Research Findings and Policy Recommendations

Study of 38 Public Universities and 28 Private Universities to Determine Faculty Emphasis on Critical Thinking in Instruction

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Executive Summary

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 postsecondary 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.

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, and a separate sample of Arts and Sciences faculty teaching courses in Commission-approved subject matter programs.

There were three major objectives in this study. The first was to assess current teaching practices and knowledge of critical thinking among faculty teaching in teacher preparation programs in California. The second was to identify exemplary teaching practices that enhance critical thinking. The third was to develop policy recommendations based on the results of the study. The study included 38 public colleges and universities and 28 private ones.

The Concept of Critical Thinking and Problem Solving Used in the Study

The concept of critical thinking and problem solving used in this study is "minimalist," that is, one which captures the essential dimensions of the concept reflected the following: its etymology and dictionary definition, major definitions and explanations in the literature, a brief history of the idea, major tests of critical thinking, and the basic values it presupposes.

This minimalist concept of critical thinking is 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. It assumes that sound critical thinking maximizes our ability to solve problems of importance to us by helping us both to avoid common mistakes and to proceed in the most rational and logical fashion.

For example, those who think critically typically engage in intellectual practices of the following sort: monitoring, reviewing, and assessing; goals and purposes; the way issues and problems are formulated; the information, data, or evidence presented for acceptance, interpretations of such information, data, or evidence; the quality of reasoning presented or developed, basic concepts or ideas inherent in thinking, assumptions made, implications and consequences that may or may not follow; points of view and frames of reference. In monitoring, reviewing and assessing these intellectual constructs, those who think critically characteristically strive for such intellectual ends as clarity, precision, accuracy, relevance, depth, breadth, and logicalness. Each of these modes of thinking help us to accomplish the ends for which we are thinking and hence to solve the problems inherent in pursuing those ends.

Current Teaching Practices and Knowledge of Critical Thinking

In-depth interviews were utilized to provide information on how faculty tend to think about critical thinking and the manner in which that thinking influences the design of their classes. Questions were designed to shed light on the extent to which students in teacher preparation programs in California are being taught in ways that facilitate skill in critical thinking and the ability to teach it to others.

There were three goals of this component of the study. The first was to ensure that any faculty who had a developed notion of critical thinking (of any kind) would have a full opportunity and much encouragement to spell out that notion. We wanted to make sure that everyone interviewed was encouraged to express their actual views and to express them in detail.

The second goal was to examine the views expressed to see: a) how many faculty actually had a developed view and b) how much internal coherence there was in any given faculty view. In other words, we sought to determine how many faculty had seriously thought through the concept of critical thinking--irrespective of how they defined it, once we had a full expression of any given person's views, we examined what was said, not only for clarity but also for coherence.

The third goal was to determine the extent to which the views expressed demonstrated an internalization of traditional "minimalist" elements of critical thinking. We sought to determine, in other words, how much of the common core of meaning now attached to the traditional concept by those working in the field of critical thinking research (and reflected in its semantics and history) has been internalized by faculty teaching in teacher preparation programs.

Data collection included both closed-ended and open-ended questions. In addition, the coders of responses made judgments about some important global features of the responses made (using minimalist components of critical thinking as criteria). The open-ended questions, and the follow-up questions, were designed, as indicated above, to provide maximum opportunity for individuals to articulate virtually any concept of critical thinking that they favored. The follow-up questions' main function was that of ensuring that the most specific and precise views that could be obtained were obtained. Since the interviews lasted 45 minutes on average, the interviewees had ample opportunity to express their views.

The same interview protocol was utilized for both education faculty and subject matter faculty. A total of 140 interviews were completed, representing a 78% response rate among those contacted for an interview. Since the samples were constructed so as to be representative in a statistical sense of all faculty involved in teacher preparation in California, the results can in fact be generalized to teacher preparation faculty in the state as a whole. The results of the analysis were as follows:

1) Though the overwhelming majority (89%) claimed critical thinking to be a primary objective of their instruction, only a small minority (19%) could give 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%) could enumerate any intellectual criteria or standards they required of students or could give 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% were able to provide 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% could elaborate 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 had little, 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% were able to clearly articulate 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 at all 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 could clearly explain the

meanings of basic terms in critical thinking. For example, only 8% could clearly differentiate between an assumption and an inference, and only 4% could differentiate between an inference and an implication.

