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# Critical Thinking and Subject Specificity: Clarification and Needed Research

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*The claim that critical thinking is subject specific appears to be of practical importance and theoretical interest. Its meaning is unclear, however, and discussions of its are often confusing and at cross purposes. In an attempt to clarify the topic, Ennis offers a number of distinctions, including a distinction among three versions of subject specificity: domain, epistemological, and conceptual subject specificity. He holds that the first two versions contain valuable insights, but that all three suffer from excessive vagueness of their basic concept (domain, field, and subject, respectively). If the proposed clarification and critique are appropriate, then a number of avenues of research—at both practical and theoretical levels—need to be pursued, some of which are outlined in this essay.*

*Educational Researcher, Vol. 18, No. 3, pp. 4–10*

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Perhaps the most controversial issue within the critical thinking movement these days is whether critical thinking should be taught separately (the “general” approach), be infused in instruction in existing subject-matter areas (the “infusion” approach), result from a student’s immersion in the subject matter (the “immersion” approach), or—an oft-neglected possibility—be taught as a combination of the general approach with infusion or immersion (a “mixed model” approach, to use Robert Sternberg’s term; 1987, p. 255). I shall elaborate these approaches after sketching the general plan for this essay, the context of which is this basic issue about which approach to use. This essay will not attempt to resolve the basic issue. Rather, the goal is to make a conceptual contribution to its resolution, both paving the way for more research of the sort needed to help resolve the issue and facilitating interpretation of this research.

In addition to the practical political, economic, and administrative aspects of the basic issue, one significant unresolved theoretical aspect is whether critical thinking is subject specific, that is, specific to subjects. Subject specificity is a confusing idea that has not received adequate attention and is my principal concern in this essay. I shall attempt to clarify this confusing notion,

offer some distinctions, note some pitfalls, and suggest needed research.

There are three principal versions—empirical, epistemological, and conceptual—of the view that critical thinking is subject specific. (Stephen Norris, 1985, has introduced a distinction between the first two in his enlightening discussion of criteria for judgments about the existence of abilities—including critical thinking ability.) Distinguishing and elaborating versions of subject specificity is important, because the arguments for them, and the reasonableness and implications of them, differ. To this task I shall devote most of my attention in this essay. But before directly addressing these three versions of subject specificity, I shall offer some preliminary clarification.

## *Critical Thinking and Thinking*

I assume critical thinking to be *reasonable reflective thinking focused on deciding what to believe or do*, a concept I have elaborated elsewhere (Ennis, 1985, 1987). The ideas in this essay, however, apply to other concepts of critical thinking, including “the correct assessing of statements” (Ennis, 1962, p. 82) and “the propensity and skill to engage in an activity with reflective scepticism” (McPeck, 1981, p. 152). They also are adaptable to other concepts of thinking, such as higher order thinking, problem

solving, and metacognition.

## *The General Approach*

By the “general approach” I mean an approach that attempts to teach critical thinking abilities and dispositions separately from the presentation of the content of existing subject-matter offerings, with the purpose of teaching critical thinking. Examples of the general approach usually do involve content. Local or national political issues, problems in the school cafeteria, or previously learned subject matter, for example, could provide content about which the critical thinking is done, but the primary purpose is to teach students to think critically in nonschool contexts.

However, the concept of the general approach does not require that there be content. For example, logic instruction can be formulated in terms of relationships between variables. The following principle has no content in this sense: “All As are Bs” implies that if something is not a B, then it is not an A. Teaching it is like teaching  $(A \times B) = (B \times A)$  in mathematics. Under the general approach, the appropriate balance between emphasis on principles that are applied to content and emphasis on abstract principles depends at least on the nature of the content, the critical thinking dispositions and abilities being promoted, and the students. This balance must be determined empirically.

General critical thinking instruction could take place in separate courses

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(such as an informal logic course in college, or a critical thinking course in secondary school), in separate instructional units in the elementary school, or as a separate thread in an existing subject-matter sequence (just as writing is a thread in language arts and English). Among the ways of implementing the general approach in secondary schools, the separate critical thinking thread within an existing subject sequence is probably the most feasible politically.

