciate receiving responses to this solicitation by March 1 so as to allow time for possible follow-up contacts with individual faculty who submit materials.

Criteria For Exemplary Practices

Teaching For Critical Thinking

The purpose of these criteria is to provide initial clarification of the concept of critical thinking that underlies the Commission on Teacher Credentialing's solicitation of exemplary practices in teaching for critical thinking and problem solving at the postsecondary level. With these criteria in hand, it is hoped that faculty will be better able to assess possible models for submission.

The criteria, it should be noted, are intended to be suggestive rather than exhaustive and we strongly recommend that all readers err on the side of inclusiveness by submitting any and all models which they feel warrant consideration as candidates for exemplary practice in teaching for critical thinking and problem solving. We do not expect that any one instance of exemplary practice will address all of the criteria we specify, but every instance should meet at least one of the criteria in a demonstrable fashion.

What is Critical Thinking?

Though there are many candidate "definitions" of critical thinking in the literature, there are some common threads of emphasis that run through most of those definitions, among them the following:

(1) that critical thinking enables thinkers proficient in it to better produce and assess intellectual work as well as to act more "reasonably" and "effectively" in the world of affairs and personal life;

(2) that the possibility of assessing intellectual work and action in the world requires intellectual standards essential to sound reasoning and personal and professional judgment;

(3) that self-assessment is an integral dimension of such reasoning and judgment;

(4) that as one learns to think critically one is better able to master content in diverse disciplines;

(5) that critical thinking is essential to and made manifest in all academic disciplines, including sound reasoning and expert performance in such diverse fields as biology, chemistry, mathematics, sociology, history, anthropology, literature, philosophy, as well as in all of the arts and professions;

(6) that as one becomes proficient in critical thinking one becomes more proficient in using and assessing goals and purposes, questions and problems, information and data, conclusions and interpretations, concepts and theoretical constructs, assumptions and presuppositions, implications and consequences, and points of view and frames of reference;

(7) that mastery of language contributes to critical thinking;

(8) that as one becomes more proficient in critical thinking one improves one's capacity to think more clearly, more accurately, more precisely, more relevantly, more deeply, more broadly, and more logically;

(9) that as one becomes more proficient in critical thinking one becomes more intellectually perseverant, more intellectually responsible, more intellectually disciplined, more intellectually humble, more intellectually empathic, and more intellectually productive;

(10) that as one becomes more proficient in critical thinking one becomes a better reader, writer, speaker, and listener;

(11) that proficiency in critical thinking is integral to lifelong learning and the capacity to deal effectively with a world of accelerating change.

What is the relationship between critical thinking and problem solving?

We understand critical thinking and problem solving to be related in the following ways:

(1) that problem solving requires critical thinking (it would make no sense to be an "uncritical" problem solver nor to think that uncritical thinking is effective in the solution of problems);

(2) well-conceived critical thinking invariably contributes to the solution of problems (it would make little sense to say, "I need to think critically, but I have no problems that I need to solve");

(3) that all of the eleven points made above with respect to critical thinking can be made with minor adjustments for problem solving, and hence

(4) that problem solving is a major use of critical thinking and critical thinking a major tool in problem solving (and therefore that the two are best treated in conjunction rather than in disjunction).

Criteria For Proposed Models

As described previously, we seek models of exemplary practices in preparing candidates for teaching credentials to think critically themselves and to teach critical thinking and problem solving skills to elementary and secondary students.

Given the characterizations above, it is clear that exemplary practices in program design, course design (including model syllabi), assessment of teaching for critical thinking, and teaching strategies (including model assignments, tests, and assessment tools, including those which facilitate student self-assessment using criteria for sound critical thinking) should have features that make plausible the cultivation of critical thinking and problem solving in the senses above. In reviewing proposed models, therefore, we will seek to determine whether the model meets at least one of the following criteria:

(1) help students to better produce and assess intellectual work as well as act more "reasonably" and "effectively" in the world of affairs and personal life;

(2) help students assess their work and action using intellectual standards essential to sound reasoning and personal and professional judgment;

(3) foster self-assessment in their reasoning and exercise of judgment;

(4) help students master content more proficiently in diverse disciplines and settings;

(5) help students exercise more skilled and proficient reasoning and problem solving in a diversity of fields;

(6) help students to become more proficient in using and assessing goals and purposes, questions and problems, information and data, conclusions and interpretations, concepts and theoretical constructs, assumptions and presuppositions, implications and consequences, and points of view and frames of reference (in the posing and solving of problems, as well as in the asking and answering of questions and the resolving of issues);

(7) help students to achieve higher levels in the mastery of language and communication;

(8) help students think more clearly, more accurately, more precisely, more relevantly, more deeply, more broadly, and more logically;

(9) help students become more intellectually perseverant, more intellectually responsible, more intellectually disciplined, more intellectually humble, more intellectually empathic, and more intellectually productive;

(10) help students become better readers, writers, speakers, and listeners;

(11) help students to become lifelong learners with more of the capacity to deal effectively with a world of accelerating change.

To help us review models sent in, we would like each submission to include a commentary section that wherever possible highlights or explains how the model helps students attain the specific skills identified in these criteria.

Please forward your response by March 1 to:

Dr. Ted Bartell
Commission on Teacher Credentialing
1812 Ninth Street
Sacramento, CA 95814
(916-322-6254)

Appendix B

Sample Strong and Weak Responses to Open-Ended Questions

To demonstrate the range of responses to the open-ended questions in the interviews, sample strong and weak responses are documented herein. Within the strong category, a broad range of perspectives can be found with some answers being more elaborate than others. All are marked with a reasonable degree of clarity. Common to all in the strong category, furthermore, is a core understanding of some dimension of critical thinking, as well as documentation of what appear to be commendable attempts to engage students in critical thinking in the classroom.

In contrast, the weak statements tend to be vague. Moreover, very often, initially vague responses are never clarified, but followed by other vague statements. In some cases, there may be insights behind the remarks but it is not possible to determine what those insights might be from what is said. In addition to repetitive problems related to vagueness and lack of clarity, many general misunderstandings with respect to critical thinking prevail among weak responses.

Among the most significant problems found in the weak responses is the common confusion of critical thinking with the "higher levels of Bloom's Taxonomy." The confusion comes in the failure to recognize that analysis, synthesis, and evaluation do not name "abilities." They name mental processes that can be used well or poorly. Both poor reasoners and good reasoners analyze, synthesize, and evaluate. Good reasoners do so clearly, accurately, relevantly, logically, etc. Poor reasoners do so unclearly, inaccurately, irrelevantly, illogically.

The weak statements reveal a lack of understanding of what critical thinking skills entail, and the role that intellectual standards play in high ability reasoning. It was common to find, for example, a lack of explicit understanding of any critical thinking skills per se, and a lack of understanding of how to teach students to assess their thinking using intellectual standards. Instead, weak statements often revealed that faculty believe they can effectively teach critical thinking implicitly, without understanding what critical thinking skills and intellectual standards are.

Furthermore, there is common confusion between the role of "active construction" of meaning by students and critical thinking. While it is important for students to be actively engaged in thinking through content, the *manner in* which they do so is the main consideration, not the mere fact that they are "active" in the classroom. Students continually and automatically construct meanings in their lives, including many that are inaccurate, distorted, prejudiced, and self-interested. To be adept at constructing high quality meaning, they must have the critical thinking tools which enable them to accurately assess situations and experiences. Otherwise they may be actively engaged in learning nonsense, half-truths, etc.

For further elaboration on the problems inherent in the weak answers, see the commentary in parentheses following a number of the statements in the "weak" section.

(Q12) Concept of Critical Thinking

Relatively Clear Responses

(28) "Critical thinking is the ability to analyze arguments, make judgments of perspectives, use some kind of logic in making decisions and inferences, finding some solution to a problem and the kind of strategy appropriate to the problem, self-analysis, recognizing how you went about thinking through a problem."

(30) "Critical thinking is the practice of applying normal standards of logic, examining arguments...to consider the source of the article and biases...looking at the thesis ...to see if the conclusion follows from the argument."

(92) "Critical thinking involves being able to reach sensible conclusions on the basis of logic and evidence, ability to perceive contradictions, to be interested in them to attempt to resolve them....a person who thinks critically will attempt to get more information, assess the validity of information, assess the way the information was collected, to synthesize the information, to develop a sounder conclusion."

(101) "Critical thinking is the ability to react to statements, hypothesis...reflectively according to a broad and objective standard." "The ability to shift your frame of reference, a broadly educated person who can bring multiple viewpoints to bear on an issue."

(104) "Critical thinking is gathering evidence, evaluating evidence, evaluating the sources of evidence, defining and dissecting the argument or thesis of any given piece of writing for its logic. Identifying the point of view and question. Evaluating the strengths and weaknesses of an argument. Having students develop their own arguments. ...being aware of your value judgments, develop a willingness to look at evidence."

(115) "Critical thinking is when students are able to use sound logical reasoning to get from one place to a conclusion, from a starting place to a conclusion. They can follow logic and get there. They can tell if someone else has done the same thing. Follow all arguments to see how sound it is. Are the assumptions valid? Is the person using the conclusion as the assumption? Is there some logical leap that's not sound?"

(116) "Critical thinking is an ability to analyze information either straightforward or abstract and to draw conclusions from it, make assessments of it, and to render interpretations of it, that are accurate in truth terms or verifiable...."

(118) "Critical thinking is the "ability to assess data and come to some kind of conclusions about it that are meaningful—the ability to process information of any kind." "(But there) has to be a degree of sophistication in how you look at the data. Degree of skepticism, ability to use logic, ability to see its conclusion is reasonable, and fits reality."

(119) "Critical thinking is a process by which a person takes objective or outside information and evaluates it. I guess I am a proponent of the scientific method. That method seems more appropriate than an emotional or intuitive reaction to things. Objective scientific inquiry. Ability to analyze multiple sides of an argument and see which are the most credible given the data." "(using the) test of logic for evaluation....Does it follow a logical train of reasoning?"

(130) "Critical thinking is the development of powers of discernment based on previous knowledge, applying that knowledge to new situations. Understanding in the application of that knowledge, cause and effect relationships that are reasonable. To reach conclusions based on evidence, objectively weighing evidence."

(156) "Critical thinking is the ability to distinguish between ideas that sound true...the ability to look behind all ideas, see who supports it, why they might support it, what its implications might be, to go beyond what might be an immediate solution to the implications of solutions....the ability to weigh different factors to determine the appropriate response."

(4) "Critical thinking is the ability to reflect on one's own ideas and thoughts and on those of others to look at multiple consequences of implied actions, to look at a variety of views on any issue, then to be able to make judgments from them. Try to take other persons point of view, to see how they are seeing

my point of view, to see how they are seeing my point of view and to re-evaluate from a broader perspective."

(139) "Critical thinking is the ability to distinguish right from wrong; to discover the accuracy of facts; to see the relevance of facts to one's own personal life; to filter evidence in the making of conclusions."

(126) "To discuss fallacies in logic. To evaluate evidence for a particular idea. To examine a statement to see if it holds water...willing to abandon your prejudices and concepts in light of counter evidence."

(134) "A good critical thinker, in approaching information, has enough background information to attempt to digest that information. To consider that if the information is unfamiliar that it might still be valid. Has the skills to further explore the context of the information."

(Q12) Concept of Critical Thinking

Vague Responses

(12) "Critical thinking is skill development, processes—to teach an isolated skill, to teach a decision making process and reflection."

(20) "Critical thinking is the ability to take information (in any form) and from that make judgments and form opinions about the information or choose a course of action."
(Even uncritical thinkers take information and form opinions and choose courses of action.)

(13) "Critical thinking is different processes I want my students to use—analyzing, synthesizing, and evaluating—based on their knowledge level." *(Even very poor thinkers analyze, synthesize, and evaluate situations and experiences.)*

(27) "Critical thinking is problem solving. It is the higher levels of Bloom's taxonomy. Observing and making inferences....you must have command of these processes."

(29) "Critical thinking is enabling the individual to distinguish between idealistic and realistic situations and be able to use a thought process which enables them to make decisions which enable them to understand their environment...distinguish subjectivity and objectivity. If they do their own work, they get full credit." *(The last statement seems to imply that any work, however poor, is acceptable, that any standards are as good as any other standards students might use in their work. On the contrary, students must learn to apply intellectual standards to their work for it to be of high quality.)*

(78) "Critical thinking is my accumulated knowledge over the years (would determine whether I thought someone was doing good or poor reasoning)—I would compare them to that." *(Many people accumulate ideas or "knowledge" which cause them, and/or others significant problems. These problematic ideas then are used as the baseline to determine whether other ideas are valid.)*

(80) "Critical thinking is being able to look at a situation, describe that situation and then be able to make judgments, problem solve, the type of activity that needs to be applied to that situation."

(85) "To me, critical thinking is a series of skills one uses to evaluates ideas....to be able to synthesize, summarize, generalize, elaborate...." *(Uncritical thinkers--as well as critical thinkers--evaluate, synthesize, summarize, generalize--they simply do these poorly. Answers that reference the terms of Bloom's Taxonomy typically make little reference to intellectual standards.)*

(87) "People will construct things in different ways and they're not right or wrong." *(This seems to imply that any way that a person chooses to construct ideas or beliefs is perfectly valid. So, for*

example, if a person constructs the idea that it is OK to murder people, they would not be right or wrong.)

(94) "Critical thinking is discovering the power of your own questions and developing tools to pursue inquiry. Then coming to value your own learning process in pursuit of those goals of inquiry."

(99) "Critical thinking is being able to assemble and synthesize information, perhaps even in new and different ways." *(All human beings assemble and synthesize information, often in "new and different" ways. The question is: how well do they assemble and synthesize?)*

(106) "Critical thinking is a judgmental process in which the thinking begins and ends with several factors...not making quick judgments. Being able to assess materials and thoughts properly. To look at multiple intelligences and expand on them."

(112) "Critical thinking is the process of the scientific process. Today I'm thinking about experiments students were to design and present to class--come up with hypothesis, showing correlation--doesn't necessarily imply causation! I recognize there are other forms of critical thinking (besides scientific process) but I haven't given much thought to it." *(How will students learn to develop their abilities to reason well across the complex domains of their lives if professors haven't given much thought to how this is done, or if they strictly equate critical thinking with the scientific process?)*

(127) "I never thought about it explicitly."

(146) "Give the basics to students--and the students alone should be able to think critically....I don't have TV because if I did, it would do the critical thinking for me." *(This seems to imply that students can easily learn to thinking critically, given some "basics." It also seems to imply that, in general, the thinking that one sees on TV is critical thinking.)*

(8) "Critical thinking means to think analytically and be aware that everyone thinks for himself. All thinking is critical to some extent. Anyone who thinks intelligently....Reflectiveness." *(If all thinking can be classified as critical in nature, then how are students to differentiate between high quality and low quality thinking?)*

(31) "Critical thinking is levels of questioning...we make use of a higher level. I use Bloom's taxonomy so we try to move students from the lower levels. So we are not just asking questions that are leaving them at the lower levels of thinking, so that they use the higher levels in their work. Are you just using recall or are you using any higher levels?"
(Uncritical thinkers--as well as critical thinkers evaluate, synthesize, summarize, generalize--they simply do these poorly. Answers that reference the terms of Bloom's Taxonomy typically make little reference to intellectual standards.)

(81) "To me critical thinking is using mental processes including recall, application, synthesis.....As long as they are processing they are thinking critical thinking." *(See comment above)*

(90) "Critical thinking is higher levels of Bloom's taxonomy."

(Q13) Description of a Typical Day in a Class that Fosters Critical Thinking

Relatively Clear Responses

(30) "...(I expect students to) give logical arguments in support of their views...and use the Socratic method."

(116) "I create situations for conflict and controversy. To follow the line of debate, whether they are participating or not, they have to pay attention. I don't want their opinion, but their judgment--I draw a keen distinction. I always use open-ended questions--and ask them to render a judgment."

(148) "Yes, follow up student questions/observations. I follow-up with questions. Why do you think this? Where do you see that? What do you base that on? Can you give an example? What would be consequences? So what? Not to let anything go at face value...orally and in writing—I ask questions for them to answer when I grade their papers."

(115) "...students working in lab, I don't give them answers, I ask if they think it's right. If no one questions a student presentation, I try to get them to think about problems in it."

(129) "Problem-posing, analyze news, mass media, what we fear from communities, use the newspaper as a textbook. Analyzing an issue from multiple perspectives."

(130) "I teach ways of thinking, i.e. scientific method....I use examples or theories that relate to the course. Ask questions that force them to apply factual information in a critical manner."

(132) "Engage in discussion, and questions that cause students to examine the issue, give essay tests, ask them to explain their thinking."

(133) "Calling on students, holding them responsible, asking students to re-state another's viewpoint. Giving brief quizzes to keep others up on the reading."

(134) "Get students to consider a range of documented views, to reason with view"

(140) "I use the Socratic method, summarizing the previous days lesson."

(151) "Start with concept discussion...simple word that they know about, like 'publication' or 'justice.' Try to open up the word, then get into subject matter for the day. Something that is current."

(156) "Discussion—rhetorical questions...to present knowledge as something we ask questions about instead of something you memorize....I can't ensure I'm teaching for critical thinking. I play devil's advocate, introduce other perspectives....get other perspectives from students. I lecture, present passages from different perspectives."

(111) "Ask students to criticize what I've just said. Do you disagree or agree? Why?"

(Q13) Description of a Typical Day in Class that Fosters Critical Thinking

Responses That Are Vague, Unclear or Problematic

(99) "Cooperative learning--more and more having students teach students....Think pair share--present question to class--give 30 seconds to one minute to think about it, then in pairs share their thinking--exchange their thinking--may not be just biological factual matter." *(Of course, cooperative learning, in itself, is not critical thinking, because there is such a thing as cooperative mislearning).*

(147) "...discussion and open-ended questions, work in cooperative learning groups to come up with answers, discuss, debate, sometimes come up with group consensus."

(79) "Almost all. As long as it is not knowledge acquisition, it is critical thinking. Students analyze and draw their own conclusions." *(This seems to imply that any conclusion a student might draw is as good as any other conclusion, as long as it is their own conclusion. If this is true, how are students to differentiate between better and worse conclusions?)*

(78) "Never put forth my own opinion...to always value what they are saying. If their opinion is based on fact that's good. I don't want them to spout off at the mouth." *(The first part of this seems to imply that anything a student says is to be valued, even if it is not well-founded. The second part seems to contradict the first point.)*

(31) "I call attention to levels of questions. Help students move the students up the ladder of Bloom's taxonomy."

(106) "Exploring different cultural views. How different cultures see themselves. Cooperative learning." *(This seems to imply that considering different cultural views in and of itself constitutes critical thinking. However, students must learn to think critically about cultural practices, to determine whether those practices are ultimately justifiable. For example, cultural practices in one society may lead them to dehumanize people of other cultures).*

(120) "Be familiar with chapters 1-5 in reading. I hope what I provide in class and questions I ask, analogies I draw involves them in thinking. I show connection between history and today."

(125) "Well, I don't know. I try to think critically about a lot of things. Ask questions to keep the ball rolling. Questions that have a suggested track, that ask for a logical progression."

(125) "Investigation; form hypothesis, do experiments. Allow students to develop their own ideas."

(128) "I encourage reflection; reflect on my lesson plans as well."