9) Only 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.
- are not able to clarify major intellectual criteria and standards.
- inadvertently confuse the active involvement of students in classroom activities with critical thinking in those activities.
- are unable to give an elaborated articulation of their concept of critical thinking.
- cannot provide plausible examples of how they foster critical thinking in the classroom.
- are not able to name specific critical thinking skills they think are important for students to learn.
- are not able to plausibly 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.
- cannot specify basic structures essential to the analysis of reasoning.
- cannot 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.
- are unable to name a particular theory or theorist that has shaped their concept of critical thinking.

Some differences were also observed between Education and Arts and Sciences faculty. These differences do not alter the overall findings but do suggest relative strengths and weaknesses for each group. The comparative results were as follows:

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 also were better able to reconcile covering content with fostering critical thinking (31% of Arts and Sciences faculty had little or no conception of how to reconcile the two, while only 11% of education faculty had little or no conception). What is more, 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 were able to elaborate 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).

Analysis of open-ended responses provided 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. Profiles of individual faculty responses are presented in the full report to illustrate clearly the kind of differences which existed between those who were articulate in explaining how they approach critical thinking and those who were not.

Most faculty 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.

Virtually all of those interviewed identified critical thinking and the learning of intellectual standards as primary objectives in instruction, yet few could give 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. 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, and intellectual responsibility, are virtually unheard of by the interviewees.

Careful analysis of the interviews indicates that, irrespective of the diversity of language used, the central problem is that most faculty have not carefully thought through any concept of critical thinking, have no sense of intellectual standards they can put into words, and are, therefore, by any reasonable interpretation, in no position to foster critical thinking in their own students or to help them to foster it in their future students- except to inculcate into their students the same vague views that they have.

Qualitative Generalizations: Interpreting 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 A.

The data collected enabled 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 on 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 below illustrate clearly the kind of differences which 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

Each profile represents one person from the study. Each profile is anonymous--in keeping with the commitment made to all of those who agreed to be interviewed.

Some Illustrative Profiles

The Basic Pattern

What follows is a series of "profiles" which suggest some of the basic patterns of thinking found in particular faculty members who participated in the interviews.

Most faculty 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 such like--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 could give 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.

After listening to the interviews it becomes obvious that irrespective of the diversity of language used, the central problem is that most faculty have not carefully thought through any concept of critical thinking, have no sense of intellectual standards they can put into words, and are, therefore, by any reasonable interpretation, in no position to foster critical thinking in their own students or to help them to foster it in their future students--except to inculcate into their students the same vague views that they have. Now let's look at some specific profiles.

Weak Profiles

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 of course 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

Professor E (16) 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 not fundamentally a matter of one's personal preference or subjective taste. 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 without 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:
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"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

Professor H (79) 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).

Overall Conclusions and Implications:

Critical thinking is clearly an honorific phrase in the minds of most teacher educators such that they feel obliged to claim both familiarity with it and commitment to it in their teaching, despite the fact that few have had any in-depth exposure to the research on the concept and most have only a vague understanding of what it is and what is involved in bringing it successfully into instruction. Critical thinking is commonly confused with active involvement in learning (forgetting that active involvement alone is quite compatible with active "mislearning"). A vague appeal to words from Bloom's Taxonomy (analysis, synthesis, evaluation) is often taken to be demonstrative of knowledge of critical thinking. Even faculty in the CSU, which has a formal policy on critical thinking instruction, are apparently largely unfamiliar with the "definition of critical thinking" and specifications of what minimal conditions for instruction in it are inherent in the policy.

It is clear that virtually all departments represented in the study uncritically assume that instruction in critical thinking takes place--without any effort to verify this assumption. In fact, we found no evidence in these interviews 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--should schools

of education desire to do it. Most disturbingly, since the overwhelming majority assume that the faculty already understand and emphasize critical thinking in their classes, any "in-house" assessment would doubtless be perceived as a pointless "political" process to be carried out with a minimum of effort (but with a clear sense of how to achieve the politically correct answer). In other words, 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 will be exceedingly difficult to produce substantial changes in teacher certification 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 not only understand critical thinking but also know how to teach for it, but who, in point of fact, understand neither. Many will equate critical thinking with mere active involvement or "cooperative learning." Others will believe that some acquaintance with the terms of Bloom's Taxonomy or Howard Gardner's theory of multiple intelligences is equivalent to understanding critical thinking. Some will equate it with an emphasis on learning styles or with concept maps or some other tool or facet or dimension of learning.