Examples of the pure general approach are described in several summaries, including those by Kruse and Presseisen (1987), Nickerson, Perkins, and Smith (1985), Sternberg (1984, 1985), and Sternberg and Kastoor (1986).

#### *Infusion and Immersion*

*Infusion* of critical thinking instruction in subject-matter instruction is deep, thoughtful, well understood subject-matter instruction in which students are encouraged to think critically in the subject, and in which general principles of critical thinking dispositions and abilities are *made explicit*. On the other hand, *immersion* is a similar thought-provoking kind of subject-matter instruction in which students do get deeply immersed in the subject, but in which general critical thinking principles are *not made explicit*.

Proponents of the infusion approach include Glaser (1984, 1985), Resnick (1987), and Swartz (1984, 1987). Proponents of the immersion approach include McPeck (1981).

#### *The Mixed Approach*

The mixed approach consists of a combination of the general approach with either the infusion or immersion approaches. Under it there is a separate thread or course aimed at teaching general principles of critical thinking, but students are also involved in subject-specific critical thinking instruction. There are many possibilities for such combinations, but presumably the general thread would facilitate articulation among the various efforts and would help fill gaps left as a result of practical exigencies that develop. Proponents of the mixed approach include Ennis (1985), Sternberg (1987), Nickerson (1988), and Perkins and Salomon (1989).

Table 1 sets forth the major characteristics of the four basic approaches

to teaching critical thinking that provide the context for the subject-specificity issue. These should be viewed as idealized types. In practice, combinations and deviations are not only possible but likely.

#### *A Danger Residing in the Ambiguity of the Word "Subject"*

It is often noted that critical thinking is always about some subject (Adler, 1986; McPeck, 1981). This seems obviously true if by the word "subject" one

mentions, I shall elaborate the three basic versions of subject specificity.

#### **Domain Specificity: A Popular Empirical View**

The use of the word "domain" instead of "subject" tends to avoid the equivocation I have just described, though it suffers from a vagueness problem that I shall discuss presently. Because the word "domain" commonly is used by cognitive scientists in discussing subject specificity, I shall use it as part of the name of an empirically based subject

**TABLE 1.**  
**The General, Mixed, Infusion, and Immersion Approaches to Teaching Critical Thinking**

	Makes General Principles Explicit?	Uses Content?	Uses Only Standard Subject-Matter Content?	Uses Standard Subject-Matter and Other Content?
General				
Abstract (only)	Y	N	N	N
Concrete (also)	Y	Y	N	Perhaps both
Mixed	Y	Y	N	Y
Infusion	Y	Y	Y	N
Immersion	N	Y	Y	N

means "topic." But one must beware of slipping back and forth between two significant uses of the word "subject" when considering the implications of the statement that critical thinking is always about some subject. Sometimes the word "subject" is used to refer to some subject taught in school. Sometimes it refers to the topic under consideration. There are, of course, many topics that are not school subjects and are not included in the study of the school subjects to which a person considering these topics is exposed. For example, the topic "stabbing," which was considered in a murder trial for which I was on the jury, was not part of any school subject that any of us had studied in school or college, yet that was a topic about which we were supposed to think critically.

It is tempting, but a mistake, to infer from the fact that critical thinking is always about some subject (that is, topic) that critical thinking teaching can take place only in school subjects.

Assuming these distinctions and defi-

specificity that is characterizable by three principles:

1. *Background knowledge.* Background knowledge is essential for thinking in a given domain.

2. *Transfer.* (a) Simple transfer of critical thinking dispositions and abilities from one domain to another domain is unlikely. (b) However, transfer becomes likely if, but only if, (1) there is sufficient practice in a variety of domains and (2) there is instruction that focuses on transfer.

3. *General instruction.* It is unlikely that any general critical thinking instruction will be effective.

Most cognitive psychologists hold at least the first two principles. All three principles together constitute what I shall call "strong domain specificity," which, if true, would support the infusion-only approach to teaching critical thinking. Proponents appear to include Robert Glaser when he urged:

abilities to think and reason will be attained when these cognitive activities are taught not as subsequent add-ons

to what we have learned, but rather are explicitly developed in the process of acquiring the knowledge and skills that we consider the objectives of education and training. (1984, p. 93)

As I read this statement by Glaser, the general approach would be "add-ons," so he would appear to endorse the third principle.