(131) "Everything I teach. Writing papers, correcting papers, correcting grammar, demand that every paper contains an argument." *(How do students learn to develop good arguments or arguments that are justifiable?)*

(136) "I do thousands of things. The question is, will students pick up on them? There's no substitute for being intelligent and interesting. If you have both critical thinking will just be there for you. You don't have to worry about it." *(This seems to imply that the role of the teacher is to be intelligent and interesting, and that the job of students is to emulate the thinking of teachers, to "pick up" the thinking habits of teacher. However, how many students have the intellectual discipline to do this? And what happens if instructors have prejudices or are mis-informed?)*

(137) "A problem is posed that relates to the concept being discussed. The problem tends to be open-ended." *(This doesn't tell us what the students are expected to do with these open-ended questions.)*

(Q14) Reconciling Covering Content with Fostering Critical Thinking

The Beginnings of Reconciliation

(5) "When I let go of coverage and focus on real reading, writing and problem solving that really matters to kids, coverage (real understanding) goes up."

(8) "A teacher who complains that he or she has too much content to cover is not an independent scholar and is not judging what is significant to teach. You start with where the student is. And how effective you can be in helping the students move from there."

(9) "If you try to cover all the content, then you are covering it up. Take a little and do it well."

(10) "I think that's ridiculous. Covering content is a trap that teachers at all levels fall into. Better to cover less well, I focus on the big ideas, keep them few, and go over them in multiple ways."

(14) "Depth should not be sacrificed to coverage. Coverage alone has almost no value. But being able to figure something out lasts your whole life."

(26) "...pretty silly for professor to 'cover' material...I let them know how much information is there. They need skills to approach and acquire the information pertinent to them....to evaluate variation in material, along with teaching key concepts—that knowledge base is always changing...have students e-mail their journal entries to me. Want students to start information a mode of thinking."

(27) "A ludicrous comment! They should learn to uncover the content. If you develop the ability to learn. That's the key. Otherwise it becomes a rhetoric of conclusions. Focus on the concepts that are most important and generalizations they can use. Produce people who can think."

(101) "You should always have room to ask people to make sense of what they are studying. Think deeply about a few major issues rather than rush through material quickly....Not everything that has to be learned has to be taught."

(104) "Content without critical thinking is empty content....That's nonsense! Content without the ability to evaluate it is content that will mastered only for the length of the course. You must organize content so it is presented logically, at a variety of levels."

(105) "That's a fairly myopic view of teaching—example of teaching them to fish rather than giving them fish...I would much rather not provide a cook book approach....Teach them to solve problems—especially in college courses...model thinking process they can use in own practice....Teach them to develop strategies for finding answers."

(140) "It's important to do two things: 1) how to use sources to get information. 2) How to critically assess that information. There are certain basic things they need to know, but its more important that students know how to find answers for themselves."

(143) "Critical thinking is the foundation of learning, not a separate entity. It's integral. It's the basis of developing your work."

(148) "It's a false dichotomy. Even if it were true, you have to sacrifice coverage because students won't remember what you teach."

(7) "The more you teach, the less kids learn. The less you teach, the more kids learn. If you teach too much, the kids get further behind."

(75) "You have to have content, otherwise nothing to think about. It would be like teaching someone to cook without ingredients."

(122) "We've always tried to teach too much. I believe very strongly that you take fewer situations and examine them thoroughly."

(131) "The two are inseparable. How can you think if you have nothing to think about? I see no contradiction. The only way to get them thinking is to give them complex content and ideas to think about."

(144) "I think that's true, but critical thinking can be taught through the content also. You can demand critical thinking even if you have a lot of content to cover."

(145) "One of my colleagues has said 'the longer I teach, the less I teach'....Critical thinking must be a part of entire curriculum."

(Q14) Reconciling Covering Content with Fostering Critical Thinking

The Problematics of Reconciliation

(23) "That is a very serious issue. We must guard against a serious decrease of content. Therefore, there should be significant lecture to make sure the content is understood." *(This seems to imply that when faculty provide "significant lecture," students necessarily understand the content contained in that lecture.)*

(99) "Unquestionably true for me. That's part of the function of the quarter system. I feel I am content riddled with almost every course I teach. Content driven courses...huge body of information...that seems to be my priority. I try to establish outlying connections to other areas. My exams test students on their ability to put information together but I don't know quite how to teach that." *(This seems to imply that students are being tested on their ability to "put information together," but they are not taught how to do this. How are they expected to learn this skill? Furthermore, how can it be fair to test students on abilities they are not taught?)*

(111) "That's true."

(112) "I agree that it's a problem—I try to figure out how to cover less."

(121) "I think that's fairly true. There isn't a great deal of time for reflection and critical thinking." *(This seems to imply that content can effectively be taught without reflection on the part of students, and without their thinking it through in a critical manner.)*

(123) "It's silly to give out information without having people analyze it a little bit. You have to strike a balance." *(This implies that all students need to do in order to learn the content is to analyze it "a little bit." How are students taught to analyze the content?)*

(126) "I think there's too much content just by the nature of knowledge." *(It is unclear what is meant by this statement. Does this mean that since there is an unlimited amount of knowledge in the world that faculty must cover a large amount of content in the classroom?)*

(138) "I would agree. I feel bound by the content, almost a slave to the textbook. There are times I've felt I've needed to cover the entire textbook. I am trying to free myself from the didactic approach." *(There are traditionally very large numbers of concepts in textbooks {sometimes as many as 500 or more}. If instructors are attempting to "cover" the entire textbook, how can students be expected to learn such a large number of concepts in a meaningful and useful way?)*

(139) "The time I have I use to teach history and not critical thinking." *(This seems to imply that history can effectively be taught without faculty requiring students to reason through, or think through in a critical manner, significant historical issues.)*

(142) "It varies from discipline to discipline. Some classes are so content-bound it's difficult to find time for critical processing, such as writing essays."

(Q15) Critical Thinking Skills that are Most Important for Your Students to Develop

The Beginnings of Clear Plausible Answers

(30) "...be able to form reasonable hypotheses and recognize them, to present reasonable or logical support, to recognize faulty arguments, to come up with reasonable conclusions based on evidence."

(92) "...ability to seek and evaluate evidence and to use logic to reach defensible conclusions...to evaluation positions of their own and others....I want them to approach teaching as an intellectual task as opposed to a technical one."

(100) "...the ability to self-analyze, critically analyze strategies for strengths and weaknesses, separate your emotional responses from the facts, to weigh arguments on both sides, to see the position of the company."

(101) "scholarship—to gather and assess information, the ability to develop a tolerance for ambiguity, to see things in various perspectives, what are the potential implications and applications."

(28) "...using metacognition to self-assess, drawing inferences, formulating hypotheses, figuring out which aspects of data that is most relevant."

(97) "...being open-minded, objective and have a reference point foundation to base their ideas on....being able to verbalize and not get emotionally involved."

(104) "Evaluate information sources....Build a logical argument. Weigh strengths and weaknesses of an argument."

(107) "Problem-framing, organizing information. Understand the problem, then pursue a broad range of methods to be critical in every respect of what you do. When you analyze and interpret—assume you are probably doing something wrong."

(109) "...not accepting things at face value. To look at incoming information from a number of perspectives. To connect incoming information with previous knowledge; generate alternative ideas or solutions; willingness to suspend judgment."

(146)"...challenge assumptions...to think anew."

87) "Living in an age where you not only need to make interpretations of the physical world but of the technological world...equipment has to be replaced every year...knowledge is capital in today's society...everyone needs to be able to evaluate information you are receiving ...develop criteria for making good judgments."

(133) "To be engaged. To weigh evidence, material. To be demanding. To be more responsible. Look at whether or not the conclusions are logical."

(134) How to gather information; how to sit with pros and cons; how to reason; how to move beyond a knee-jerk response; and how to come to a reasoned conclusion."

(135) "The ability to read and evaluate; to build and argument; to recognize a position and gather evidence to support that position."

(136) "Reading critically is the most important skill."

(5) "Reflective approach to their own learning. Why am I doing this? Does it matter? Is it purposeful? Is it relevant? Is it meaningful? Our own reflection and action....What are our assumptions? Where do they come from? Then look at synthesis of longitudinal research. Then in light of that—then why aren't we doing it in our own communities."

(Q15) Critical Thinking Skills that are Most Important for Your Students to Develop

Unclear or Implausible Answers

(129) "The ability to see that any issue has multiple perspectives, that it depends on our cultural differences and socializing process. Having the perspective of cultural relativism. Creativity and divergent thinking, moving outside our own paradigm." *(This implies that there are not questions and problems that have one correct answer and that all points of view of any culture, regardless of the quality of the socialization process, are equally valid. How, then, are students to determine what practices could be considered justifiable in any culture?)*

(14) "...to analyze, predict, compare, observe, etc...all those listed by Bloom...all the science processes."

(15) "You're asking me to decontextualize. Be able to clarify or evaluate something (Bloom) based on how much information they are willing to get." *(The first part of this statement seems to imply that to name any particular critical thinking skill cannot be done except within a context. If this is true, then there are no critical thinking skills that are generalizable across disciplines or domains.)*

(27) "Being able to analyze—being able to infer." *(All humans have the ability to analyze and to infer. Human beings do so continually. The question is: What is the quality of such analysis and inference making?)*

(81)"The ability to analyze, synthesize, and evaluate information." *(Poor reasoners do all of these.)*

(83) "...Analysis, inference, defining terms...examining ideas, comparing/contrasting...." *(What intellectual standards are students using in doing these things?)*

(7) "To use their total brain....Most use the right hemisphere (concrete)...relate things to their experiences—to move them to left hemisphere (abstract)."

(8) "I can't answer this. I can't identify skills." *(If faculty are unable to identify any critical thinking skills, how are they to teach students such skills?)*

(10) "I don't think in terms of critical thinking skills. To think critically is to be a competent observer of events and to have a disposition to ask questions about them, classify and find patterns...."

(11) "I'm not sure what skills are involved. How they organize their thoughts, how they communicate them."

(15) "Analysis, creativity and evaluation."

(17) "I don't think you can isolate—because it's a process—you have an incomplete thing if you leave something out." *(If critical thinking skills cannot be isolated, how are students to learn the "process" of critical thinking? What does this process entail?)*

(18) "I don't know the study of critical thinking intellectually, so I'm not sure how to explain it....trying to get them to look at things in a broader way."

(21) "..early intervention competencies...observation (of very young children)...appropriate assessments and interventions...individualized instruction."

(118) "That would be hard to say....learning cause/effect, relationships, to learn if they are related."

(120) "They are thinking critically in everything they do." *(If students are thinking critically in everything they do, why are they, in general, intellectually undisciplined? Why do they frequently make mistakes in thinking, mistakes which often carry with them long term negative consequences?)*

(21) "Analysis of material, critical thinking, interpreting the text, thinking of consequences and making a judgment based on information." *(Whenever students interpret the text, think of consequences, and make judgments, they do so either well or poorly. The fact that they are doing these things does not necessarily imply that they are thinking critically.)*

(3) "By allowing students to voice their opinion....their satisfaction is what determines the quality of the work. If they are satisfied, then they would get an A." *(This seems to imply that any "opinion" students give, and any work that they are satisfied with is acceptable, and even merits the grade of "A." How, then are students to learn to differentiate between high quality and low quality "opinions" and work?)*

(9) "Teaching of critical thinking skills is not a priority. When it happens, it is a byproduct. Critical thinking skill stuff seems to be fashionable right not. I'm not sure I have taken it that seriously.... When one tries to prescribe thinking and thinking skills I'm kind of bewildered by that. Is everyone supposed to come up with the same answer? I'm a bit puzzled and waiting for the shakeout of the critical thinking frenzy before I am willing to commit the energy and set it as a high priority in my class." *(How are students to think through the content of the course work, if not critically?)*

(06) "I think in terms of multiple intelligences. I wish I had a list of skills in front of me because right now I am blank. Assess and see the relevance on things. A solid knowledge base."

(10) "Being reflective about what and how they've learned."

(11) "I don't know. Question your own beliefs. Do students present a contrary view?"

(26) "I wish I knew what some critical thinking skills were. Can you tell me some?"

(31) "It seem to me that all thinking is critical thinking, which is why I am having trouble with these questions." *(If all thinking is critical thinking, then how are students to differentiate between high quality and low quality reasoning?)*

(50) "I don't know what an intellectual standard would be." *(If faculty members do not know what intellectual standards are, how are students to learn such standards?)*

(Q16) How One Would Assess the Extent to Which a Faculty Member Was/Was Not Fostering Critical Thinking

The Beginnings of Clear and Plausible Answers

(5)"Does it ask students to make judgments, to take positions, defend those positions on basis of data, objective experiences of others, ask students to consider other viewpoints once they arrive at own—then defend their positions against those?"

(29) "Classroom visits, analyze their curriculum, discuss their syllabi. Is a macro-approach to issues encouraged? Is dialogue going on? What feedback is given to the students? Is the instructor asking questions that encourage analysis or recall?"

(137) "Are the assignments multiple-choice? Or does the teacher provide opportunities for application to their personal life? What amount of questioning are students doing? Do students ask for examples, clarification, contrast outcomes or only ask for definitions?"

(18) "If they use straight lecture, then no critical thinking, but if they use collaborative or reciprocal, then better chance for critical thinking."

(130) "Classroom visits, look for questions that pose new problems or requires them to analyze data. Look for performance of students on standardized critical thinking tests."

(131) "Is writing being assigned? Are they giving multiple choice tests or tests that require thought and the ability to construct an argument? Are open-ended questions asked? Are students asked to respond to objections?"

(141) "What kinds of exam questions? Formula-plugging questions vs. reasoning questions? Does the teacher ask the students to solve un-defined problems?"

(143) "The presentation of alternatives, alternative viewpoints, teaching methods, etc. Without this you aren't teaching critical thinking."

(Q16) How One would Assess the Extent to which a Faculty Member Was/Was Not Fostering Critical Thinking

Unclear or Implausible Answers

(25) "I'd observe to see if I felt stimulated. I would interview the students and get their perspectives and their understanding of the material....I really don't know....Are they really engaged in the material? Are they really considering objections? Just argument or just agreement is not enough to prove critical thinking."

(105) "...by looking at whether students could perform whatever it is a professor is trying to teach them." *(This seems to imply that whatever the professor is trying to teach would count as critical thinking.)*

(116) "I don't know anyone who has agreed on this." "I haven't seen methods whereby we can assess students' critical thinking ability. One reason is because the disciplines are so disparate, because critical thinking is manifested differently. It's tough to do." *(This seems to imply that there are no generalizable critical thinking skills that are applicable across all disciplines.)*

(10) "Critical thinking is built into an active learning model. How are we supporting students in becoming active, autonomous learners. Active participation, reflection on personal experience and the ability to make connections between their own views and others. Lively dialogue." *(Active learning may be compatible with students actively sharing prejudices or confirming false beliefs and self-deception.)*

(15) "I look at all the methodology and let students decide what they value from their own perspectives."

(16) "Was the student's own thinking stimulated?" *(The stimulation of student thinking is a necessary but not sufficient condition for teaching critical thinking).*

(17) "Reflection, metacognition, categorizing, prioritizing, rethinking, looking for multiple solutions, validating others thoughts, make allowances and still come to outcome that everyone agrees upon." *(It is unclear whether intellectual standards are involved. In addition, because all people will not necessarily think in a reasonable way, they will not necessarily agree upon reasonable answers. What is the instructor to do in cases where they do not agree?)*

(26) "Are they interested in skills for requiring information and perspectives (instead of coverage)? How does their specialty incorporate critical thinking? Authentic assessment? It is its usual criteria instead of projects, demos, etc.—Signals that they aren't?" *(unclear)*

(109) "Look at assignments; observe discourse; assigned readings; exams (true/false vs. asking for analysis and come up with new solutions) is there an open-exchange of ideas? Are students engaged?" *(Active learning is confused here with disciplined critical thinking).*

(115) "Teacher asks questions which go beyond recall. Hard to do in lectures, but ... have like ten minutes where they have to solve problems." *(This seems to imply that it is difficult to ask students questions during lectures. How then, does the instructor know that students are actively engaged in learning the lecture material?)*

(127) "Difficult to answer because I've never taught critical thinking per se. Did the instructor ask questions that require thoughtful answers, their sense making faculty? Listen to their oral and written explanations."

(31) "I'm not sure we have a right to do that..." *(This seems to imply that instructors should not be evaluated, that others don't have the "right" to evaluate them. If this is true, then how can the quality of their instruction be determined?)*

(99)"I don't know how to assess whether they learn critical thinking." *(How can instructors teach for critical thinking if they don't know how to assess it?)*

(145) "...unable to answer, because we don't do that."

(150) "I don't know...self-reflection, compare/contrast....observing is discouraged due to academic freedom."

(Q17) Personal Conception of Intellectual Standards

The Beginnings of Clear and Plausible Answers

(100) "...conforming to a scholarly model, present logically and coherently this response, organized presentation of the argument, looking for multiple layers of analysis, synthesis."

(101) "internally logical and coherent, does evidence square with the other argument."

(113) "Be accurate, consistent in their definitions; being precise; what specifically are you looking for—show this clearly."

(115) "...thoroughness, so they don't ignore large bodies of information. Information applies to what they are talking about....They can show how the data applies to their argument....Spell out logic steps they use...consider opposite conclusion. They understand others conclusions regarding the same topic."

(130) "What are intellectual standards? Is the information accurate, significant? . Are the conclusions valid?"

(6) "Beyond the objective test. Can students write, talk, make sense, judgment is involved"

(23) "Logical thinking."

(91) "To what extent does the student deal effectively with complexity...looks for quality in terms of whether reasoning passes the test of non-fallacious thought."

(107) "The degree to which they're able to lay out a chain of reasoning about a problem. Consider alternative reasoning. The level of clarity in your argument."

(112) "Logic—does it follow logically? Are they over-generalizing or restricting answers to evidence presented? Have they considered alternatives? Have they been able to present their ideas so they are intelligible to others?"

(116) "Adhere to factual evidence...historically accurate...ability to ascertain what the relevant data are to evaluate and analyze based upon them and get to core meaning of them—reach rational logical conclusion based on information...shaped clear, well-formed argument."

(119) "Articulation—hard to evaluate without this. Inarticulate presentations show student not clear...depth of coverage...good examples, being able to draw conclusions...accuracy of their understanding."

(122) "What the students agreed or disagreed to and why; the reasoning behind their answer. Their thinking should be logical and consistent; the standards vary from question to question."

(131) "The ability to follow a logical, sequential argument to provide evidence for their arguments. To look for hidden biases. Is the information relevant? Is it from a reliable source? Are they confusing an argument with evidence?"

(135) "I would evaluate students arguments to see how logical they are, are they well developed? Are there gaps? Are there assumptions? Is evidence provided? Are they reading the context of the text?"

(142) "The internal consistency of the argument. Consistency and getting it right; clarity."

(143) "Flexible judgment-making, being tolerant of intolerant people. Having a broad viewpoint. Are students reflecting?"

(156) "Can they ask their own questions? Identify drawbacks? Can they critique their own ideas? ...ability to think vs. ability to remember...to ask good questions. I don't think I have names for my standards."

(14) "All thoughts should be tentative. Are we using the processes and holding thoughts tentatively? In all these cases letting the students develop his level of understanding."

(109) "I don't understand the concept of accuracy with respect to reasoning. Logic seems to be a better word. I value logical reasoning. The ability to synthesize information."

(134) "They should have the research and inquiry skills to explore an issue. To explain a situation objectively. Can students deal with complexity? Are they suckered in by opinions?"