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

Using the criteria of the California State Universities and Colleges as an alternative reference point, it is clear that, based on the information we have gathered, the overwhelming number of those certified to teach have little understanding of how to teach so that students will understand

"the relationship of language to logic,... (or have) 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....(or acquire) 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."

Finally, 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 (historically, biologically, psychologically, ...).

It appears likely that we are now certifying teachers who not only have little understanding of critical thinking nor how to teach for it but also wrongly and confidently think they do. The end result is that California classrooms are places in which both teachers and students lack explicit knowledge of how to reason in a disciplined way 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). Subjectivity of response, subjectivity of grading, intellectual undisciplined answers will in all likelihood be unconsciously encouraged. Open-mindedness will be confused with the willingness to accept everyone's answer to a complex question as equally "right" (for them).

Given the facts revealed in this study, it is unlikely that students preparing to teach are being instructed in the basic structures of reasoning. Students studying history, biology, and mathematics will not recognize that historians, biologists, and mathematicians equally 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. Students studying English, Physics, and Chemistry will not recognize that thinking clearly, accurately, and precisely; thinking deeply, broadly, and logically; are equally important intellectual criteria in every subject. Students will continue to lack any 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. Students will graduate, in short, without any plausible semblance of intellectual perspective and discipline.

If we are interested in teachers certified 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.

Limitations of the Study

There were numerous limitations of our study. Some were limitations of time and resources. We were limited in the quantity of people we could interview. We were limited as to the length of the interview. We were limited in the time we had to collect exemplary practices, as well as in the time designated to assembling the report as a whole. There are, therefore, limitations in the richness of the data collected. With more time and financial support, we could have conducted interviews in yet greater depth. We

could have engaged in greater study of exemplary practices including, for example, classroom visitations. We could have broadened the net in soliciting exemplary practices and thereby obtained examples from even more disciplines. We could have interviewed teachers in the field, new graduates from teacher education programs, even students at the K-12 level. Very much more might have been done, had there been the time and dollars to do it.

Nevertheless, despite the obvious limitations of the study, certain patterns in the data we did collect were so consistent across a wide variety of faculty that we believe the study unequivocally establishes some things beyond question, perhaps the main one being that most faculty teaching in teacher education programs have not thought systematically or deeply enough about critical thinking to express a clear, elaborated, and coherent conception of it. It is also beyond question, given the data of the study, that a high percentage of faculty simply assume that they and their colleagues do understand critical thinking and do effectively teach for it.

It is also beyond question, from the data we gathered, that it is possible to identify college and university faculty who have devoted some significant portion of their time to developing a clear, well-elaborated, and coherent conception of critical thinking and are actively engaged in developing a variety of effective ways to cultivate critical thinking in their students.

What remains to be seen is whether or not we develop the academic and political motivation to pursue a realistic, long-range solution to these problems. It is difficult to predict at this time the degree of resistance and denial that will emerge from education faculty, and the broader education community, to the results of this study. No professional group likes to hear that it has significantly failed to act effectively in fostering a basic value and in furthering an end importantly connected both to its prestige and mission. We can only point to the fact that there are a growing number of faculty nationally who are recognizing the failure of colleges and universities to effectively teach students to think critically and become effective problem solvers. Unfortunately, the history of education does not provide us with a similarly large problem that was solved in the education community by some set of strategies which we could now appropriate, which could be used in developing strategies to rectify the problems clearly documented in the study.

Critical thinking Advisory Task Force

An Advisory Task Force was appointed consisting of teacher educators, subject matter

faculty, and K-12 teachers and administrators to guide the study design, interpretation of data, and policy recommendations. The following individuals served as members of the Critical Thinking Advisory Task Force:

- Barclay Anderson, Teacher Edison High School Stockton Unified School District
- Jerry Brunetti, Professor School of Education St. Mary's College
- Willis Copeland, Professor Department of Education University of California, Santa Barbara
- Webster Cotton, Professor School of Education California State University, Los Angeles
- Connie DeCapite, Teacher Spurgeon Intermediate School Santa Ana Unified School District
- Marilyn Draheim, Professor University of the Pacific
- Jack Fraenkel, Professor College of Education San Francisco State University
- Jane Willsen Lorand, President Lorand and Company, Inc.
- Richard Pope, Teacher Toyon Elementary School Berryessa Union Elementary School District
- Ted Simonson, Principal Los Gatos High School Los Gatos-Saratoga Joint Union High School District
- Yehudi Webster, Professor Department of Sociology California State University, Los Angeles School of Education