The first two principles constitute what I shall call "moderate domain specificity." Proponents include Lauren Resnick (1987)—who appears to be agnostic about the third principle, but supports an infusion approach, because it assures that at least "something worthwhile will have been learned" (p. 36)—and others who appear to feel that third principle is wrong, including Nickerson (1988), who supports a mixed approach to teaching critical thinking.

I shall consider the three principles of domain specificity, exhibit traps and pitfalls, and urge caution and further research.

*Domain-Specificity Principle 1: Background knowledge is essential for thinking in a given domain.*

That knowledge about a topic is ordinarily a necessary condition for thinking critically in the topic seems obvious and is shown by a number of studies, including several cited by Glaser (1984) in support of his infusion-only position. We must beware, however, of inferring carelessly from this necessary "conditionship" that subject-matter knowledge is a sufficient condition for good thinking. There are at least three problems with making such an inference:

1. An experienced person can become in a way so well informed about and embedded in an area that he or she stops thinking, becoming inflexible and, for example, unable to conceive of and consider alternatives.

2. Subject-matter knowledge often consists of a mass of rote-memorized subject matter that is not understood deeply enough to enable a student to think critically in the subject. Students are often taught and tested in a way that makes this a likely result. At least the first phases of E.D. Hirsch, Jr.'s (1987) cultural literacy, the ones on which he places the most emphasis, appear to be this sort of learning.

3. If the domain-specificity transfer principle is correct, immersion in a subject-matter area, which, let us assume, includes ability to think in the

area, probably will not lead to critical thinking in everyday life (except perhaps for gifted students), because immersion is not accompanied by explicit attention to general principles of critical thinking. I am assuming that critical thinking in everyday life is an important goal of the schools, and that explicit attention to general principles of critical thinking is the way to focus on transfer. (Focusing is required by the transfer principle.)

This is not to suggest that anyone would state explicitly that a necessary condition is thereby a sufficient condition, and thus risk the difficulties I outlined. Rather, unconsciously doing so is a trap for the unwary.

*Domain-Specificity Principle 2: (a) Simple transfer of critical thinking dispositions and abilities from one domain to another domain is unlikely; (b) Transfer becomes likely if, but only if, (1) there is sufficient practice in a variety of domains, and (2) there is instruction that focuses on transfer.*

*Vagueness of the concept "domain."* The application of Parts a and b-1 of the transfer principle requires us to be able to distinguish domains. Otherwise we cannot tell whether we are going from one domain to another instead of staying within the same domain, and we cannot tell whether we are working with a variety of domains or just one. But the concept, *domain*, is vague, because of the ease with which we can draw different boundaries for domains.

To see the vagueness, try to decide which of the following four topics is in the same subject-matter domain as one or more of the others: (a) the degree to which a straight rod will bend (a standard Piagetian topic), (b) the degree to which a spring will stretch, (c) the impact of a sphere that rolls down a ramp, and (d) a person's perception of the credibility of a source of information. Assume that the critical thinking ability involved is judging causal hypotheses in an experimental situation and justifying one's judgment.

All four examples conceivably could be classified under the same domain, science. But science itself is divided into many areas. The first three might come under natural science (or, progressively more narrowly, physical science, or physics, or mechanics: Which should we choose?) and the last under social science (or psychology, or social psychology, or speech communication—

Which?). So are the four topics in different domains or the same domain (that is, science)? Why?

Furthermore, within mechanics, the first two might come under statics and the third under dynamics. So the first two could be in different domains from the third, but also could be in the same domain as the third: mechanics (or physics, etc.). Which is it?

Linn, Pulos, and Gans (1981, p. 443) found that there was a content effect for these first three topics in the area of hypothesis judging and justifying—the rods and springs topics were about as distant from each other in tested hypothesis-judging-and-justifying achievement as the springs and ramps topics were from each other. So there is some difference among these three, but whether there is a practical difference among them is not clear. As with most variables involving human beings, there appears to be a continuum.