(Q17) Personal Conception of Intellectual Standards

Unclear or Implausible Answers

(75) "What is considered honest in one culture is considered dishonest in another." *(This seems to imply that any conception of what it means to be honest is as good as any other conception. If this were true, then, by implication, there could be no established meanings of concepts. Thus communication would be impossible.)*

(4) "Bloom's taxonomy—levels can be way of looking at standards."

(5) "I'm frightened anytime I hear the word standards because standards come from larger social/political/cultural context in which we try to maintain what is normal. How do things get normalized?" *(This seems to imply that there are no established universal standards for thinking. Following this line of reasoning, to figure out whether a given practice is acceptable, one need only determine what is the norm in any particular culture.)*

(8) "That's a hard question to answer. I don't think I see an answer to it."

(125) "It depends on level and context to some extent. ... Show facility between generalizing and abstraction, and details." *(Unclear)*

(17) "My point of view comes from whether I have looked at all sides...looking at cultural differences. I base my standards on observing other people." *(Does this mean that one should judge one's behavior by the behavior of others, that if others are doing something, it is acceptable?)*

(18) "...this is something I haven't thought about." *(If faculty members have not thought about intellectual standards, how can we expect students to? How then can students learn what standards they should use to determine when to accept and when to reject something?)*

(29) "...concrete and appropriate and shows work on their part.... It's definitely subjective...." *(Does this mean that whenever students engage in "work" in the classroom, that it is acceptable, whatever the quality of that work?)*

(33) "I look at their writing....I have an internal set of criteria but they are intuitive...I know it when I see it." *(If faculty are not explicit with their criteria, how can students learn those criteria?)*

(74) "Sensitive to broader cultural contexts—blanket generalizations not valuable."

(80) "It gets real squishy....How do you grade if someone's critically thought about something?" (*This seems to imply that critical thinking cannot be assessed, that there is no way to determine the quality of one's reasoning.)*

(85) "It's pretty esoteric. The moral value and truth that reflects the person's level of thinking is a major consideration. They each identify it for themselves. The idea is for each student to determine his/her own criteria." *(Students already have criteria that they use in their thinking. The problem is that these criteria are not intellectual. They often determine whether an idea is sound, for example, if their peer group believes it. If students are allowed to determine their own criteria, then we cannot expect them to engage in high quality reasoning.)*

(86) "...analytical, receptivity, awareness, relating to daily lives with people, ability to relate/challenge."

(87) "Any position you take is a biased one....Look for students to bring criteria to it...." *(The first part of this statement seems to imply that it is impossible to be objective about any issue, that it is not possible to be fair-minded in considering alternative relevant points of view.)*

(88) "I look for multi-dimensional thinking, higher order, holistic, not the traditional either/or stuff...they look at all perspectives...the ability to express themselves."

(93) "If they reason it out and that's their opinion, then they are entitled to that." *(What if they "reason it out" poorly? Are they entitled to thinking which is not well-grounded, logically speaking?)*

(94) "Accuracy is not one...remaining open, not too opinionated, poor thinking--not considering other options." *(Does this mean that it is not important for students to engage in thinking which is accurate, that when they are figuring out the solution to a problem, that they should gather information which is inaccurate to address that problem, for example?)*

(103) "Does it ring true to you? Based on your life experiences, do the arguments ring true? Based on their knowledge.

(105) "...very complex—multifaceted view of intelligences...Gardner...Thurstone. We have been too myopic in looking at intelligences. You have to break it down in the independent domains." *(How do multiple intelligences relate to intellectual standards?)*

(108) "This can be part of someone's background, where they're coming from, what ax their trying to grind, what's their political agenda. How did they arrive at their solution?"

(110) "Writing standards—such as correct grammar and punctuation. The diagram has to be neat and labeled. Well-organized portfolio."

(126) "there's all kinds of logical fallacies I use intuitively. I can't think of anything. Are the students contradicting themselves? Does their prose flow? Use other opinions to compare."

(129) "This is an ongoing debate. Is diversity a necessary requirement for intellectual ability? How do you define intellectual dialogue? There are narrow and broad perspectives. Original thinking." *(If the faculty member is unclear about how to define intellectual dialogue, how can that faculty member teach students how to engage intellectually in discussions?)*

(137) "Academic competence and the application of that competence to practice. The gut instinct and background knowledge as used to judge an editorial or someone's thinking." *(What is meant by "academic competence?" How are students taught to have reasonable "gut instincts"?)*

(138) "We probably always set our own."

(146) "...contrasting their knowledge to my knowledge....not if they are thinking accurately or not—that would be up to me to teach them....I trust them to come up with their own opinions—using their knowledge/background, respecting other opinions—that they may not be correct." *(How are student to learn how to assess others opinions, to determine whether they are faulty or not justifiable?)*

(152) "Take information (data) and apply it to another system."

(27) "...an open mind....Different people have different values."

(90) "It comes down to every person's personal values. This is my opinion based on my perspective. Give opinions without offending. I look for openness. I look for people who are committed to their own values. I rely a lot on intuitiveness. *(This seems to imply that any set of values is justifiable and as good as any other set of values. Furthermore, how are students to learn intuitive thinking which is of high quality?)*

(118) "want them to be normative, objective first, to have values at the end. Some things you like better than others. Am I happy with this—if so, I'm home free." *(How are students to learn whether they should be "happy" with something?)*

(Q18) Difference between Assumption and Inference

The Better Answers

(5) "Assumption—a belief we carry around in our tummies theoretically, philosophically inside us, sometimes we haven't thought about it, we don't recognize it, or deny its existence—but other people see them by observing our behavior. Inferences—more specific, when I look at patterns, data, behavior I draw inferences from something already happening."

(110) "An inference is a conclusion based on evidence or observation. A very thoughtful conclusion. An assumption you can postulate, but not necessarily prove."

(136) "An assumption is something you bring to a text, an inference is something you draw from it. Your inferences are based on your assumptions. Your assumptions determine the power of your inferences."

(103) "Infer result of information that has been shared, one draws an inference from that. Assumptions we learn over period of time, almost the stereotype, more deeply ingrained, based on our observations"

(105) "Assumption—something you make with very little information...shoot from the hip....Inference—based on information you gathered. ... You take several sources of information and draw inferences from it."

(107) "An assumption is a starting point. An inference is something that can be drawn logically or illogically from the assumptions."

(Q18) Difference between Assumption and Inference

Relatively Unclear or Inaccurate Responses

In lieu of commenting on specific statements in this section, the following general statement about the difference between an assumption and an inference should help the reader identify problems inherent in the weak answers.

An assumption is a statement accepted or supposed as true without proof or demonstration; an unstated premise or belief. All human thought is based on assumptions. Our thought must begin with something we take to be true in a particular context. We are typically unaware of what we assume and therefore rarely question our assumptions. Much of what is wrong with human thought can be found in the uncritical or unexamined assumptions that underlie it.

An inference, on the other hand, is a step of the mind, an intellectual act by which one concludes that something is so in light of something else's being so, or seeming to be so. Inferences can be strong or weak, justified or unjustified. Moreover, inferences are at least partially based upon assumptions.

An assumption, therefore, is a generalization that typically lies beneath the surface of thinking, and which (typically) leads us to draw certain conclusions, or make certain inferences.

Example: If we meet a male student who is tall and INFER that he is probably good at basketball, then we have (unconsciously) ASSUMED that all tall male students are good at the sport.

(119) "assumptions—person accepts without any data" "inferences—something I might do once I have some data I will infer from that, that this is the case and I can use that inference to evaluate the assumptions."

(140) "An assumption is a premise that must be true."

(8) "An inference is something based on information. An assumption is based on feeling and a lack of thinking."

(13) "If there is a line between the two...I would ...the word assumption...I think an assumption is linked to a database and an inference is more directly connected to the data you are using."

(15) "You're getting into the jargon. I never read the critical thinking books. Assumptions—data explicit. Inference—would have to be gleaned from data."

(29) "An assumption is a body of knowledge that you believe is true or not, usually subjective. An inference is more objective in which you know the cause and why it happens."

(31) "I don't use those terms."

(88) "When you infer something you base it on a body of knowledge. When you assume things there is not."

(90) "An assumption is my values being applied. An inference is a subtle something that conflicts with something."

(94) "infer--more of a question....assumption--more of a conclusion."

(106) "An assumption would be something I assume. An inference is referring to something but not assuming this is it."

(113) "We don't use these terms very much. When I think of inferences I think of jumping to conclusions."

(122) An inference comes about because one has done something. An assumption can involve anything."

(132) "An inference is a conclusion. An assumption is something someone makes after looking at the material. An assumption would be the conclusion you would reach after looking at a body of evidence."

(133) "An assumption is an accepted view. An inference is more on the periphery. An inference is something suggested."

(134) "An assumption doesn't require analysis." "To infer involves deducement. Your critical thinking is engaged with inferences."

(141) "An assumption is a basic premise you take with you. An assumption is like seeing something and then drawing an inference from that. I really don't know."

(143) "You draw inferences from the intention of the writer. You may not make assumptions about the actual text. Perhaps you make assumptions based only on the title, the author."

(97) "I prefer the word implication, but you want inference? Infer--implies something, it infers something...I think they are pretty close to each other."

(112) "Assumption—something that comes prior. Prior to evidence. Inference—after analysis. I'm not going to be coherent on that one."

(128) "An assumption is a point of view that someone creates at face value only, with very minimal information. An inference is a statement or comment about a subject based on information."

(137) "An assumption is something that is agreed upon without necessarily hard data. An inference is something to whatever I am questioning, reading, or talking about."

(Q19) Difference between Inference and Implication

Relatively Clear and Accurate Responses

(30) "If I imply that you're a thief...I say something that suggests that you're a thief without saying it. If I infer you are a thief, I use some information about you to form a conclusion that you are a thief."

(87) "implications typically come out of results of research-based on certain kinds of information. Some times it is fairly well grounded in data or theory, sometimes it's not...."

(Q19) Difference between Inference and Implication

Relatively Unclear or Inaccurate Responses

In lieu of commenting on specific statements in this section, the following general statement about the difference between an inference and an implication should help the reader identify problems inherent in the weak answers.

An inference is a step of the mind, an intellectual act by which one concludes that something is so in light of something else's being so, or seeming to be so. Inferences can be strong or weak, justified or unjustified. Furthermore inferences are based upon assumptions.

An implication, on the other hand, is a claim or truth which follows from other claims or truths. One of the most important skills of critical thinking is the ability to distinguish between what is actually implied by a statement or situation from what may be carelessly inferred by people. Thus critical thinkers try to monitor their inferences to keep them in line with what is actually implied by what they know.

Thus an inference is a conclusion that a human mind comes to, while an implication is a truth which follows from another truth, or a claim which follows from another claim.

For example, I may infer that my students are learning the content in my courses in a meaningful and useful way, when in fact they may be merely memorizing facts for the test. One implication of my teaching in this way is that students are unlikely to be able to use the concepts from my course in any significant way in their lives. Therefore, that which I inferred is not actually implied in the situation.

(80) "If I have some information, based on that I infer I have information, I can give out stuff about that information, I am implying."

(103) "In my mind, they are fairly close. Infer-- same. Implication-- specificity"

(119) "inference—may indicate some kind of connection" "implication—direct result of something"

(128) "An implication is something you assume an object may mean. What's likely to happen if...."

(13) An implication is a forward moving event."

(85) "The implication comes from the assumption. The inference reads into the assumption."

(88) "Inference is based on a body of knowledge. Implied? Again, doesn't have to be based on anything."

(106) "An implication is involving someone or something. Inferring is making a remark about whatever we are talking about."

(107) "I really don't know. The two work contrary to each other."

(113) "A inference is more intuitive and implication refers to the data."

(121) "I don't know."

(122) "They're almost interchangeable. You got me."

(125) "An implication is not necessarily logically binding. It involves a conclusion but not necessarily the analysis of data."

(126) "Implication would be where you've got a whole bunch of...I need a dictionary. In common usage they're the same."

(130) "I don't see a big difference. An implication is less strong than an inference."

(132) "I don't see the difference."

(134) An implication is more directed association. An implication may not be directly tied to an issue, but may be found in repercussions."

(141) An implication is like a consequence, the result on the other end. An inference is looking in rather than at the end."

(97) "...use terms infer and imply interchangeably."

(111) "An implication may come from than one source."

(133) "I don't think I would."

(136) "It's the difference between push and pull. Imply is putting something in. Infer is pulling something out. To imply is to have meaning—intent put into the communication."

(137) "An implication really points to the practice—what outcome is this practice going to have?"

(139) "An implication would be similar to an inference."

Appendix C

Accelerating Change, the Complexity of Problems and the Quality of Our Thinking[1]

By Richard Paul and Jane Willsen

Why Critical Thinking is Essential in the Post-Industrial World

The world is swiftly changing and with each day the pace quickens. The pressure to respond intensifies. New global realities are rapidly working their way into the deepest structures of our lives: economic, social, environmental realities — realities with profound implications for teaching and learning, for business and politics, for human rights and human conflicts. These realities are becoming increasingly complex; and they all turn on the powerful dynamic of accelerating change. This chapter explores the general character of these changes and the quality of thinking necessary for effectively adapting to them.

Can we deal with incessant and accelerating change and complexity without revolutionizing our thinking? Traditionally our thinking has been designed for routine, for habit, for automation and fixed procedure. We learned how to do something once, and then we did it over and over. Learning meant becoming habituated. But what is it to learn to continually re-learn? To be comfortable with perpetual re-learning? This is a new world for us to explore, one in which the power of critical thinking to turn back on itself in continual cycles and re-cycles of self-critique is crucial.

Consider, for a moment, even a simple feature of daily life: drinking water from the tap. With the increase of pollution, the poisoning of ground water, the indirect and long-term negative consequences of even small amounts of a growing number of chemicals, how are we to judge whether or not public drinking water is safe? Increasingly governments are making decisions about how many lives to risk against the so many dollars of cost to save them. How are we to know whether the risk the government is willing to take with our lives is equivalent to our willingness to risk? This is just one of hundreds of decisions that require extraordinary thinking.

Consider also the quiet revolution that is taking place in communications. From fax machines to E-Mail, from bulletin board systems to computer delivery systems to home shopping, we are providing opportunities for people to not only be more efficient with their time, but to build invisible networks where goods, services, and ideas are exchanged with individuals the world over. But how is one to interface with this revolution? How much is one to learn and how fast? How much money should one spend on this or that new system? When is the new system cost effective? When should one wait for a newer development?

These communication innovations have re-introduced a way of life lost in the industrial revolution of the late 1800s. Farmers used to work at home, doctors' offices were routinely downstairs from where they lived. All that is coming back, not for farmers or doctors, but for millions of service and technical professionals for whom, "I work at home," is now a common refrain. But how are we to take these realities into account in planning our lives and careers?

Yes, technological growth brings new opportunities, new safety devices, more convenience, new lifestyles. But we must also juggle and judge work and child care, efficiency and clogged transportation systems, expensive cars and inconvenient office space, increased specialization and increasing obsolescence. We are caught up in an increasing swirl of challenges and decisions.

These changes ask and offer much at the same time, if only we can make sense of them and put them into perspective. For example, what are we to make of altered forms of community, for community

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[1] From *Critical Thinking: How to Prepare Students for a Rapidly Changing World* by Richard Paul. © Foundation for Critical Thinking, 1993.

in a world of automatic tellers, home shopping, self-service, delivery services, malls, video rentals, and television? How shall we evaluate these social changes and their implications for our lives?

Or consider another facet of the accelerating change: that young people today can expect to make from four to seven career changes in their lifetimes. The question, "What do you want to be when you grow up?" is a poignant reminder of a vision from the past. Our children and students can no longer anticipate the knowledge or data that they will need on the job, because they can no longer predict the kinds of jobs that will be available or what they will entail.

What is more, even if the young could predict the general fields in which they will work, about half of the information which is current in each field will be obsolete in six years. Will people recognize which half? Will they know how to access and use it?

Accelerating change is intermeshed with another powerful force, the increasing complexity of the problems we face. Consider, for a moment, solid waste management. This problem involves every level of government, every department: from energy to water quality, to planning, to revenues, to public health. Without a cooperative venture, without bridging the territorial domains, without overcoming the implicit adversarial process within which we currently operate, the responsible parties at each tier of government cannot even *begin* to solve these problems. When they do communicate, they often do not speak honestly about the issues given the human propensity to mask the limitations of one's position and promote one's narrow but deeply vested interests.

Consider the issues of depletion of the ozone layer, world hunger, over-population, and AIDS. Without a grasp of the elements, and internal relationships of the elements, in each of dozens of interrelating systems from specific product emissions to social incentives, from effective utilization of the media to human learning, we are adrift in a stormy sea of information. Without a grasp of the of political realities, economic pressures, scientific data on the physical environment and its changes — all of which are simultaneously changing the as well — we stand no chance of making any significant positive impact on the deterioration of the quality of life for all who share the planet.

These two characteristics, then, accelerating change and increasing complexity — with their incessant demand for a new capacity to adapt, for the now rare ability to think effectively through new problems and situations in new ways — sound the death knell for traditional methods of learning how to survive in the world in which we live. How can we adapt to reality when reality won't give us time to master it before it changes itself, again and again, in ways we cannot anticipate? As we struggle to gain insight, let's look more closely at the operating forces.

Robert Heilbroner, the distinguished American economist, in *Twenty-First Century Capitalism*, identifies capitalism as a global force that brings us "kaleidoscopic changefulness," a "torrent of market-driven change." As he illustrates in example after example, "If capitalism is anything, it is a social order in constant change — and beyond that, change that seems to have a direction, an underlying principle of motion, a logic." The logic, however, is the logic of "creative destruction, the unpredictable displacement of one process or product by another at the hands of giant enterprise" (p. 20).

Furthermore, along with kaleidoscopic change, along with the continual social transformations that follow from those changes, come "both wealth and misery," development and damage, a "two-edged sword" that makes instability permanent in unpredicted and unpredictable forms. Basic change continually destabilizes the system at the micro-level, making for multiple imbalances and upheavals. The complexity and speed of change means that we shall always have to make unpredictable adjustments to both the upsides and downsides that result from this upheaval, for we cannot hope to predict the myriad of micro-level system changes that are continually emerging and putting pressure on the system at the macro level.

We can no longer rely on the past to be the guide for the future. Technology will continually race ahead, creating links that make the world smaller and smaller. New opportunities will continually emerge but within them are embedded new problems, hence the need for acute readiness and disciplined ingenuity. At every step along the way, however, polished, satiny voices will tempt us astray with slick, simplistic messages that appear to guide us back to the "tried and true." Often, these voices in fact coax us into policies and practices that continually sacrifice our long-term interests to someone's short-term gain. In business, education, and politics, the same sirens echo.