*A possible definition?* The only reasonable attempted definition of "domain" by a domain specificist that I have found was offered by Susan Carey (1985); for it she credits Dudley Shapere, a philosopher of science: "He [Shapere] characterized a domain as encompassing a certain set of real-world phenomena, a set of concepts used to represent those phenomena, and the laws and other explanatory mechanisms that constitute an understanding of the domain" (p. 487). This broad definition, if accepted, would probably help us to apply the transfer principle in making predictions about whether learning in the last area will then be applied in the others, because the concepts, laws, and explanatory mechanisms used by scientists in studying the things that affect people's judgment about the credibility of sources are not the ones used in studying rods, springs, and inclined planes, inertia, and impact. The definition does not tell us, however, whether the first three topics are in different domains from one another. We could put them together under the domain, physics—or mechanics—by starting with a broad set of phenomena and progressing to a broad set of concepts and laws. Or we could even separate rods and springs (as suggested by the Linn et al., 1981, research) by noting that the study of springs (if we try to amalgamate it with rods) invokes the concept of a spring's being a spiral rod, a concept not needed in

studying rods. It depends on the set of phenomena, concepts, laws, and explanatory mechanisms we choose to associate with a given example.

Another problem with this definition is that it is not at all clear that this is the concept of domain that most cognitive psychologists employ when making statements of domain specificity. So it is not clear that the research that has been done can be applied in terms of this definition.

*Research possibilities.* To avoid the severe vagueness of the term "domain" in the critical thinking transfer principle, we probably need to reconceive the way the principle works. One possibility is to turn the transfer principle around by using empirically determined nontransfer as one criterion for separate domains (instead of separate domains as the independently determined criterion for nontransfer). The resulting theory would employ the concept *domain* as a summarizing concept, rather than as an independent variable in the research.

Then we would need much detailed exploratory research (of which the Linn et al., 1981, research is a precursor) that investigates the extent to which each of many aspects of critical thinking, when taught to various kinds of students in the context of single pieces or various combinations of pieces of subject matter, is likely to be applied successfully to some other particular piece of subject matter. After a good bit of this sort of exploratory research, some theorizing might well be possible, but the resulting theories would probably be more elaborate than the simple domain-specificity transfer principle.

Until we have much more information, Parts 1 and 2a of the transfer principle are too sloganlike. The concept, domain, is too vague.

*Domain-specificity principle 3: It is unlikely that any general critical thinking instruction will be effective.*

For present purposes, a detailed description of the research on the effectiveness of general critical thinking instruction is unnecessary. Instead, the important thing about the summaries that have been done is that the results are mixed. On the basis of his review of the literature, Glaser (1984) is pessimistic about the possibilities of teaching "the abilities to think and reason . . . as subsequent add-ons to what we have learned" (p. 93), as are Resnick

(1987)—though less so—and many others. On the other hand, Holland, Holyoak, Nisbett, and Thagard (1986), Langley, Simon, Bradshaw, and Zytkow (1987), Nickerson (1984, 1988), Nickerson, Perkins, and Smith (1985), Nisbett, Fong, Lehman, and Cheng (1987), Perkins (1985), Perkins and Salomon (1989), and Sternberg and Kastoore (1986) are somewhat optimistic and have concluded that some general programs are helpful.

However, most of these more optimistic reviewers express reservations about this overall conclusion because of the difficulties of evaluating the results of the programs that have been studied. Absence of information about what occurred, conflict of interest of those who did the studies, uncertain validity of evaluation devices, vagaries of experimental design, lack of objective information, and differences in conceptual systems and jargon are some of the things that they say make evaluation difficult. But still the reviewers make guarded claims that some general thinking programs (including at least some in critical thinking) were helpful.