Many American business and labor leaders have yet to come to terms with these realities. They yearn for a world of stability in which they can play a predictable game in a predictable way. As Laura Tyson, Chairwoman of the President's Council of Economic Advisors,has put it,

> ... the vast majority of American companies ... [continue] to opt for traditional hierarchical work organizations that ... [make] few demands on the skills of their workers. In fact, most American companies interviewed by the Commission on the Skills of the American Workforce continue to prefer this approach, which dooms most American workers to a low-wage future. If American workers are to look forward to anything more than low-wage employment, changes in work organization are required to upgrade their skills and productivity so that American companies can afford to pay higher wages and still compete in world markets. ("Failing Our Youth: America's K–12 Education," p. 52)

What our businesses are failing to change is what European and Japanese companies are changing: namely, "making their high-wage labor more productive not simply by investing in more equipment but by organizing their workers in ways that ... [upgrade] their skills." World-class, internationally-competitive companies recognize the need to play a new game and have re-organized themselves accordingly. As Tyson explains,

> High productivity work-place organizations depend on workers who can do more than read, write, and do simple arithmetic, and who bring more to their jobs than reliability and a good attitude. In such organizations, workers are asked to use judgment and make decisions rather than to merely follow directions. Management layers disappear as workers take over many of the tasks that others used to do — from quality control to production scheduling. Tasks formerly performed by dozens of unskilled individuals are turned over to a much smaller number of skilled individuals. Often, teams of workers are required to monitor complicated computer-controlled production equipment, to interpret computer output, to perform statistical quality control techniques, and to repair complex and sensitive equipment. (p. 53) [our emphasis]

These new kinds of workers, of course, are not asked merely to "use judgment and make decisions," rather they are asked to use good judgment and make well-thought-out decisions. How will workers acquire these fundamental abilities to think deeply and well? Are educators able to "make meaning" out of these exhortations of our leaders?

Bold changes in business organization and practices require parallel changes in education. Yet the U.S. public school systems, like most U.S. businesses, remain mired in the past, focused on lower order skills, and unresponsive to the need for higher order abilities. Again, as Laura Tyson puts it, "[Higher-order tasks] ... require higher-order language, math, scientific, and reasoning skills that America's K–12 education system is not providing."

Our students deserve at least a fighting chance to compete, to rise to the challenges of the day. Reconstructing and adapting our business and educational systems to teach our managers as well as our teachers and administrators how to create these higher order workplaces and classrooms, and then to expect them to do so in the ordinary course of their professional obligations, is our first major challenge. Today, at every level, we are failing this test, failing our students and workers, jeopardizing our future. What is missing is a genuine sense of what accelerating change entails and a shared public vision of the need for fundamental changes. Many of our leading economic analysts are struggling to create just such a new frame of reference within which we can come to terms with the new imperatives.

Appendix D

Universal Intellectual Standards and Questions that Can be Used to Apply Them

By Linda Elder and Richard Paul

Universal intellectual standards are standards which must be applied to thinking whenever one is interested in checking the quality of reasoning about a problem, issue, or situation. To think critically entails having command of these standards. To help students learn them, teachers should pose questions which probe student thinking, questions which hold students accountable for their thinking, questions which, through consistent use by the teacher in the classroom, become internalized by students as questions they need to ask themselves. The ultimate goal, then, is for these questions to become infused in the thinking of students, forming part of their inner voice, which then guides them to better and better reasoning. While there are a number of universal standards, the following are the most significant:

Clarity: Could you elaborate further on that point? Could you express that point in another way? Could you give me an illustration? Could you give me an example?

Clarity is a gateway standard. If a statement is unclear, we cannot determine whether it is accurate or relevant. in fact, we cannot tell anything about it because we don't yet know what it is saying. For example, the question "What can be done about the education system in America?" is unclear. In order to adequately address the question, we would need to have a clearer understanding of what the person asking the question is considering the "problem" to be. A clearer question might be "What can educators do to ensure that students learn the skills and abilities which help them function successfully on the job and in their daily decision-making?"

Accuracy: Is that really true? How could we check that? How could we find out if that is true?

A statement can be clear but not accurate, as in "Most dogs are over 300 pounds in weight."

Precision: Could you give me more details? Could you be more specific?

A statement can be both clear and accurate, but not precise, as in "Jack is overweight" (We don't know how overweight Jack is, one pound or 500 pounds.).

Relevance: How is that connected to the question? How does that bear on the issue?

A statement can be clear, accurate, and precise, but not relevant to the question at issue. For example, students often think that the amount of effort they put into a course should be used in raising their grade in a course. Often, however, "effort" does not measure the quality of student learning, and when that is so, effort is irrelevant to their appropriate grade.

Depth: How does your answer address the complexities in the question? How are you taking into account the problems in the question? Is that dealing with the most significant factors?

A statement can be clear, accurate, precise, and relevant, but superficial (that is, lack depth). For example, the statement "Just Say No" which is often used to discourage children and teens from using drugs, is clear, accurate, precise, and relevant. Nevertheless, it lacks depth because it treats an extremely complex issue, the pervasive problem of drug use among young people, superficially. It fails to deal with the complexities of the issue.

Breadth: Do we need to consider another point of view? Is there another way to look at this question? What would this look like from a conservative standpoint? What would this look like from the point of view of...?

A line of reasoning may be clear, accurate, precise, relevant, and deep, but lack breadth (as in an argument from either the conservative or liberal standpoints which gets deeply into an issue, but only recognizes the insights of one side of the question.)

Logic: Does this really make sense? Does that follow from what you said? How does that follow? But before you implied this and now you are saying that, I don't see how both can be true.

When we think, we bring a variety of thoughts together into some order. When the combination of thoughts are mutually supporting and make sense in combination, the thinking is "logical." When the combination is not mutually supporting, is contradictory in some sense, or does not "make sense," the combination is "not logical."

Appendix E

Critical Thinking: Using Intellectual Standards to Assess Student Reasoning

By Richard Paul and Linda Elder

A crucial part of critical thinking involves the ability to accurately assess one's own reasoning ability. Therefore, as teachers, one of our primary objectives is to teach students to assess their own thinking. Before teachers can do this, however, they must first learn to assess student reasoning. Then teachers can and should focus on teaching students to assess their own reasoning. To assess student reasoning requires that we focus our attention as teachers on two interrelated dimensions of reasoning. The first dimension consists of the *elements of reasoning;* the second dimension consists of the *universal intellectual standards* by which we measure student ability to use, in a skillful way, each of those elements of reasoning.

Elements of Reasoning

Once we progress from thought which is purely associational and undisciplined to thinking which is conceptual and inferential, thinking which attempts in some intelligible way to figure something out (in short, to reason) then it is helpful to concentrate on what can be called "the elements of reasoning". The elements of reasoning are those essential dimensions of reasoning which are present whenever and wherever reasoning occurs. Working together, they shape reasoning and provide a general logic to the use of reason. We can articulate these elements by paying close attention to what is implicit in the act of figuring anything out by the use of reason. These elements, then—purpose, question at issue, assumptions, inferences, implications, point of view, concepts, and evidence—constitute a central focus in the assessment of student thinking.

Standards of Reasoning

When we assess student reasoning, we want to evaluate, in a reasonable, defensible, objective way, not just that students are reasoning but how well they are reasoning. We will be assessing not just that they are using the elements of reasoning (because whenever a person reasons, he or she is implicitly processing through all the elements) but the degree to which they are reasoning well. This can be measured by continually applying the appropriate intellectual standards to each element as they think through a problem or issue.

To assess a student response, whether written or oral, in structured discussion of content or in critical response to reading assignments, by how clearly or completely it states a position, is to assess it on the basis of a standard of reasoning. Similarly, assessing student work by how logically and consistently it defends its position—by how flexible and fair the student is in articulating other points of view, by how significant and realistic the student's purpose is, by how precisely and deeply the student articulates the question at issue—is an evaluation based on universal standards of reasoning.

Distinct from such reasoning standards are other standards that teachers sometimes use to assess student work. To evaluate a student response on the basis of how concisely or elegantly it states a position is to use standards that are inappropriate to assessing student reasoning. Similarly unrelated to the assessment of reasoning is evaluating student work by how humorous, glib, personal, or sincere it is; by how much it agrees with the teacher's views; by how "well-written" it is; by how exactly it repeats the teacher's words; or by the mere quantity of information it contains. The danger is that such standards are confused with reasoning standards, often unconsciously, and students are assessed on grounds other than the degree to which they are reasoning well. The basic conditions implicit

whenever we gather, conceptualize, apply, analyze, synthesize, or evaluate information— THE ELEMENTS OF REASONING—are as follows:

1. Purpose, goal, or end in view. Whenever we reason, we reason to some end, to achieve some objective, to satisfy some desire, or to fulfill some need. One source of problems in student reasoning is traceable to defects at the level of goal, purpose, or end. If the goal is unrealistic, for example, or contradictory to other goals the student has, if it is confused or muddled in some way, then the reasoning used to achieve it is problematic.

A teacher's assessment of student reasoning, then, necessarily involves an assessment of the student's ability to handle the dimension of purpose in accord with relevant intellectual standards. It also involves giving feedback to students about the degree to which their reasoning meets those standards.

2. Questions at issue or problems to be solved. Whenever we attempt to reason something out, there is at least one question at issue, at least one problem to be solved. One area of concern for assessing student reasoning, therefore, will be the formulation of the question to be answered or problem to be solved, whether with respect to the student's own reasoning or to that of others.

Assessing skills of mastery of this element of reasoning requires assessing—and giving feedback on—students' ability to formulate a problem in a clear and relevant way. It requires giving students direct commentary on whether the question they are addressing is an important one, whether it is answerable, or whether they understand the requirements for settling the question or for solving the problem.

3. Point of view or frame of reference. Whenever we reason, we must reason within some point of view or frame of reference. Any "defect" in that point of view or frame of reference is a possible source of problems in the reasoning process.

A point of view may be too narrow or too parochial, may be based on false or misleading analogies or metaphors, may contain contradictions, and so forth. It may be restricted or unfair. Alternatively, student reasoning involving articulation of their point of view may meet the relevant standards to a significant degree: their point of view may be broad, flexible, and fair; it may be clearly stated and consistently adhered to.

Feedback to students would involve commentary noting both when students meet the standards and when they fail to meet them. Evaluation of students' ability to handle the dimension of point of view would also appropriately direct students to lines of reasoning that would promote a richer facility in reasoning about and in terms of points of view. Teachers should help students understand the problem at issue from opposing points of view, enabling them to clearly see how their own point of view may be limited or flawed.

4. The empirical dimension of reasoning (the evidence). Whenever we reason, there is some "stuff," some phenomena about which we are reasoning. Any defect, then, in the experiences, data, information, evidence, or raw material upon which a person's reasoning is based is a possible source of problems.

Students would be assessed and receive feedback on their ability to give evidence that is gathered and reported clearly, fairly, and accurately. Does the student furnish data at all?
Is the data relevant and valid? Is there sufficient information for the conclusion being drawn? Is the information adequate for achieving the student's purpose? Is it applied consistently, or does the student distort it to fit a personal point of view?

5. The conceptual dimension of reasoning. All reasoning uses some ides or concepts and not others. These concepts can include the theories, principles, axioms, and rules implicit in our reasoning. Any defect in the concepts or ideas of the reasoning is a possible source of problems in student reasoning.

Feedback to students would note whether their understanding of theories and rules was deep or merely superficial. Are the concepts they use in their reasoning clear ones? Are their ideas relevant to the issue at hand; are their principles slanted by their point of view?

6. Assumptions. All reasoning must begin somewhere, must take some things for granted. Any defect in the assumptions or presuppositions with which the reasoning begins is a possible source of problems for students.

Assessing skills of student reasoning involves assessing their ability to recognize and articulate their assumptions, again according to the relevant standards. The student's assumptions may be stated clearly or unclearly; the assumptions may be justifiable or unjustifiable, crucial or extraneous, and consistent or contradictory.

The feedback students receive from teachers on their ability to identify and articulate their assumptions and to meet the relevant standards in regard to their assumptions will be a large factor in the improvement of student reasoning.

7. Implications and consequences. No matter where we stop our reasoning, it will always have further implications and consequences. No matter how well we reason, the implications and consequences of any given situation will occur as a reality. Any defect in our ability to accurately determine implications or consequences in any circumstance is a possible source of problems.

The ability to reason well is measured in part by an ability to understand and enunciate the implications and consequences of the reasoning. Students therefore need help in coming to understand both the relevant standards of reasoning out implications and the degree to which their own reasoning meets those standards.

When they spell out the implications of their reasoning, have they succeeded in identifying significant and realistic implications, or have they confined themselves to unimportant and unrealistic ones? Have they enunciated the implications of their views clearly and precisely enough to permit their thinking to be evaluated by the validity of those implications ?

8. Inferences. Reasoning proceeds by steps in which we reason as follows: "Because this is so, that also is so or probably so," or "Since this, therefore that" Any defect in such inferences is a possible problem in our reasoning. The ideal is to match inferences with actual implications.
Assessment would evaluate students' ability to make sound inferences in their reasoning. When is an inference sound? When it meets reasonable and relevant standards of inferring. Are the inferences the student draws clear? Are they justifiable ? Do they draw deep conclusions or do they stick to the trivial and superficial? Are the conclusions they draw consistent?

If an assignment requires reasoning (and most assignments should), then the elements of thought will be embedded in it. It is important for students to check their use of those elements. Here are some of the key points the students must understand:

1. All reasoning has a PURPOSE.
   - Take time to state your purpose clearly.
   - Distinguish your purpose from related purposes.
   - Check periodically to be sure you are still on target.
   - Choose significant and realistic purposes.

2. All reasoning is an attempt to FIGURE SOMETHING OUT, TO SETTLE SOME QUESTION, TO SOLVE SOME PROBLEM.
   - Take time to clearly and simply state the question at issue.
   - Express the question in several ways to clarify its meaning and scope.
   - Break the question into subquestions.
   - Identify if the question has one right answer, is a matter of mere opinion, or requires reasoning from more than one point of view.

3. All reasoning is based on ASSUMPTIONS.
   - Clearly identify your assumptions and check their validity.
   - Consider how your assumptions are shaping your viewpoint.

4. All reasoning is done from some POINT OF VIEW.
   - Identify your point of view.
   - Seek other points of view and identify their strengths as well as weaknesses.
   - Strive to be fair-minded in evaluating all points of view.

5. All reasoning is based on DATA, INFORMATION, AND EVIDENCE.
   - Restrict your claims to those supported by sufficient data.
   - Search for information that opposes your position as well as information that supports it.
   - Make sure that all information used is clear, valid, accurate, and relevant to the question at issue.

6. All reasoning is expressed through, and shaped by, CONCEPTS AND IDEAS.
   - Identify key concepts and explain them.
   - Consider alternative concepts or alternative definitions of concepts.

7. All reasoning contains INFERENCES by which we draw CONCLUSIONS and give meaning to data.
   - Infer only what the evidence implies.
   - Check inferences for their consistency with each other.

8. All reasoning leads somewhere or has IMPLICATIONS and CONSEQUENCES.
   - Trace your implications and consequences that follow from your reasoning.
   - Search for negative as well as positive consequences.
   - Consider all possible consequences.

Unfortunately many teachers are not familiar with the elements of reasoning and do not realize there are universal standards appropriate to their use. Only a well-designed professional development program can help teachers clearly understand the elements and the standards and how they interrelate.

Appendix F

Intellectual Traits and Values Essential to Critical Thinking

Richard Paul, in Critical Thinking: How To Prepare Students For A Rapidly Changing World (1995), argues that there are fundamental intellectual traits that are based on basic values essential to critical thinking. He delineates them as follows:

Intellectual Humility

Having a consciousness of the limits of one's knowledge, including a sensitivity to circumstances in which one's native egocentrism is likely to function self-deceptively; sensitivity to bias, prejudice and limitations of one's viewpoint. Intellectual humility depends on recognizing that one should not claim more than one actually knows. It does not imply spinelessness or submissiveness. It implies the lack of intellectual pretentiousness, boastfulness, or conceit, combined with insight into the logical foundations, or lack of such foundations, of one's beliefs.

Intellectual Courage

Having a consciousness of the need to face and fairly address ideas, beliefs or viewpoints toward which we have strong negative emotions and to which we have not given a serious hearing. This courage is connected with the recognition that ideas considered dangerous or absurd are sometimes rationally justified (in whole or in part) and that conclusions and beliefs inculcated in us are sometimes false or misleading. To determine for ourselves which is which, we must not passively and uncritically "accept" what we have "learned." Intellectual courage comes into play here, because inevitably we will come to see some truth in some ideas considered dangerous and absurd, and distortion or falsity in some ideas strongly held in our social group. We need courage to be true to our own thinking in such circumstances. The penalties for non-conformity can be severe.

Intellectual Empathy

Having a consciousness of the need to imaginatively put oneself in the place of others in order to genuinely understand them, which requires the consciousness of our egocentric tendency to identify truth with our immediate perceptions of long-standing thought or belief. This trait correlates with the ability to reconstruct accurately the viewpoints and reasoning of others and to reason from premises, assumptions, and ideas other than our own. This trait also correlates with the willingness to remember occasions when we were wrong in the past despite an intense conviction that we were right, and with the ability to imagine our being similarly deceived in a case-at-hand.

Intellectual Integrity

Recognition of the need to be true to one's own thinking; to be consistent in the intellectual standards one applies; to hold one's self to the same rigorous standards of evidence and proof to which one holds one's antagonists; to practice what one advocates for others; and to honestly admit discrepancies and inconsistencies in one's own thought and action.

Intellectual Perseverance

Having a consciousness of the need to use intellectual insights and truths in spite of difficulties, obstacles, and frustrations; firm adherence to rational principles despite the irrational opposition of others; a sense of the need to struggle with confusion and unsettled questions over an extended period of time to achieve deeper understanding or insight.

Faith in Reason

Confidence that, in the long run, one's own higher interests and those of humankind at large will be best served by giving the freest play to reason, by encouraging people to come to their own conclusions by developing their own rational faculties; faith that, with proper encouragement and cultivation, people can learn to think for themselves, to form rational viewpoints, draw reasonable conclusions, think coherently and logically, persuade each other by reason and become reasonable persons, despite the deep-seated obstacles in the native character of the human mind and in society as we know it.

Fair-Mindedness

Having a consciousness of the need to treat all viewpoints alike, without reference to one's own feelings or vested interests, or the feelings or vested interests of one's friends, community or nation; implies adherence to intellectual standards without reference to one's own advantage or the advantage of one's group. "

Paul argues that these intellectual traits develop best in concert with each other, as follows:

> "Consider intellectual humility. To become aware of the limits of our knowledge, we need the courage to face our own prejudices and ignorance. To discover our own prejudices in turn, we often must empathize with and reason within points of view toward which we are hostile. To achieve this end, we must typically persevere over a period of time, for learning to empathically enter a point of view against which we are biased takes time and significant effort. That effort will not seem justified unless we have the confidence in reason to believe we will not be "tainted" or "taken in" by whatever is false or misleading in the opposing viewpoint. Furthermore, merely believing we can survive serious consideration of an "alien" point of view is not enough to motivate most of us to consider them seriously. We must also be motivated by an intellectual sense of justice. We must recognize an intellectual responsibility to be fair to views we oppose. We must feel obliged to hear them in their strongest form to ensure that we are not condemning them out of ignorance or bias on our part. At this point, we come full circle back to where we began: the need for intellectual humility.
>
> To begin at another point, consider intellectual good faith or integrity. Intellectual integrity is clearly a difficult trait to develop. We are often motivated, generally without admitting to or being aware of this motivation, to set up inconsistent intellectual standards. Our egocentric or sociocentric tendencies make us ready to believe positive information about those we like, and negative information about those we dislike. We are likewise strongly inclined to believe what serves to justify our vested interest or validate our strongest desires. Hence, all humans have some innate mental tendencies to operate with double standards, which of course is paradigmatic of intellectual bad faith. Such modes of thinking often correlate quite well with getting ahead in the world, maximizing our power or advantage, and getting more of what we want.

Nevertheless, it is difficult to operate explicitly or overtly with a double standard. We therefore need to avoid looking at the evidence too closely. We need to avoid scrutinizing our own inferences and interpretations too carefully. At this point, a certain amount of intellectual arrogance is quite useful. I may assume, for example, that I know just what you're going to say (before you say it), precisely what you are really after (before the evidence demonstrates it), and what actually is going on (before I have studied the situation carefully). My intellectual arrogance may make it easier for me to avoid noticing the unjustifiable discrepancy between the standards I apply to you and the standards I apply to myself. Of course, if I don't have to empathize with you, that too makes it easier to avoid seeing my duplicity. I am also better positioned if I lack a keen need to be fair to your point of view. A little background fear of what I might discover if I seriously considered the consistency of my own judgments can be quite useful as well. In this case, my lack of intellectual integrity is supported by my lack of intellectual humility, empathy, and fair-mindedness.

Going in the other direction, it will be difficult to use a double standard if I feel a responsibility to be fair to your point of view, see that this responsibility requires me to view things from your perspective empathically, and do so with some humility, recognizing I could be wrong, and you right. The more I dislike you personally, or feel wronged in the past by you or by others who share your way of thinking, the more pronounced in my character the trait of intellectual integrity and good faith must be to compel me to be fair."

Appendix G

Goals for a Curriculum in Critical Thinking and Reasoning

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WORKING DEFINITION: Critical thinking is reasonable reflective thinking that is focused on deciding what to believe or do.[2] Critical thinking so defined involves both dispositions and abilities:

A. DISPOSITIONS:

1. Seek a clear statement of the thesis or question
2. Seek reasons
3. Try to be well-informed
4. Use credible sources and mention them
5. Take into account the total situation
6. Try to remain relevant to the main point
7. Keep in mind the original and/or basic concern
8. Look for alternatives
9. Be openminded
   a. Consider seriously other points of view than one's own ("dialogical thinking")
   b. Reason from premises with which one disagrees-without letting the disagreement interfere with one's reasoning ("suppositional thinking")
   c. Withhold judgment when the evidence and reasons are insufficient
10. Take a position (and change a position) when the evidence and reasons are sufficient to do so
11. Seek as much precision as the subject permits
12. Deal in an orderly manner with the parts of a complex whole
13. Be sensitive to the feelings, level of knowledge, and degree of sophistication of others[3]

B. ABILITIES: (Classified under these categories: Elementary Clarification, Basic Support, Inference, Advanced Clarification, and Strategy and Tactics)

Elementary Clarification

1. Focusing on a question

   a. Identifying or formulating a question
   b. Identifying or formulating criteria for judging possible answers
   c. Keeping the situation in mind

2. Analyzing Arguments

   a. Identifying conclusions
   b. Identifying stated reasons
   c. Identifying unstated reasons
   d. Seeing similarities and differences
   e. Identifying and handling irrelevance
   f. Seeing the structure of an argument
   g. Summarizing

3. Asking and answering questions of clarification and/or challenge for example:

   a. Why?
   b. What is your main point?
   c. What do you mean by "_____"?
   d. What would be an example?
   e. What would not be an example (though close to being one)?
   f. How does that apply to this case (describe case, which might well appear to be counter example)?
   g. What difference does it make?
   h. What are the facts?
   i. Is this what you are saying:_____?
   j. Would you say some more about that?

Basic Support

4. Judging the credibility of a source; criteria:

   a. Expertise
   b. Lack of conflict of interest
   c. Agreement among sources
   d. Reputation
   e. Use of established procedures
   f. Known risk to reptuation
   g. Ability to give reasons
   h. Careful habits

5. Observing and judging observation reports; criteria:

   a. Minimal inferring involved
   b. Short time interval between observation and report
   c. Report by observer, rather than someone else (i.e., not hearsay)
   d. Records are generally desirable. If report is based on a record, it is generally best that:

      (1) The record was close in time to the observation
      (2) The record was made by the observer

(3) The record was made by the reporter
(4) The statement was believed by the reporter, either because of a prior belief in its correctness or because of a belief that the observer was habitually correct

e. Corroboration
f. Possibility of corroboration
g. Conditions of good access
h. Competent employment of technology, if technology is useful
i. Satisfaction by observer (and reporter, if a different person) of credibility criteria (#4 above)

Inference

6. Deducing, and judging deductions

a. Class logic - Euler circles
b. Conditional logic
c. Interpretation of statements

(1) Double negation
(2) Necessary and sufficient conditions
(3) Other logical words: "only", "if and only if", "or", "some", "unless", "not", "not both", etc.

7. Inducing, and judging inductions

a. Generalizing

(1) Typicality of data: limitation of coverage
(2) Sampling
(3) Tables and graphs

b. Inferring explanatory conclusions and hypotheses of explanatory conclusions and hypotheses

(1) Types

(a) Causal claims
(b) Claims about the beliefs and attitudes of people
(c) Interpretations of authors' intended meanings
(d) Historical claims that certain things happened
(e) Reported definitions
(f) Claims that something is an unstated reason or unstated conclusion

(2) Investigating

(a) Designing experiments, including planning to control variables
(b) Seeking evidence and counterevidence
(c) Seeking other possible explanations

(3) Criteria: Given reasonable assumptions,

(a) The proposed conclusion would explain the evidence (essential)
(b) The proposed conclusion is consistent with known facts (essential)
(c) Competitive alternative conclusions are inconsistent with known facts (essential)
(d) The proposed conclusion seems plausible (desirable)

8. Making and judging value judgments

a. Background facts
b. Consequences
c. Prima facie application of acceptable principles
d. Considering alternatives
e. Balancing, weighing, and deciding

Advanced Clarification

9. Defining terms, and judging definitions; three dimensions:

a. Form

(1) Synonym
(2) Classification
(3) Range
(4) Equivalent expression
(5) Operational
(6) Example - nonexample

b. Definitional strategy

(1) Acts

(a) Report a meaning ("reported" definition)
(b) Stipulate a meaning ("stipulative definition)
(c) Express a position on an issue ("positional", including "programmatic" and "persuasive" definition)

(2) Identifying and handling equivocation

(a) Attention to the context
(b) Possible types of response:

(i) "The definition is just wrong" (the simplest response)
(ii) Reduction to absurdity: According to that definition, there is an outlandish result"
(iii) Considering alternative interpretations: XOn this interpretation, there is this problem; on that interpretation, there is that problem
(iv) Establishing that there are two meanings of key term, and a shift in meaning from one to the other

c. Content

10. Identifying assumptions

a. Unstated reasons
b. Needed assumptions: argument reconstruction

Strategy and Tactics

11. Deciding on an Action
    a. Define the problem
    b. Select criteria to judge possible solutions
    c. Formulate alternative solutions
    d. Tentatively decide what to do
    e. Review, taking into account the total situation, and decide
    f. Monitor the implementation

12. Interacting with Others

    a. Employing and reacting to "fallacy" labels (including)

1)	Circularity	12)	Conversion
2)	Appeal to authority	13)	Begging the question
3)	Bandwagon	14)	Either-or
4)	Glittering term	15)	Vagueness
5)	Namecalling	16)	Equivocation
6)	Slippery slope	17)	Straw person
7)	Post hoc	18)	Appeal to tradition
8)	Non sequitur	19)	Argument from analogy
9)	Ad hominem	20)	Hypothetical question
10)	Affirming the consequent	21)	Oversimplification
11)	Denying the antecedent	22)	Irrelevance

    b. Logical strategies
    c. Rhetorical strategies
    d. Presenting a position, oral or written (argumentation)

        1) Aiming at a particular audience and keeping it in mind
        2) Organizing (common type: main point, clarification, reasons, alternatives, attempt to rebut prospective challenges, summary-including repeat of main point)

Notes

1. This is only an overall content outline. It does not incorporate suggestions for level, sequence, repetition in greater depth, emphasis, or infusion in subject matter area (which might be either exclusive or overlapping).

2. Elaboration of the ideas in this set of proposed goals may be found in my "Rational Thinking and Educational Practice" in Jonas F. Soltis (ed.), Philosophy and Education (Eightieth Yearbook of the National Society for the Study of Education, Part I), Chicago: NSSE, 1981; also my "A Conception of Rational Thinking" in Jerrold Coombs (ed.), Philosophy of Education 1979, Bloomington, IL: Philosophy of Education Society, 1980. A note on terminology: the term: "rational thinking", as used in these articles, is what I mean here by "critical-thinking/reasoning". In diference to popular usage and theoretical considerations as well, I have abandoned the more narrow appraisal-only sense of "critical thinkings" that I earlier advocated.

3. Item 13 under "Dispositions" is not strictly speaking a critical thinking disposition. Rather it is a social disposition that is desirable for a critical thinker to have.

Appendix H

Portrait of a Teacher from a Critical Thinking Perspective

The Montclair State University community is committed to the continuing development of teachers who:

(a) continues to inquire into the nature of teaching and learning and reflects upon her own professional practice.

(b) possesses the literacy and critical thinking abilities associated with the concept of an educated person.

(c) has content knowledge which includes a strong sense of the concepts. purposes and intellectual processes associated with the discipline he/she will teach.

(d) understands the effects of human development on the learning of children, adolescents and adults.

(e) possesses the skills and dispositions necessary to establish a classroom environment that stimulates critical thinking and inquiry.

(f) understands principles of democracy and plans instruction to promote critical reflection on the ideals, values and practices of democratic citizenship.

(g) understands and is committed to the moral, ethical and enculturating responsibilities of those who work in the school. She believes in the educability of all children and seeks to ensure equal learning opportunities for every student.

(h) models respect for individual differences and an appreciation of the basic worth of each individual. He plans instruction with sensitivity to issues of class. gender, race, ethnicity, sexual orientation. and special needs, and works to foster an appreciation of diversity among students and co-workers.

(i) is committed to her role as a steward of renewal and best practice in the schools.

(j) possesses the interpersonal skills and dispositions to work cooperatively and collaboratively with colleagues.

(k) is willing to explore a career in a variety of settings--urban, suburban and rural.

Appendix I

A Glossary of Critical Thinking Concepts and Terms

By Richard W. Paul

Introduction. The following glossary illustrates the richness and substantive character of critical thinking. The glossary you elaborates on the concept of critical thinking in ways that go beyond the baseline conceptualization level.

accurate: Free from errors, mistakes, or distortion. *Correct* connotes little more than absence of error; *accurate* implies a positive exercise of one to obtain conformity with fact or truth; *exact* stresses perfect conformity to fact, truth, or some standard; *precise* suggests minute accuracy of detail. Accuracy is an important goal in critical thinking, though it is almost always a matter of degree. It is also important to recognize that making mistakes is an essential part of learning and that it is far better that students make their own mistakes, than that they parrot the thinking of the text or teacher. It should also be recognized that some distortion usually results whenever we think within a point of view or frame of reference. Students should think with this awareness in mind, with some sense of the limitations of their own, the text's, the teacher's, the subject's perspective. See *perfections of thought.*

ambiguous: A sentence having two or more possible meanings. Sensitivity to ambiguity and vagueness in writing and speech is essential to good thinking. A *continual effort to be clear and precise in language usage is fundamental to education.* Ambiguity is a problem more of sentences than of individual words. Furthermore, not every sentence that can be construed in more than one way is problematic and deserving of analysis. Many sentences are clearly intended one way; any other construal is obviously absurd and not meant. For example, "Make me a sandwich." is never seriously intended to request metamorphic change. It is a poor example for teaching genuine insight into critical thinking. For an example of a problematic ambiguity, consider the statement, "Welfare is corrupt." Among the possible meanings of this sentence are the following: Those who administer welfare programs take bribes to administer welfare policy unfairly; Welfare policies are written in such a way that much of the money goes to people who don't deserve it rather than to those who do; A government that gives money to people who haven't earned it corrupts both the giver and the recipient. If two people are arguing about whether or not welfare is corrupt, but interpret the claim differently, they can make little or no progress; they aren't arguing about the same point. Evidence and considerations relevant to one interpretation may be irrelevant to others.

analyze: To break up a whole into its parts, to examine in detail so as to determine the nature of, to look more deeply into an issue or situation. *All learning presupposes some analysis of what we are learning,* if only by categorizing or labeling things in one way rather than another. Students should continually be asked to analyze their ideas, claims, experiences, interpretations, judgments, and theories and those they hear and read. See *elements of thought.*

argue: There are two meanings of this word that need to be distinguished: *1)* to argue in the sense of *to fight* or to emotionally disagree; and *2)* to give reasons for or against a proposal or proposition. In emphasizing critical thinking, we continually try to get our students to move from the first sense of the word to the second; that is, we try to get them to see the importance of *giving reasons* to support their views without getting their egos involved in what they are saying. This is a fundamental problem in human life. To argue in the critical thinking sense is to use logic and reason, and to bring forth facts to support or refute a point. It is done in a spirit of cooperation and good will.

argument: A reason or reasons offered for or against something, the offering of such reasons. This term refers to a discussion in which there is disagreement and suggests the use of logic and bringing forth of facts to support or refute a point. See *argue.*

to assume: To take for granted or to presuppose. Critical thinkers can and do make their assumptions explicit, assess them, and correct them. Assumptions can vary from the mundane to the problematic: I heard a scratch at the door. I got up to let the cat in. I *assumed* that only the cat makes that noise, and that he makes it only when he wants to be let in. Someone speaks gruffly to me. I feel guilty and hurt. I assume he is angry *at me,* that he is only angry at me when I do something bad, and that if he's angry at me, he dislikes me. *Notice that people often equate making assumptions with making false assumptions.* When people say, "Don't assume", this is what they mean. In fact, we cannot avoid making assumptions and some are justifiable. (For instance, we have assumed that people who buy this book can read English.) Rather than saying "Never assume", we say, "Be aware of and careful about the assumptions you make, and be ready to examine and critique them." See *assumption, elements of thought.*

assumption: A statement accepted or supposed as true without proof or demonstration; an unstated premise or belief. *All human thought and experience is based on assumptions.* Our thought must begin with something we take to be true in a particular context. We are typically unaware of what we assume and therefore rarely question our assumptions. Much of what is wrong with human thought can be found in the uncritical or unexamined assumptions that underlie it. For example, we often experience the world in such a way as to assume that we are observing things just as they are, as though we were seeing the world without the filter of a point of view. People we disagree with, of course, we recognize as *having a point of view.* One of the key dispositions of critical thinking is the on-going sense that as humans we always think within a perspective, that we virtually never experience things totally and absolutistically. There is a connection, therefore, between thinking so as to be *aware of our assumptions* and being *intellectually humble.*

authority: *1)* The power or supposed right to give commands, enforce obedience, take action, or make final decisions. *2)* A person with much knowledge and expertise in a field, hence reliable. Critical thinkers recognize that ultimate authority rests with reason and evidence, since it is only on the assumption that purported experts have the backing of reason and evidence that they rightfully gain authority. Much instruction discourages critical thinking by encouraging students to believe that whatever the text or teacher says is true. As a result, students do not learn how to assess authority. See *knowledge.*

bias: A mental leaning or inclination. We must clearly distinguish two different senses of the word 'bias'. One is neutral, the other negative. In the neutral sense we are referring simply to the fact that, *because of one's point of view, one notices some things rather than others,* emphasizes some points rather than others, and thinks in one direction rather than others. This is not in itself a criticism because *thinking within a point of view is unavoidable.* In the negative sense, we are implying *blindness or irrational resistance to weaknesses within one's own point of view* or to the strength or insight within a point of view one opposes. Fair-minded critical thinkers try to be aware of their bias (in sense one) and try hard to avoid bias (in sense two). Many people confuse these two senses. Many confuse bias with emotion or with evaluation, perceiving any expression of emotion or any use of evaluative words to be biased (sense two). Evaluative words that can be justified by reason and evidence are not biased in the negative sense. See *criteria, evaluation, judgment, opinion.*

clarify: To make easier to understand, to free from confusion or ambiguity, to remove obscurities. *Clarity* is a fundamental perfection of thought and *clarification* a fundamental aim in critical thinking. Students often do not see why it is important to write and speak clearly, why it is important to *say what you mean and mean what you say.* The key to clarification is *concrete, specific* examples. See *accurate, ambiguous, logic of language, vague.*

concept: An idea or thought, especially a generalized idea of a thing or of a class of things. Humans think within concepts or ideas. *We can never achieve command over our thoughts unless we learn how to achieve command over our concepts or ideas.* Thus we must learn how to identify the concepts or ideas we are using, contrast them with alternative concepts or ideas, and clarify what we include and exclude by means of them. For example, most people say they believe strongly in democracy, but few can clarify with examples what that word does and does not imply. *Most people confuse the meaning of words with cultural associations,* with the result that 'democracy' means to people whatever *we* do in running *our* government — any country that is different is undemocratic. We must distinguish the concepts implicit in the English language from the psychological associations surrounding that concept in a given social group or culture. The failure to develop this ability is a major cause of uncritical thought and selfish critical thought. See *logic of language.*

conclude/conclusion: To decide by reasoning, to infer, to deduce; the last step in a reasoning process; a judgment, decision, or belief formed after investigation or reasoning. All beliefs, decisions, or actions are based on human thought, but rarely as the result of conscious reasoning or deliberation. *All that we believe is,* one way or another, *based on conclusions* that we have come to during our lifetime. Yet, we rarely monitor our thought processes, we don't critically assess the conclusions we come to, to determine whether we have sufficient grounds or reasons for accepting them. People seldom recognize when they have come to a conclusion. They confuse their conclusions with evidence, and so cannot assess the reasoning that took them from evidence to conclusion. Recognizing that *human life is inferential,* that we continually come to conclusions about ourselves and the things and persons around us, is essential to thinking critically and reflectively.

consistency: To think, act, or speak in agreement with what has already been thought, done, or expressed; to have intellectual or moral integrity. Human life and thought is filled with inconsistency, hypocrisy, and contradiction. We often say one thing and do another, judge ourselves and our friends by one standard and our antagonists by another, lean over backwards to justify what we want or negate what does not serve our interests. Similarly, we often confuse desires with needs, treating our desires as equivalent to needs, putting what we want above the basic needs of others. *Logical and moral consistency are fundamental values of fair-minded critical thinking.* Social conditioning and native egocentrism often obscure social contradictions, inconsistency, and hypocrisy. See *personal contradiction, social contradiction, intellectual integrity, human nature.*

contradict/contradiction: To assert the opposite of; to be contrary to, go against; a statement in opposition to another; a condition in which things tend to be contrary to each other; inconsistency; discrepancy; a person or thing containing or composed of contradictory elements. See *personal contradiction, social contradiction.*

criterion (criteria, pl): A standard, rule, or test by which something can be judged or measured. Human life, thought, and action are based on human values. The standards by which we determine whether those values are achieved in any situation represent criteria. Critical thinking depends upon making explicit the standards or criteria for rational or justifiable thinking and behavior. See *evaluation.*

critical listening: A mode of monitoring how we are listening so as to maximize our accurate understanding of what another person is saying. By understanding the logic of human communication — that *everything spoken expresses point of view,* uses some ideas and not others, has implications, etc. — critical thinkers can listen so as to enter sympathetically and analytically into the perspective of others. See *critical speaking, critical reading, critical writing, elements of thought, intellectual empathy.*

critical person: One who has mastered a range of intellectual skills and abilities. If that person generally uses those skills to advance his or her own selfish interests, that person is a critical thinker only in a weak or qualified sense. If that person generally uses those skills fair-mindedly, entering empathically into the points of view of others, he or she is a critical thinker in the strong or fullest sense. See *critical thinking*.

critical reading: Critical reading is an active, intellectually engaged process in which the reader participates in an inner dialogue with the writer. Most people read uncritically and so miss some part of what is expressed while distorting other parts. A critical reader realizes the way in which *reading, by its very nature, means entering into a point of view other than our own,* the point of view of the writer. A critical reader actively looks for assumptions, key concepts and ideas, reasons and justifications, supporting examples, parallel experiences, implications and consequences, and any other structural features of the written text, to interpret and assess it accurately and fairly. See *elements of thought.*

critical society: A society which rewards adherence to the values of critical thinking and hence *does not use indoctrination and inculcation as basic modes of learning* (rewards reflective questioning, intellectual independence, and reasoned dissent). Socrates is not the only thinker to imagine a society in which independent critical thought became embodied in the concrete day-to-day lives of individuals; William Graham Sumner, North America's distinguished anthropologist, explicitly formulated the ideal:

> The critical habit of thought, if usual in a society, will pervade all its mores, because it is a way of taking up the problems of life. Men educated in it cannot be stampeded by stump orators and are never deceived by dithyrambic oratory. They are slow to believe. They can hold things as possible or probable in all degrees, without certainty and without pain. They can wait for evidence and weigh evidence, uninfluenced by the emphasis or confidence with which assertions are made on one side or the other. They can resist appeals to their dearest prejudices and all kinds of cajolery. Education in the critical faculty is the only education of which it can be truly said that it makes good citizens (*Folkways*, 1906).