*Needed research and development.* Better evaluation approaches and instruments need to be developed, because our results can be no better than our evaluation devices. Ennis (1984), Arter and Salmon (1987), Ennis and Norris (in press), and Norris and Ennis (1989) have descriptions of available critical thinking tests accompanied by discussion of some problems, indicating the need for research on approaches and the development of more, better, and varied instruments. Ennis (1985), a study group chaired by Lamar Alexander (Study Group, 1987), The Review Committee of the National Academy of Education—R. Glaser, Chairman (1987), and Resnick (1987) have called for such development. Unfortunately, the National Academy of Education Review Committee has also suggested that we limit our efforts to the development of tests that are specific to school subject-matter areas (Review Committee, p. 54), a mistake if the transfer of critical thinking instruction to real life is a goal of the schools. School-subject-matter-specific tests presumably would not test for transfer.

Large scale, long-term, schoolwide (and sometimes school-system-wide) use of several variations of each of the four major approaches (general, infusion-only, immersion-only, and

mixed) should be compared. Careful records should be kept of the perceived difficulties and successes, and of what actually occurs in the schools. The research should be sponsored and carried out by disinterested parties able to make a long-term commitment.

After such research is done, we will have a much better idea of the effectiveness of each of the approaches, including the effectiveness of the controversial general approach, the possibilities of transfer from the infusion and immersion approaches, the advantages and disadvantages of the mixed approach, and of the practical problems involved in implementing each. It is important to know about the practical problems, because it might turn out that even though an approach like the infusion-only approach is the most effective when actually implemented, the coordination, subject-matter coverage, and articulation problems that go with it are overwhelming.

### Epistemological Subject Specificity

The epistemological version of subject specificity holds that in different fields different sorts of things count as good reasons, so critical thinking varies from field to field. That only the immersion approach to critical thinking instruction would be appropriate is a conclusion drawn from epistemological subject specificity by John McPeck (1981), who is the version's most influential proponent in education. Resnick (1987) also expresses the view that "each discipline has characteristic ways of reasoning" (p. 36), as does Swartz (1984). But they do not draw from it the strong immersion-only conclusion that McPeck does.

Here are three principles of the epistemological subject specificity, which I have abstracted from McPeck (1981, pp. 22–38).

1. *Background knowledge.* Background knowledge is essential for critical thinking in a given field.

2. *Interfield variation.* Because in different fields different things "constitute good reasons for various beliefs" (p. 22), critical thinking must vary from field to field.

3. *Full understanding.* A full understanding of a field requires the ability to think critically in the field.

#### *The Attractiveness of the Principles of Epistemological Subject Specificity*

The first principle (background knowledge) seems quite acceptable. Though

based on an examination of what matters in settling field-specific issues rationally, it is like the first principle of domain specificity, which is based on observation of the difficulties experienced by ignorant people in thinking critically. Being well informed is necessary for critical thinking, no matter which way you look at it.

The following three contrasts show the plausibility of the second principle (interfield variation): (a) Mathematics has different criteria for good reasons from most other fields, because mathematics accepts only deductive proof, whereas most fields do not even seek it for the establishment of a final conclusion; (b) in the social sciences, statistical significance is an important consideration, whereas in many branches of physics it is largely ignored; (c) in the arts, some subjectivity is usually acceptable, whereas in the sciences, it is usually shunned.

The third principle (full understanding) is also acceptable if we take the words "full understanding" to mean much more than memorization of facts and principles and some ability to apply them, and to include the ability to think critically in the field. The principle then becomes true by definition, but it does express a reasonable interpretation of "full understanding" and represents much more than students usually acquire in our schools.

#### *Problems in Using Epistemological Subject Specificity as a Ground for the Immersion-Only Approach to Critical Thinking Instruction*

If one wants to infer from these principles that the only approach to critical thinking instruction is the immersion approach, there are problems.

*Vagueness of the concept "field."* For one thing, the concept "field" is almost as vague as the concept "domain." For example, is the bending-rods investigation in the same field as the impact-of-the-spheres-rolling-down-the-ramp investigation? They are both in physics and in mechanics, but one is in statics and the other in dynamics. Are they in the same or different fields?

Stephen Toulmin (1964), a philosopher who has inspired McPeck's (1981) epistemological subject specificity, has defined field in terms of the logical type of argument used: "Two arguments will be said to belong to the same field when the data and conclusions in each of the two arguments are,

respectively, of the same logical type" (p. 14). Although it seems clear that arguments in mathematics (which are generally deductive) are of different logical type from arguments in the social and natural sciences where the form often seems to be best-explanation inference, the concept of logical type seems too loose for us to decide on the basis of it whether the four items considered before come under the same or different logical types. So the claim that critical thinking varies from field to field is not very discriminating.