Until critical habits of thought pervade our society, however, there will be a tendency for schools as social institutions to transmit the prevailing world view more or less uncritically, to transmit it as reality, not as a picture of reality. Education for critical thinking, then, requires that the school or classroom become a microcosm of a critical society. See *didactic instruction, dialogical instruction, intellectual virtues, knowledge.*

critical thinking: 1) Disciplined, self-directed thinking which exemplifies the perfections of thinking appropriate to a particular mode or domain of thinking. *2)* Thinking that displays mastery of intellectual skills and abilities. *3)* The art of thinking about your thinking while you are thinking in order to make your thinking better: more clear, more accurate, or more defensible. Critical thinking can be distinguished into two forms: "selfish" or "sophistic", on the one hand, and "fair-minded", on the other. In thinking critically we use our command of the elements of thinking to adjust our thinking successfully to the logical demands of a type or mode of thinking. See *critical person, critical society, critical reading, critical listening, critical writing, perfections of thought, elements of thought, domains of thought, intellectual virtues.*

critical writing: To express ourselves in language requires that we arrange our ideas in some relationships to each other. When accuracy and truth are at issue, then we must understand what our thesis is, how we can support it, how we can elaborate it to make it intelligible to others, what objections can be raised to it from other points of view, what the limitations are to our point of view, and so forth. *Disciplined writing requires disciplined thinking; disciplined thinking is achieved through disciplined writing.* See *critical listening, critical reading, logic of language.*

critique: An objective judging, analysis, or evaluation of something. The purpose of critique is the same as the purpose of critical thinking: to appreciate strengths as well as weaknesses, virtues as well as failings. *Critical thinkers critique in order to redesign, remodel, and make better.*

cultural association: Undisciplined thinking often reflects associations, personal and cultural, absorbed or uncritically formed. If a person who was cruel to me as a child had a particular tone of voice, I may find myself disliking a person who has the same tone of voice. Media advertising juxtaposes and joins logically unrelated things to influence our buying habits. Raised in a particular country or within a particular group within it, we form any number of mental links which, if they remain unexamined, unduly influence our thinking. See *concept, critical society.*

cultural assumption: Un-assessed (often implicit) belief adopted by virtue of upbringing in a society. Raised in a society, we unconsciously take on its point of view, values, beliefs, and practices. At the root of each of these are many kinds of assumptions. Not knowing that we perceive, conceive, think, and experience within assumptions we have taken in, we take ourselves to be perceiving "things as they are", not "things as they appear from a cultural vantage point". Becoming aware of our cultural assumptions so that we might critically examine them is a crucial dimension of critical thinking. It is, however, a dimension almost totally absent from schooling. Lip service to this ideal is common enough; a realistic emphasis is virtually unheard of. See *ethnocentricity, prejudice, social contradiction.*

data: Facts, figures, or information from which conclusions can be inferred, or upon which interpretations or theories can be based. As critical thinkers we must make certain to distinguish hard data from the inferences or conclusions we draw from them.

dialectical thinking: Dialogical thinking (thinking within more than one perspective) conducted to test the strengths and weaknesses of opposing points of view. (Court trials and debates are, in a sense, dialectical.) When thinking dialectically, reasoners pit two or more opposing points of view in competition with each other, developing each by providing support, raising objections, countering those objections, raising further objections, and so on. Dialectical thinking or discussion can be conducted so as to "win" by defeating the positions one disagrees with — using critical insight to support one's own view and point out flaws in other views (associated with critical thinking in the restricted or weak sense), or fair-mindedly, by conceding points that don't stand up to critique, trying to integrate or incorporate strong points found in other views, and using critical insight to develop a fuller and more accurate view (associated with critical thinking in the fuller or strong sense). See *monological problems.*

dialogical instruction: Instruction that fosters dialogical or dialectic thinking. Thus, when considering a question, the class brings all relevant subjects to bear and considers the perspectives of groups whose views are not canvassed in their texts — for example, "What did King George think of the *Declaration of Independence,* the Revolutionary War, the Continental Congress, Jefferson and Washington, etc.?" or, "How would an economist analyze this situation? A historian? A psychologist? A geographer?" See *critical society, didactic instruction, higher order learning, lower order learning, Socratic questioning, knowledge.*

dialogical thinking: Thinking that involves a dialogue or extended exchange between different points of view or frames of reference. Students learn best in dialogical situations, in circumstances in which they continually express their views to others and try to fit other's views into their own. See *Socratic questioning, monological thinking, multilogical thinking, dialectical thinking.*

didactic instruction: Teaching by telling. In didactic instruction, the teacher directly tells the student what to believe and think about a subject. The student's task is to remember what the teacher said and reproduce it on demand. In its most common form, this mode of teaching falsely assumes that one can directly give a person knowledge without that person having to think his or her way to it.

It falsely assumes that knowledge can be separated from understanding and justification. It confuses the ability to *state* a principle with *understanding* it, the ability to *supply* a definition with *knowing* a new word, and the act of *saying* that something is important with *recognizing* its importance. See *critical society, knowledge.*

domains of thought: Thinking can be oriented or structured with different issues or purposes in view. *Thinking varies in accordance with purpose and issue.* Critical thinkers learn to discipline their thinking to take into account the nature of the issue or domain. We see this most clearly when we consider the difference between issues and thinking within different academic disciplines or subject areas. Hence, mathematical thinking is quite different from, say, historical thinking. Mathematics and history, we can say then, represent different domains of thought. See the *logic of questions.*

egocentricity: A tendency to view everything in relationship to oneself; to confuse immediate perception (how things *seem)* with reality. One's desires, values, and beliefs (seeming to be self-evidently correct or superior to those of others) are often uncritically used as the norm of all judgment and experience. Egocentricity is one of the fundamental impediments to critical thinking. As one learns to think critically in a strong sense, one learns to become more rational, and less egocentric. See *human nature, strong sense critical thinker, ethnocentrism, sociocentrism, personal contradiction.*

elements of thought: All thought has a universal set of elements, each of which can be monitored for possible problems: Are we clear about our *purpose or goal?* about the *problem or question at issue?* about our *point of view or frame of reference?* about our *assumptions?* about the *claims* we are making? about the *reasons or evidence* upon which we are basing our claims? about our *inferences and line of reasoning?* about the *implications and consequences* that follow from our reasoning? Critical thinkers develop skills of identifying and assessing these elements in their thinking and in the thinking of others.

emotion: A feeling aroused to the point of awareness, often a strong feeling or state of excitement. When our egocentric emotions or feelings get involved, when we are excited by infantile anger, fear, jealousy, etc., our objectivity often decreases. Critical thinkers need to be able to monitor their egocentric feelings and use their rational passions to reason themselves into feelings appropriate to the situation as it really is, rather than to how it seems to their infantile ego. Emotions and feelings themselves are not irrational; however, it is common for people to feel strongly when their ego is stimulated. One way to understand the goal of strong sense critical thinking is as the attempt to develop rational feelings and emotions at the expense of irrational, egocentric ones. See *rational passions, intellectual virtues.*

empirical: Relying or based on experiment, observation, or experience rather than on theory or meaning. *It is important to continually distinguish those considerations based on experiment, observation, or experience from those based on the meaning of a word or concept or the implications of a theory.* One common form of uncritical or selfish critical thinking involves distorting facts or experience in order to preserve a preconceived meaning or theory. For example, a conservative may distort the facts that support a liberal perspective to prevent empirical evidence from counting against a theory of the world that he or she holds rigidly. Indeed, within all perspectives and belief systems many will distort the facts before they will admit to a weakness in their favorite theory or belief. See *data, fact, evidence.*

empirical implication: That which follows from a situation or fact, not due to the logic of language, but from experience or scientific law. The redness of the coil on the stove empirically implies dangerous heat.

ethnocentricity: A tendency to view one's own race or culture as central, based on the deep-seated belief that one's own group is superior to all others. Ethnocentrism is a form of egocentrism extended from the self to the group. Much uncritical or selfish critical thinking is either egocentric or ethnocentric in nature. ('Ethnocentrism' and 'sociocentrism' are used synonymously, for the most part, though 'sociocentricity' is broader, relating to *any* group, including, for example, sociocentricity regarding one's profession.) The "cure" for ethnocentrism or sociocentrism is empathic thought within the perspective of opposing groups and cultures. Such empathic thought is rarely cultivated in the societies and schools of today. Instead, many people develop an empty rhetoric of tolerance, saying that others have different beliefs and ways, but without seriously considering those beliefs and ways, what they mean to those others, and their reasons for maintaining them.

evaluation: To judge or determine the worth or quality of. *Evaluation has a logic and should be carefully distinguished from mere subjective preference.* The elements of its logic may be put in the form of questions which may be asked whenever an evaluation is to be carried out: *1)* Are we clear about *what precisely we are evaluating?; 2)* Are we clear about *our purpose?* Is our purpose legitimate?; *3)* Given our purpose, what are the *relevant criteria or standards* for evaluation?; *4)* Do we have *sufficient information* about that which we are evaluating? Is that *information relevant to the purpose?;* and *5)* Have we *applied our criteria accurately and fairly to the facts* as we know them? Uncritical thinkers often treat evaluation as mere preference or treat their evaluative judgments as direct observations not admitting of error.

evidence: The data on which a judgment or conclusion might be based or by which proof or probability might be established. Critical thinkers distinguish the evidence or raw data upon which they base their interpretations or conclusions from the inferences and assumptions that connect data to conclusions. Uncritical thinkers treat their conclusions as something given to them in experience, as something they directly observe in the world. As a result, they find it difficult to see why anyone might disagree with their conclusions. After all, the truth of their views is, they believe, right there for everyone to see! Such people find it difficult or even impossible to describe the evidence or experience without coloring that description with their interpretation.

explicit: Clearly stated and leaving nothing implied; *explicit* is applied to that which is so clearly stated or distinctly set forth that there should be no doubt as to the meaning; *exact and precise* in this connection both suggest that which is strictly defined, accurately stated, or made unmistakably clear; *definite* implies precise limitations as to the nature, character, meaning, etc. of something; *specific* implies the pointing up of details or the particularizing of references. Critical thinking often requires the ability to be explicit, exact, definite, and specific. Most students cannot make what is *implicit* in their thinking *explicit.* This deficiency hampers their ability to monitor and assess their thinking.

fact: What actually happened, what is true; verifiable by empirical means; distinguished from interpretation, inference, judgment, or conclusion; the raw data. There are distinct senses of the word 'factual': "True" (as opposed to "claimed to be true"); and "empirical" (as opposed to conceptual or evaluative). You may make many "factual claims" in one sense, that is, claims which can be verified or disproven by observation or empirical study, but I must evaluate those claims to determine if they are true. People often confuse these two senses, even to the point of accepting as true, statements which merely "seem factual", for example, "29.23 % of Americans suffer from depression." Before I accept this as true, I should assess it. I should ask such questions as "How do you know? How *could* this be known? Did you merely ask people if they were depressed and extrapolate those results? How exactly did you arrive at this figure?" Purported facts should be assessed for their accuracy, completeness, and relevance to the issue. Sources of purported facts should be assessed for their qualifications, track records, and impartiality. Education which stresses retention and repetition of factual claims stunts students' desire and ability to assess alleged facts, leaving them open to manipulation. Activities in which students are asked to "distinguish fact from opinion" often confuse these two senses. They encourage students to *accept as true* statements which merely "look like" facts. See *intellectual humility, knowledge.*

fair: Treating both or all sides alike without reference to one's own feelings or interests; *just* implies adherence to a standard of rightness or lawfulness without reference to one's own inclinations; *impartial* and *unbiased* both imply freedom from prejudice for or against any side; *dispassionate* implies the absence of passion or strong emotion, hence, connotes cool, disinterested judgment; *objective* implies a viewing of persons or things without reference to oneself, one's interests, etc.

faith: 1) Unquestioning belief in anything. *2)* Confidence, trust, or reliance. A critical thinker does not accept faith in the first sense, for every belief is reached on the basis of some thinking, which may or may not be justified. Even in religion one believes in one religion rather than another, and in doing so implies that there are good reasons for accepting one rather than another. A Christian, for example, believes that there are good reasons for not being an atheist, and Christians often attempt to persuade non-Christians to change their beliefs. In some sense, then, everyone has confidence in the capacity of his or her own mind to judge rightly on the basis of good reasons, and does not believe simply on the basis of blind faith.

fallacy/fallacious: An error in reasoning; flaw or defect in argument; an argument which doesn't conform to rules of good reasoning (especially one that appears to be sound). Containing or based on a fallacy; deceptive in appearance or meaning; misleading; delusive.

higher order learning: Learning through exploring the foundations, justification, implications, and value of a fact, principle, skill, or concept. *Learning so as to deeply understand.* One can learn in keeping with the rational capacities of the human mind or in keeping with its irrational propensities, cultivating the capacity of the human mind to discipline and direct its thought through commitment to intellectual standards, or one can learn through mere association. Education for critical thought produces higher order learning by helping students actively think their way to conclusions; discuss their thinking with other students and the teacher; entertain a variety of points of view; analyze concepts, theories, and explanations in their own terms; actively question the meaning and implications of what they learn; compare what they learn to what they have experienced; take what they read and write seriously; solve non-routine problems; examine assumptions; and gather and assess evidence. Students should learn each subject by engaging in thought within that subject. They should learn history by thinking historically, mathematics by thinking mathematically, etc. See *dialogical instruction, lower order learning, critical society, knowledge, principle, domains of thought.*

human nature: The common qualities of all human beings. People have both a primary and a secondary nature. Our primary nature is spontaneous, egocentric, and strongly prone to irrational belief formation. It is the basis for our instinctual thought. People need no training to believe what they want to believe: what serves their immediate interests, what preserves their sense of personal comfort and righteousness, what minimizes their sense of inconsistency, and what presupposes their own correctness. People need no special training to believe what those around them believe: what their parents and friends believe, what is taught to them by religious and school authorities, what is repeated often by the media, and what is commonly believed in the nation in which they are raised. People need no training to think that those who disagree with them are wrong and probably prejudiced. People need no training to assume that their own most fundamental beliefs are self-evidently true or easily justified by evidence. People naturally and spontaneously identify with their own beliefs. They experience most disagreement as personal attack. The resulting defensiveness interferes with their capacity to empathize with or enter into other points of view.

On the other hand, *people need extensive and systematic practice to develop their secondary nature, their implicit capacity to function as rational persons.* They need extensive and systematic practice to recognize the tendencies they have to form irrational beliefs. They need extensive practice to develop a dislike of inconsistency, a love of clarity, a passion to seek reasons and evidence and to be fair to points of view other than their own. People need extensive practice to recognize that they indeed have a point of view, that they live inferentially, that they do not have a direct pipeline to reality, that it is perfectly possible to have an overwhelming inner sense of the correctness of one's views and still be wrong. See *intellectual virtues.*

idea: Anything existing in the mind as an object of knowledge or thought; *concept* refers to generalized idea of a class of objects, based on knowledge of particular instances of the class; *conception*, often equivalent to concept, specifically refers to something conceived in the mind or imagined; *thought* refers to any idea, whether or not expressed, that occurs to the mind in reasoning or contemplation; *notion* implies vagueness or incomplete intention; *impression* also implies vagueness of an idea provoked by some external stimulus. Critical thinkers are aware of what ideas they are using in their thinking, where those ideas came from, and how to assess them.

imply/implication: A claim or truth which follows from other claims or truths. One of the most important skills of critical thinking is the ability to distinguish between what is actually implied by a statement or situation from what may be carelessly inferred by people. Critical thinkers try to *monitor their inferences to keep them in line with what is actually implied* by what they know. When speaking, critical thinkers *try to use words that imply only what they can legitimately justify.* They recognize that there are established word usages which generate established implications. To say of an act that it is murder, for example, is to imply that it is intentional and unjustified. See *clarify, precision, logic of language, critical listening, critical reading, elements of thought.*

infer/inference: An inference is a step of the mind, an intellectual act by which one concludes that something is so in light of something else's being so, or seeming to be so. If you come at me with a knife in your hand, I would probably infer that you mean to do me harm. Inferences can be strong or weak, justified or unjustified. Inferences are based upon assumptions. See *imply/implication.*

insight: The ability to see and clearly and deeply understand the inner nature of things. Instruction for critical thinking fosters insight rather than mere performance; it cultivates the achievement of deeper knowledge and understanding through insight. *Thinking one's way into and through a subject leads to insights* as one synthesizes what one is learning, relating one subject to other subjects and all subjects to personal experience. Rarely is insight formulated as a goal in present curricula and texts. See *dialogical instruction, higher order learning, lower order learning, didactic instruction, intellectual humility.*

intellectual autonomy: Having rational control of ones beliefs, values, and inferences. The ideal of critical thinking is to learn to think for oneself, to gain command over one's thought processes. Intellectual autonomy does not entail willfulness, stubbornness, or rebellion. It entails a commitment to analyzing and evaluating beliefs on the basis of reason and evidence, to question when it is rational to question, to believe when it is rational to believe, and to conform when it is rational to conform. See *know, knowledge.*

intellectual civility: A commitment to take others seriously as thinkers, to treat them as intellectual equals, to grant respect and full attention to their views — a commitment to persuade rather than browbeat. It is distinguished from intellectual rudeness: verbally attacking others, dismissing them, stereotyping their views. Intellectual civility is not a matter of mere courtesy, but arises from a sense that communication itself requires honoring others' views and their capacity to reason.

(intellectual) confidence or faith in reason: Confidence that in the long run *one's own higher interests and those of humankind at large will best be served by giving the freest play to reason* — by encouraging people to come to their own conclusions through a process of developing their own rational faculties; faith that (with proper encouragement and cultivation) people can learn to think for themselves, form rational viewpoints, draw reasonable conclusions, think coherently and logically, persuade each other by reason, and become reasonable, despite the deep-seated obstacles in the native character of the human mind and in society. Confidence in reason is developed through experiences in which one reasons one's way to insight, solves problems through reason, uses reason to persuade, is persuaded by reason. Confidence in reason is undermined when one is expected to perform tasks without understanding why, to repeat statements without having verified or justified them, to accept beliefs on the sole basis of authority or social pressure.

intellectual courage: The willingness to face and fairly assess ideas, beliefs, or viewpoints to which we have not given a serious hearing, regardless of our strong negative reactions to them. This courage arises from the recognition that *ideas considered dangerous or absurd are sometimes rationally justified* (in whole or in part), and that *conclusions or beliefs espoused by those around us or inculcated in us are sometimes false or misleading.* To determine for ourselves which is which, we must not passively and uncritically "accept" what we have "learned". Intellectual courage comes into play here, because inevitably we will come to see some truth in some ideas considered dangerous and absurd and some distortion or falsity in some ideas strongly held in our social group. It takes courage to be true to our own thinking in such circumstances. Examining cherished beliefs is difficult, and the penalties for non-conformity are often severe.

intellectual curiosity: A strong desire to deeply understand, to figure things out, to propose and assess useful and plausible hypotheses and explanations, to learn, to find out. People do not learn well, do not gain knowledge, unless they *want* knowledge — deep, accurate, complete understanding. When people lack passion for figuring things out (suffer from intellectual apathy), they tend to settle for an incomplete, incoherent, sketchy "sense" of things incompatible with a critically developed, richer, fuller conception. This trait can flourish only when it is allowed and encouraged, when people are allowed to pose and pursue questions of interest to them and when their intellectual curiosity pays off in increasing understanding.

intellectual discipline: The trait of thinking in accordance with intellectual standards, intellectual rigor, carefulness, order, conscious control. The undisciplined thinker neither knows nor cares when he or she comes to unwarranted conclusions, confuses distinct ideas, fails to consider pertinent evidence, and so on. Thus, intellectual discipline is at the very heart of becoming a critical person. It takes discipline of mind to keep oneself focused on the intellectual task at hand, to locate and carefully assess needed evidence, to systematically analyze and address questions and problems, to hold one's thinking to sufficiently high standards of clarity, precision, completeness, consistency, etc. Such discipline is achieved slowly, bit by bit, only in an atmosphere of intellectual rigor and is acquired only to the degree that one develops insight into elements and standards of reasoning.

intellectual empathy: Understanding the need to imaginatively put oneself in the place of others to genuinely understand them. We must recognize our egocentric tendency to identify truth with our immediate perceptions or long-standing beliefs. Intellectual empathy correlates with the ability to accurately reconstruct the viewpoints and reasoning of others and to *reason from premises, assumptions, and ideas other than our own.* This trait also requires that we remember occasions when we were wrong, despite an intense conviction that we were right, and consider that we might be similarly deceived in a case at hand.

intellectual humility: Awareness of the limits of one's knowledge, including sensitivity to circumstances in which one's native egocentrism is likely to function self-deceptively; sensitivity to bias and prejudice in, and limitations of one's viewpoint. Intellectual humility is based on the recognition that *no one should claim more than he or she actually knows.* It does not imply spinelessness or submissiveness. It implies the lack of intellectual pretentiousness, boastfulness, or conceit, combined with insight into the strengths or weaknesses of the logical foundations of one's beliefs.

intellectual integrity: Recognition of the need to be true to one's own thinking, to be consistent in the intellectual standards one applies, to hold oneself to the same rigorous standards of evidence and proof to which one holds one's antagonists, to practice what one advocates for others, and to honestly admit discrepancies and inconsistencies in one's own thought and action. This trait develops best in a supportive atmosphere in which people feel secure and free enough to honestly acknowledge their inconsistencies, and can develop and share realistic ways of ameliorating them. It requires honest acknowledgment of the difficulties of achieving greater consistency.

intellectual perseverance: Willingness and consciousness of the need to pursue intellectual insights and truths despite difficulties, obstacles, and frustrations; firm adherence to rational principles despite irrational opposition of others; a sense of the need to struggle with confusion and unsettled questions over an extended period of time in order to achieve deeper understanding or insight. This trait is undermined when teachers and others continually provide the answers, do students' thinking for them or substitute easy tricks, algorithms, and short cuts for careful, independent thought.

intellectual responsibility: The responsible person keenly feels the obligation to fulfill his or her duties; intellectual responsibility is the application of this trait to intellectual matters. Hence, the intellectually responsible person feels strongly obliged to achieve a high degree of precision and accuracy in his or her reasoning, is deeply committed to gathering complete, relevant, adequate evidence, etc. This sense of obligation arises when people recognize the need for meeting the intellectual standards required by rational, fair-minded thought.

intellectual sense of justice: Willingness and consciousness of the need to entertain all viewpoints sympathetically and to assess them with the same intellectual standards, without reference to one's own feelings or vested interests, or the feelings or vested interests of one's friends, community, or nation; implies adherence to intellectual standards without reference to one's own advantage or the advantage of one's group.

intellectual standards: Principles by which reasoning can be judged; requirements of quality reasoning. Intellectual standards are a pervasive part of critical; thinking. Thinking that qualifies as critical thinking is thinking clear, accurate, relevant to the question at issue, fair, precise, specific, plausible, consistent, logical, deep, broad, complete, and significant. Such standards are implicit in all aspects of critical thinking: where standards are not explicitly stated, they are presupposed. (For example, the critical thinker does not merely identify assumptions, but *accurately* identifies *significant* assumptions.)

intellectual virtues: The traits of mind and character necessary for right action and thinking; the traits of mind and character essential for fair-minded rationality; the traits that distinguish the narrow-minded, self-serving critical thinker from the open-minded, truth-seeking critical thinker. These *intellectual traits are interdependent.* Each is best developed while developing the others as well. They cannot be imposed from without; they must be cultivated by encouragement and example. People can come to deeply understand and accept these principles by analyzing their experiences of them: learning from an unfamiliar perspective, discovering you don't know as much as you thought, and so on. They include: intellectual sense of justice, intellectual perseverance, intellectual integrity, intellectual humility, intellectual empathy, intellectual courage, (intellectual) confidence in reason, and intellectual autonomy.

interpret/interpretation: To give one's own conception of, to place in the context of one's own experience, perspective, point of view, or philosophy. Interpretations should be distinguished from the facts, the evidence, the situation. (I may interpret someone's silence as an expression of hostility toward me. Such an interpretation may or may not be correct. I may have projected my patterns of motivation and behavior onto that person, or I may have accurately noticed this pattern in the other.) The best interpretations take the most evidence into account. Critical thinkers recognize their interpretations, distinguish them from evidence, consider alternative interpretations, and reconsider their interpretations in the light of new evidence. *All learning involves personal interpretation, since whatever we learn we must integrate into our own thinking and action.* What we learn must be given a meaning by us, must be meaningful to us, and hence involves interpretive acts on our part. Didactic instruction, in attempting to directly implant knowledge in students' minds, typically ignores the role of personal interpretation in learning.

intuition: The direct knowing or learning of something without the conscious use of reasoning. We sometimes seem to know or learn things without recognizing how we came to that knowledge. When this occurs, we experience an inner sense that what we believe is true. The problem is that

sometimes we are correct (and have genuinely experienced an intuition) and sometimes we are incorrect (having fallen victim to one of our prejudices). A critical thinker does not blindly accept that what he or she thinks or believes but cannot account for is necessarily true. A critical thinker realizes how easily we confuse intuitions and prejudices. Critical thinkers may follow their inner sense that something is so, but only with a healthy sense of intellectual humility.

There is a second sense of 'intuition' that is important for critical thinking, and that is the meaning suggested in the following sentence: "To develop your critical thinking abilities, it is important to develop your critical thinking *intuitions*." This sense of the word is connected to the fact that we can learn concepts at various levels of depth. If we learn nothing more than an abstract definition for a word and do not learn how to apply it effectively in a wide variety of situations, one might say that we end up with no *intuitive* basis for applying it. We lack the insight into how, when, and why it applies. Helping students to develop critical thinking intuitions is helping them gain the practical insights necessary for a ready and swift application of concepts to cases in a large array of circumstances. We want critical thinking to be "intuitive" to our students, ready and available for immediate translation into their everyday thought and experience.

irrational/irrationality: *1)* Lacking the power to reason. *2)* Contrary to reason or logic. *3)* Senseless, absurd. Uncritical thinkers have failed to develop the ability or power to reason well. Their beliefs and practices, then, are often contrary to reason and logic, and are sometimes senseless or absurd. It is important to recognize, however, that in societies with irrational beliefs and practices, it is not clear whether challenging those beliefs and practices — and therefore possibly endangering oneself — is rational or irrational. Furthermore, suppose one's vested interests are best advanced by adopting beliefs and practices that are contrary to reason. Is it then rational to follow reason and negate one's vested interests or follow one's interests and ignore reason? These very real dilemmas of everyday life represent on-going problems for critical thinkers. Selfish critical thinkers, of course, face no dilemma here because of their consistent commitment to advance their narrow vested interests. Fair-minded critical thinkers make these decisions self-consciously and honestly assess the results.

irrational learning: All rational learning presupposes rational assent. And, though we sometimes forget it, not all learning is automatically or even commonly rational. *Much that we learn in everyday life is quite distinctively irrational.* It is quite possible — and indeed the bulk of human learning is unfortunately of this character — *to come to believe any number of things without knowing how or why.* It is quite possible, in other words, to believe for irrational reasons: because those around us believe, because we are rewarded for believing, because we are afraid to disbelieve, because our vested interest is served by belief, because we are more comfortable with belief, or because we have ego identified ourselves, our image, or our personal being with belief. In all of these cases, our beliefs are without rational grounding, without good reason and evidence, without the foundation a rational person demands. We become rational, on the other hand, to the extent that our beliefs and actions are grounded in good reasons and evidence; to the extent that we recognize and critique our own irrationality; to the extent that we are not moved by bad reasons and a multiplicity of irrational motives, fears, and desires; to the extent that we have cultivated a passion for clarity, accuracy, and fair-mindedness. These global skills, passions, and dispositions, integrated into behavior and thought, characterize the rational, the educated, and the critical person. See *higher and lower order learning, knowledge, didactic instruction.*

judgment: *1)* The act of judging or deciding. *2)* Understanding and good sense. A person has good judgment when they typically judge and decide on the basis of understanding and good sense. Whenever we form a belief or opinion, make a decision, or act, we do so on the basis of implicit or explicit judgments. All thought presupposes making judgments concerning what is so and what is not so, what is true and what is not. To cultivate people's ability to think critically is to foster their judgment, to help them to develop the habit of judging on the basis of reason, evidence, logic, and good sense. Good judgment is developed, not by merely learning about principles of good judgment, but by frequent practice judging and assessing judgments.

justify/justification: The act of showing a belief, opinion, action, or policy to be in accord with reason and evidence, to be ethically acceptable, or both. Education should foster reasonability in students. This requires that both teachers and students develop the disposition to ask for and give justifications for beliefs, opinions, actions, and policies. Asking for a justification should not, then, be viewed as an insult or attack, but rather as a normal act of a rational person. Didactic modes of teaching that do not encourage students to question the justification for what is asserted fail to develop a thoughtful environment conducive to education.

know: To have a clear perception or understanding of, to be sure of, to have a firm mental grasp of; *information* applies to data that are gathered in any way, as by reading, observation, hearsay, etc. and does not necessarily connote validity; *knowledge* applies to any body of facts gathered by study, observation, etc. and to the ideas inferred from these facts, and connotes an *understanding* of what is known. Critical thinkers need to distinguish knowledge from opinion and belief. See *knowledge.*

knowledge: The act of having a clear and justifiable grasp of what is so or of how to do something. Knowledge is based on understanding or skill, which in turn are based on thought, study, and experience. 'Thoughtless knowledge' is a contradiction. 'Blind knowledge' is a contradiction. 'Unjustifiable knowledge' is a contradiction. Knowledge implies justifiable belief or skilled action. Hence, when students blindly memorize and are tested for recall, they are not being tested for knowledge. *Knowledge is continually confused with recall in present-day schooling.* This confusion is a deep-seated impediment to the integration of critical thinking into schooling. *Genuine knowledge is inseparable from thinking minds.* We often wrongly talk of knowledge as though it could be divorced from thinking, as though it could be gathered up by one person and given to another in the form of a collection of sentences to remember. When we talk in this way, we forget that *knowledge,* by its very nature, *depends on thought.* Knowledge is produced by thought, analyzed by thought, comprehended by thought, organized, evaluated, maintained, and transformed by thought. Knowledge can be *acquired only* through thought. Knowledge exists, properly speaking, only in minds that have comprehended and justified it through thought. Knowledge is not to be confused with belief nor with symbolic representation of belief. Humans easily and frequently believe things that are false or believe things to be true without knowing them to be so. A book contains knowledge only in a derivative sense, only because minds can thoughtfully read it and through that process gain knowledge.

logic: 1) Correct reasoning or the study of correct reasoning and its foundations. *2)* The relationships between propositions (supports, assumes, implies, contradicts, counts against, is relevant to, ...). *3)* The system of principles, concepts, and assumptions that underlie any discipline, activity, or practice. *4)* The set of rational considerations that bear upon the truth or justification of any belief or set of beliefs. *5)* The set of rational considerations that bear upon the settlement of any question or set of questions. The word 'logic' covers a range of related concerns all bearing upon the question of rational justification and explanation. *All human thought and behavior is to some extent based on logic* rather than instinct. Humans try to figure things out using ideas, meanings, and thought. Such intellectual behavior inevitably involves "logic" or considerations of a logical sort: some sense of what is relevant and irrelevant, of what supports and what counts against a belief, of what we should and should not assume, of what we should and should not claim, of what we do and do not know, of what is and is not implied, of what does and does not contradict, of what we should or should not do or believe. *Concepts have a logic* in that we can investigate the conditions under which they do and do not apply, of what is relevant or irrelevant to them, of what they do or don't imply, etc. *Questions have a logic* in that we can investigate the conditions under which they can be settled. *Disciplines have a logic* in that they have purposes and a set of logical structures that bear upon those purposes: assumptions, concepts, issues, data, theories, claims, implications, consequences, etc. The concept of logic is a seminal notion in critical thinking. Unfortunately, it takes a considerable length of time before most people become comfortable with its multiple uses. In part, this is due to people's failure to monitor their own thinking in keeping with the standards of reason and logic. This is not to deny, of course, that logic is involved in all human thinking. It is

rather to say that the logic we use is often implicit, unexpressed, and sometimes contradictory. See *knowledge, higher and lower order learning, the logic of a discipline, the logic of language, the logic of questions.*

the logic of a discipline: The notion that every technical term has logical relationships with other technical terms, that some terms are logically more basic than others, and that every discipline relies on concepts, assumptions, and theories, makes claims, gives reasons and evidence, avoids contradictions and inconsistencies, has implications and consequences, etc. Though all students study disciplines, most are ignorant of the logic of the disciplines they study. This severely limits their ability to grasp the discipline as a whole, to think independently within it, to compare and contrast it with other disciplines, and to apply it outside the context of academic assignments. Typically now, students do not look for seminal terms as they study an area. They do not strive to translate technical terms into analogies and ordinary words they understand or distinguish technical from ordinary uses of terms. They do not look for the basic assumptions of the disciplines they study. Indeed, on the whole, they do not know what assumptions are nor why it is important to examine them. What they have in their heads exists like so many BB's in a bag. Whether one thought supports or follows from another, whether one thought elaborates another, exemplifies, presupposes, or contradicts another, are matters students have not learned to think about. They have not learned to use thought to understand thought, which is another way of saying that they have not learned how to use thought to gain knowledge. *Instruction for critical thinking cultivates the students' ability to make explicit the logic of what they study.* This emphasis gives depth and breath to study and learning. It lies at the heart of the differences between lower order and higher order learning. See *knowledge.*

the logic of language: For a language to exist and be learnable by persons from a variety of cultures, it is necessary that *words have definite uses and defined concepts that transcend particular cultures.* The English language, for example, is learned by many peoples of the world unfamiliar with English or North American cultures. Critical thinkers must learn to use their native language with precision, in keeping with educated usage. Unfortunately, many students do not understand the significant relationship between precision in language usage and precision in thought. Consider, for example, how most students relate to their native language. If one questions them about the meanings of words, their account is typically incoherent. They often say that people have their own meanings for all the words they use, not noticing that, were this true, we could not understand each other. Students speak and write in vague sentences because they have no rational criteria for choosing words — they simply write whatever words pop into their heads. They do not realize that every language has a highly refined logic one must learn in order to express oneself precisely. They do not realize that even words similar in meaning typically have different implications. Consider, for example, the words explain, expound, explicate, elucidate, interpret, and construe. *Explain* implies the process of making clear and intelligible something not understood or known. *Expound* implies a systematic and thorough explanation, often by an expert. *Explicate* implies a scholarly analysis developed in detail. *Elucidate* implies a shedding of light upon by clear and specific illustration or explanation. *Interpret* implies the bringing out of meanings not immediately apparent. *Construe* implies a particular interpretation of something whose meaning is ambiguous. See *clarify, concept.*

the logic of questions: The range of rational considerations that bear upon the settlement of a given question or group of questions. A critical thinker is adept at analyzing questions to determine what, precisely, a question asks and how to go about rationally settling it. A critical thinker recognizes that different kinds of questions often call for different modes of thinking, different kinds of considerations, and different procedures and techniques. Uncritical thinkers often confuse distinct questions and use considerations irrelevant to an issue while ignoring relevant ones.

lower order learning: Learning by rote memorization, association, and drill. There are a variety of forms of lower order learning in the schools which we can identify by understanding the relative *lack of logic informing them.* Paradigmatically, lower order learning is learning by sheer

association or rote. Hence students come to think of history class, for example, as a place where you hear names, dates, places, events, and outcomes; where you try to remember them and state them on tests. Math comes to be thought of as numbers, symbols, and formulas — mysterious things you mechanically manipulate as the teacher told you in order to get the right answer. Literature is often thought of as uninteresting stories to remember along with what the teacher said is important about them. Consequently, students leave with a jumble of undigested fragments, scraps left over after they have forgotten most of what they stored in their short-term memories for tests. Virtually never do they grasp the logic of what they learn. Rarely do they relate what they learn to their own experience or critique each by means of the other. Rarely do they try to test what they learn in everyday life. Rarely do they ask "Why is this so? How does this relate to what I already know? How does this relate to what I am learning in other classes?" To put the point in a nutshell, very few students think of what they are learning as worthy of being arranged logically in their minds or have the slightest idea of how to do so. See *didactic instruction, monological and multilogical problems and thinking.*

monological (one-dimensional) problems: Problems that can be solved by reasoning exclusively within one point of view or frame of reference. For example, consider the following problems: *1)* Ten full crates of walnuts weigh 410 pounds, whereas an empty crate weighs 10 pounds. How much do the walnuts alone weigh?; and *2)* In how many days of the week does the third letter of the day's name immediately follow the first letter of the day's name in the alphabet? I call these problems and the means by which they are solved "monological". They are settled within one frame of reference with a definite set of logical moves. When the right set of moves is performed, the problem is settled. The answer or solution proposed can be shown by standards implicit in the frame of reference to be the "right" answer or solution. *Most important human problems are multilogical rather than monological,* non-atomic problems inextricably joined to other problems, with some conceptual messiness to them and very often with important values lurking in the background. When the problems have an empirical dimension, that dimension tends to have a controversial scope. In multilogical problems, it is often arguable how some facts should be considered and interpreted, and how their significance should be determined. When they have a conceptual dimension, there tend to be arguably different ways to pin the concepts down. Though life presents us with predominantly multilogical problems, schooling today over-emphasizes monological problems. Worse, and more frequently, present instructional practices treat multilogical problems as though they were monological. The posing of multilogical problems, and their consideration from multiple points of view, play an important role in the cultivation of critical thinking and higher order learning.

monological (one-dimensional) thinking: Thinking that is conducted exclusively within one point of view or frame of reference: figuring our how much this $67.49 pair of shoes with a 25% discount will cost me; learning what signing this contract obliges me to do; finding out when Kennedy was elected President. A person can think monologically whether or not the question is genuinely monological. (For example, if one considers the question, "Who caused the Civil War?" only from a Northerner's perspective, one is thinking monologically about a multilogical question.) The strong sense critical thinker avoids monological thinking when the question is multi-logical. Moreover, higher order learning requires multi-logical thought, even when the problem is monological (for example, learning a concept in chemistry), since students must explore and assess their original beliefs to develop insight into new ideas.

multilogical (multi-dimensional) problems: Problems that can be analyzed and approached from more than one, often from conflicting, points of view or frames of reference. For example, many ecological problems have a variety of dimensions to them: historical, social, economic, biological, chemical, moral, political, etc. A person comfortable thinking about multilogical problems is comfortable thinking within multiple perspectives, in engaging in dialogical and dialectical thinking, in practicing intellectual empathy, in thinking across disciplines and domains. See *monological problems, the logic of questions, the logic of disciplines, intellectual empathy, dialogical instruction.*

multilogical thinking: Thinking that sympathetically enters, considers, and reasons within multiple points of view. See *multilogical problems, dialectical thinking, dialogical instruction.*

national bias: Prejudice in favor of one's country, it's beliefs, traditions, practices, image, and world view; a form of sociocentrism or ethnocentrism. It is natural, if not inevitable, for people to be favorably disposed toward the beliefs, traditions, practices, and world view within which they were raised. Unfortunately, this favorable inclination commonly becomes a form of prejudice: a more or less rigid, irrational ego-identification which significantly distorts one's view of one's own nation and the world at large. It is manifested in a tendency to mindlessly take the side of one's own government, to uncritically accept governmental accounts of the nature of disputes with other nations, to uncritically exaggerate the virtues of one's own nation while playing down the virtues of "enemy" nations. National bias is reflected in the press and media coverage of every nation of the world. Events are included or excluded according to what appears significant within the dominant world view of the nation, and are shaped into stories to validate that view. Though constructed to fit into a particular view of the world, the stories in the news are presented as neutral, objective accounts, and uncritically accepted as such because people tend to uncritically assume that their own view of things is the way things really are. To become responsible critically thinking citizens and fair-minded people, students must practice identifying national bias in the news and in their texts, and to broaden their perspective beyond that of uncritical nationalism. See *ethnocentrism, sociocentrism, bias, prejudice, world view, intellectual empathy, critical society, dialogical instruction, knowledge.*

opinion: A belief, typically one open to dispute. Sheer unreasoned opinion should be distinguished from reasoned judgment — beliefs formed on the basis of careful reasoning. See *evaluation, judgment, justify, know, knowledge, reasoned judgment.*

the perfections of thought: Thinking, as an attempt to understand the world as it is, has a natural excellence or fitness to it. This excellence is manifest in its *clarity, precision, specificity, accuracy, relevance, consistency, logicalness, depth, completeness, significance, fairness, and adequacy.* These perfections are general canons for thought; they represent legitimate concerns irrespective of the discipline or domain of thought. To develop one's mind and discipline one's thinking with respect to these standards *requires extensive practice and long-term cultivation.* Of course, achieving these standards is a relative matter and varies somewhat among domains of thought. Being *precise* while doing mathematics is not the same as being precise while writing a poem, describing an experience, or explaining a historical event. Furthermore, one perfection of thought may be periodically incompatible with the others: adequacy to purpose. Time and resources sufficient to thoroughly analyze a question or problem is all too often an unaffordable luxury. Also, since the social world is often irrational and unjust, because people are often manipulated to act against their interests, and because skilled thought often serves vested interest, thought adequate to these manipulative purposes may require *skilled violation of the common standards for good thinking.* Skilled propaganda, skilled political debate, skilled defense of a group's interests, skilled deception of one's enemy may require the violation or selective application of any of the above standards. Perfecting one's thought as an instrument for success in a world based on power and advantage differs from perfecting one's thought for the apprehension and defense of fair-minded truth. To *develop one's critical thinking skills merely to the level of adequacy for social success is to develop those skills in a lower or* weaker *sense.*

personal contradiction: An inconsistency in one's personal life, wherein one says one thing and does another, or uses a double standard, judging oneself and one's friends by an easier standard than that used for people one doesn't like; typically a form of hypocrisy accompanied by self-deception. Most personal contradictions remain unconscious. People too often ignore the difficulty of becoming intellectually and morally consistent, preferring instead to merely admonish others. Personal contradictions are more likely to be discovered, analyzed, and reduced in an atmosphere in which

they can be openly admitted and realistically considered without excessive penalty. See *egocentricity, intellectual integrity.*

perspective (point of view): Human thought is relational and selective. It is impossible to understand any person, event, or phenomenon from every vantage point simultaneously. Our purposes often control how we see things. Critical thinking requires that this fact be taken into account when analyzing and assessing thinking. This is not to say that human thought is incapable of truth and objectivity, but only that human truth, objectivity, and insight is virtually always limited and partial, virtually never total and absolute. The hard sciences are themselves a good example of this point, since qualitative realities are systematically ignored in favor of quantifiable realities.

precision: The quality of being accurate, definite, and exact. The standards and modes of precision vary according to subject and context. See *the logic of language, elements of thought.*

prejudice: A judgment, belief, opinion, point of view — favorable or unfavorable — formed before the facts are known, resistant to evidence and reason, or in disregard of facts which contradict it. Self-announced prejudice is rare. Prejudice almost always exists in obscured, rationalized, socially validated, functional forms. It enables people to sleep peacefully at night even while flagrantly abusing the rights of others. It enables people to get more of what they want, or to get it more easily. It is often sanctioned with a superabundance of pomp and self-righteousness. Unless we recognize these powerful tendencies toward selfish thought in our social institutions, even in what appear to be lofty actions and moralistic rhetoric, we will not face squarely the problem of prejudice in human thought and action. Uncritical and selfishly critical thought are often prejudiced. Most instruction in schools today, because students do not think their way to what they accept as true, tends to give students prejudices rather than knowledge. For example, partly as a result of schooling, people often accept as authorities those who liberally sprinkle their statements with numbers and intellectual-sounding language, however irrational or unjust their positions. This prejudice toward pseudo-authority impedes rational assessment. See *insight, knowledge.*

premise: A proposition upon which an argument is based or from which a conclusion is drawn. A starting point of reasoning. For example, one might say, in commenting on someone's reasoning, "You seem to be reasoning from the premise that everyone is selfish in everything they do. Do you hold this belief?"

principle: A fundamental truth, law, doctrine, value, or commitment, upon which others are based. Rules, which are more specific, and often superficial and arbitrary, are based on principles. Rules are more algorithmic; they needn't be understood to be followed. Principles must be understood to be appropriately applied or followed. Principles go to the heart of the matter. Critical thinking is dependent on principles, not rules and procedures. Critical thinking is principled, not procedural, thinking. Principles cannot be truly grasped through didactic instruction; they must be practiced and applied to be internalized. See *higher order learning, lower order learning, judgment.*

problem: A question, matter, situation, or person that is perplexing or difficult to figure out, handle, or resolve. Problems, like questions, can be divided into many types. Each has a (particular) logic. See *logic of questions, monological problems, multilogical problems.*

problem-solving: Whenever a problem cannot be solved formulaically or robotically, critical thinking is required: first, to determine the nature and dimensions of the problem, and then, in the light of the first, to determine the considerations, points of view, concepts, theories, data, and reasoning relevant to its solution. Extensive practice in independent problem-solving is essential to developing critical thought. Problem-solving is rarely best approached procedurally or as a series of rigidly followed steps. For example, problem-solving schemas typically begin, "State the problem." Rarely can problems be precisely and fairly stated prior to analysis, gathering of evidence, and dialogical or dialectical thought wherein several provisional descriptions of the problem are proposed, assessed, and revised.

proof (prove): Evidence or reasoning so strong or certain as to demonstrate the truth or acceptability of a conclusion beyond a reasonable doubt. How strong evidence or reasoning have to be to demonstrate what they purport to prove varies from context to context, depending on the significance of the conclusion or the seriousness of the implications following from it. See *domain of thought.*

rational/rationality: That which conforms to principles of good reasoning, is sensible, shows good judgment, is consistent, logical, complete, and relevant. Rationality is a summary term like 'virtue' or 'goodness'. It is manifested in an unlimited number of ways and depends on a host of principles. There is some ambiguity in it, depending on whether one considers only the logicalness and effectiveness by which one pursues one's ends, or whether it includes the assessment of ends themselves. There is also ambiguity in whether one considers selfish ends to be rational, even when they conflict with what is just. Does a rational person have to be just or only skilled in pursuing his or her interests? Is it rational to be rational in an irrational world? See *perfections of thought, irrational/irrationality, logic, intellectual virtues, weak sense critical thinking, strong sense critical thinking.*

rational emotions/passions: R. S. Peters has explained the significance of the affective side of reason and critical thought in his defense of the necessity of "rational passions":

> There is, for instance, the hatred of contradictions and inconsistencies, together with the love of clarity and hatred of confusion without which words could not be held to relatively constant meanings and testable rules and generalizations stated. A reasonable man cannot, without some special explanation, slap his sides with delight or express indifference if he is told that what he says is confused, incoherent, and perhaps riddled with contradictions.
>
> Reason is the antithesis of arbitrariness. In its operation it is supported by the appropriate passions which are mainly negative in character — the hatred of irrelevance, special pleading, and arbitrary fiat. The more developed emotion of indignation is aroused when some excess of arbitrariness is perpetuated in a situation where people's interests and claims are at stake. The positive side of this is the passion for fairness and impartial consideration of claims....
>
> A man who is prepared to reason must feel strongly that he must follow the arguments and decide things in terms of where they lead. He must have a sense of the giveness of the impersonality of such considerations. In so far as thoughts about persons enter his head they should be tinged with the respect which is due to another who, like himself, may have a point of view which is worth considering, who may have a glimmering of the truth which has so far eluded himself. A person who proceeds in this way, who is influenced by such passions, is what we call a reasonable man.

rational self: Our character and nature to the extent that we seek to base our beliefs and actions on good reasoning and evidence. Who we are, what our true character is, or our predominant qualities are, is always somewhat or even greatly different from who we *think* we are. Human egocentrism and accompanying self-deception often stand in the way of our gaining more insight into ourselves. We can develop a rational self, become a person who gains significant insight into what our true character is, only by reducing our egocentrism and self-deception. Critical thinking is essential to this process.

rational society: See *critical society.*

reasoned judgment: Any belief or conclusion reached on the basis of careful thought and reflection, distinguished from mere or unreasoned opinion on the one hand, and from sheer fact on the other. Few people have a clear sense of which of their beliefs are based on reasoned judgment and which on mere opinion. Moral or ethical questions, for example, are questions requiring reasoned judgment. One way of conceiving of subject-matter education is as developing students' ability to engage in reasoned judgment in accordance with the standards of each subject.

reasoning: The mental processes of those who reason; especially the drawing of conclusions or inferences from observations, facts, or hypotheses; the evidence or arguments used in this procedure. A critical thinker tries to develop the capacity to transform thought into reasoning at will, or rather, the ability to make his or her inferences explicit, along with the assumptions or premises upon which those inferences are based. Reasoning is a form of explicit inferring, usually involving multiple steps. When students write a persuasive paper, for example, we want them to be clear about their reasoning.

reciprocity: The act of entering empathically into the point of view or line of reasoning of others; learning to think as others do and by that means sympathetically assessing that thinking. (Reciprocity requires creative imagination as well as intellectual skill and a commitment to fairmindedness.)

relevant: Bearing upon or relating to the matter at hand; *relevant* implies close logical relationship with, and importance to, the matter under consideration; *germane* implies such close natural connection as to be highly appropriate or fit; *pertinent* implies an immediate and direct bearing on the matter at hand (a pertinent suggestion); *apposite* applies to that which is both relevant and happily suitable or appropriate; *applicable* refers to that which can be brought to bear upon a particular matter or problem. Students often have problems sticking to an issue and distinguishing information that bears upon a problem from information that does not. Merely reminding students to limit themselves to relevant considerations fails to solve this problem. The usual way of teaching students the term 'relevant' is to mention only clear-cut cases of relevance and irrelevance. Consequently, students do not learn that not everything that *seems* relevant is, or that some things which *do not seem* relevant are. Sensitivity to (ability to judge) relevance can only be developed with continual practice — practice distinguishing relevant from irrelevant data, evaluating or judging relevance, arguing for and against the relevance of facts and considerations.

self-deception: Deceiving one's self about one's true motivations, character, identity, etc. One possible definition of the human species is "The self-deceiving Animal". Self-deception is a fundamental problem in human life and the cause of much human suffering. Overcoming self-deception through self-critical thinking is a fundamental goal of strong sense critical thinking. See *egocentric, rational self, personal contradiction, social contradiction, intellectual virtues.*

social contradiction: An inconsistency between what a society preaches and what it practices. In every society there is some degree of inconsistency between its image of itself and its actual character. Social contradiction typically correlates with human self-deception on the social or cultural level. Critical thinking is essential for the recognition of inconsistencies, and recognition is essential for reform and eventual integrity.

sociocentricity: The assumption that one's own social group is inherently and self-evidently superior to all others. When a group or society sees itself as superior, and so considers its views as correct or as the only reasonable or justifiable views, and all its actions as justified, there is a tendency to presuppose this superiority in all of its thinking and thus, to think closedmindedly. All dissent and doubt are considered disloyal and rejected without consideration. Few people recognize the sociocentric nature of much of their thought.

Socratic questioning: A mode of questioning that deeply probes the meaning, justification, or logical strength of a claim, position, or line of reasoning. Socratic questioning can be carried out in a variety of ways and adapted to many levels of ability and understanding. See *elements of thought, dialogical instruction, knowledge.*

specify/specific: To mention, describe, or define in detail; limiting or limited; specifying or specified; precise; definite. Student thinking, speech, and writing tend to be vague, abstract, and ambiguous rather than specific, concrete, and clear. Learning how to state one's views specifically is essential to learning how to think clearly, precisely, and accurately. See *perfections of thought.*

strong sense critical thinker: One who is predominantly characterized by the following traits: *1)* an ability to question deeply one's own framework of thought; *2)* an ability to reconstruct sympathetically and imaginatively the strongest versions of points of view and frameworks of thought opposed to one's own; and *3)* an ability to reason dialectically (multilogically) in such a way as to determine when one's own point of view is at its weakest and when an opposing point of view is at its strongest. Strong sense critical thinkers are not routinely blinded by their own points of view. They know they have points of view and therefore recognize on what framework of assumptions and ideas their own thinking is based. They realize the necessity of putting their own assumptions and ideas to the test of the strongest objections that can be leveled against them. Teaching for critical thinking in the strong sense is teaching so that students explicate, understand, and critique their own deepest prejudices, biases, and misconceptions, thereby discovering and contesting their own egocentric and sociocentric tendencies. Only if we contest our inevitable egocentric and sociocentric habits of thought, can we hope to think in a genuinely rational fashion. Only dialogical thinking about basic issues that genuinely matter to the individual provides the kind of practice and skill essential to strong sense critical thinking.

Students need to develop all critical thinking skills in dialogical settings to achieve ethically rational development, that is, genuine fair-mindedness. If critical thinking is taught simply as atomic skills separate from the empathic practice of entering into points of view that students are fearful of or hostile toward, they will simply find additional means of rationalizing prejudices and preconceptions, or convincing people that their point of view is the correct one. They will be transformed from vulgar to sophisticated (but not to strong sense) critical thinkers.

teach: The basic inclusive word for the imparting of knowledge or skills. It usually connotes some individual attention to the learner; *instruct* implies systematized teaching, usually in some particular subject; *educate* stresses the development of latent faculties and powers by formal, systematic teaching, especially in institutions of higher learning; *train* implies the development of a particular faculty or skill or instruction toward a particular occupation, as by methodical discipline, exercise, etc. See *knowledge.*

theory:: A systematic statement of principles involved in a subject; a formulation of apparent relationships or underlying principles of certain observed phenomena which has been verified to some degree. Often without realizing it, we form theories that help us make sense of the people, events, and problems in our lives. Critical thinkers put their theories to the test of experience and give due consideration to the theories of others. Critical thinkers do not take their theories to be facts.

think: The general word meaning to exercise the mental faculties so as to form ideas, arrive at conclusions, etc.; *reason* implies a logical sequence of thought, starting with what is known or assumed and advancing to a definite conclusion through the inferences drawn; *reflect* implies a turning of one's thoughts back on a subject and connotes deep or quiet continued thought; *speculate* implies a reasoning on the basis of incomplete or uncertain evidence and therefore stresses the conjectural character of the opinions formed; *deliberate* implies careful and thorough consideration of a matter in order to arrive at a conclusion. Though everyone thinks, few people think critically. We don't need instruction to think; we think spontaneously. We need instruction to learn how to discipline and direct our thinking on the basis of sound intellectual standards. See *elements of thought, perfections of thought.*

truth: Conformity to knowledge, fact, actuality, or logic: a statement proven to be or accepted as true, not false or erroneous. Most people uncritically assume their views to be correct and true. Most people, in other words, assume themselves to possess the truth. Critical thinking is essential to avoid this, if for no other reason.

uncritical person: One who has not developed intellectual skills (naive, conformist, easily manipulated, dogmatic, easily confused, unclear, close-minded, narrow-minded, careless in word choice, inconsistent, unable to distinguish evidence from interpretation). Un-criticalness is a fundamental problem in human life, for when we are uncritical we nevertheless think of ourselves as critical. The first step in becoming a critical thinker consists in recognizing that we are uncritical. Teaching for insight into un-criticalness is an important part of teaching for criticalness.

vague: Not clearly, precisely, or definitely expressed or stated; not sharp, certain, or precise in thought, feeling, or expression. Vagueness of thought and expression is a major obstacle to the development of critical thinking. We cannot begin to test our beliefs until we recognize clearly what they are. We cannot disagree with what someone says until we are clear about what they mean. Students need much practice in transforming vague thoughts into clear ones. See *ambiguous, clarify, concept, logic, logic of questions, logic of language.*

verbal implication: That which follows, according to the logic of the language. If I say, for example, that someone used flattery on me, I *imply* that the compliments were insincere and given only to make me feel positively toward that person, to manipulate me against my reason or interest for some end. *See imply, infer, empirical implication, elements of thought.*

weak sense critical thinkers: *1)* Those who do not hold themselves or those with whom they ego-identify to the same intellectual standards to which they hold "opponents". *2)* Those who have not learned how to reason empathically within points of view or frames of reference with which they disagree. *3)* Those who tend to think monologically. *4)* Those who do not genuinely accept, though they may verbally espouse, the values of critical thinking. *5)* Those who use the intellectual skills of critical thinking selectively and self-deceptively to foster and serve their vested interests (at the expense of truth); able to identify flaws in the reasoning of others and refute them; able to shore up their own beliefs with reasons.

world view: All human action takes place within a way of looking at and interpreting the world. As schooling now stands, very little is done to help students to grasp how they are viewing the world and how those views determine the character of their experience, their interpretations, their conclusions about events and persons, etc. In teaching for critical thinking in a strong sense, we make the discovery of one's own world view and the experience of other people's world views a fundamental priority. See *bias, interpret.*

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