*Interfield commonalities.* A second problem is that there are many interfield commonalities in critical thinking, such as agreement that conflict of interest counts against the credibility of a source, and agreement on the importance of the distinction between necessary and sufficient conditions. Fields differ, but, as Govier (1983, p. 172), Resnick (1987, p. 45), and Weddle (1984, p. 24) have noted, there is also a common core of basic principles that apply in most fields (though not every principle applies in every field). Even Toulmin's book on logic devotes about half its space to general interfield principles (Toulmin, Reike, & Janik, 1979). The three epistemological principles do not exclude such interfield commonalities. Thus the limitation to the immersion approach (or even to the infusion approach) does not follow from the given principles of epistemological subject specificity, which neither imply nor state that there are no general overarching principles that bridge fields.

This is not to say that there is complete agreement about and clarity of these general overarching principles. There are discrepancies in vocabulary (including different meanings for such words as "connotation," "theory," and "assumption") that cause coordination problems. More seriously, there are some disagreements about the principles themselves, such as the role of the distinction between induction and deduction in argument reconstruction, the fact-opinion distinction, and the meaning of "if." Weddle (1985), who has provided a helpful untangling of the fact-opinion distinction, exemplifies the sort of work that needs to be done in this area.

*Transfer.* A third problem is that of transfer. Will the learning in the individual fields transfer to daily life? If the transfer principle of domain specificity is correct, then immersion will not

result in transfer to daily life (much of the content of which is not taught in school subjects), because teaching for transfer does not occur in the immersion approach.

Thus the insights of the epistemological view do not imply that we should limit ourselves to the immersion approach. These insights incorporate the vagueness problem of domain specificity and do not rule out interfield commonalities. Furthermore, the transfer principle of domain specificity is inconsistent with the immersion approach, a reason to be leery of the immersion approach.

*Research.* The extent of interfield commonalities is a topic requiring extensive research. Arguments offered by specialists in a number of different disciplines need to be examined and compared to see how much they have in common. This has never been done thoroughly, so far as I know. In an informal interview study of Fellows at the Center for Advanced Study in the Behavioral Sciences in 1984, I found that the behavioral and other social scientists interviewed expressed the view that there are more differences in logical type of data, arguments, and conclusions within individual social science disciplines than between them. But this study dealt only with the social sciences (including history) and was impressionistic. Careful comparative analysis of articles and arguments in these and many other disciplines is needed.

#### **Conceptual Subject Specificity**

According to a third version of subject specificity, conceptual subject specificity, it does not even make sense to speak of critical thinking or critical thinking instruction outside of a subject-matter area, and the idea *general critical thinking ability* is meaningless. Hence, general instruction in critical thinking is inconceivable.

As offered by the view's most influential proponent, John McPeck (1981), the argument for the conceptual view starts with the true premise, "Thinking is always thinking *about* something" (p. 3). Mortimer Adler (1986) has made a similar statement, though it is not clear that he would take the argument as far as McPeck. McPeck then draws the conclusion that there is nothing general to teach, and so we cannot teach thinking in general. He puts the argument as follows:

It is a matter of conceptual truth that

thinking is always *thinking about X*, and that *X* can never be “everything in general” but must always be something in particular. Thus the claim “I teach students to think” is at worst false and at best misleading . . . . In isolation from a particular subject, the phrase “critical thinking” neither refers to nor denotes any particular skill. It follows from this that it makes no sense to talk about critical thinking as a distinct subject and that it therefore cannot profitably be taught as such. To the extent that critical thinking is not about a specific subject *X*, it is both conceptually and practically empty. The statement “I teach critical thinking,” *simpliciter*, is vacuous because there is no generalized skill properly called critical thinking. (pp. 4-5)

This argument assumes that the fact that there can be no examples of critical thinking about nothing (or about everything in general) implies that there can be no general critical thinking skills. But nowhere is this assumption defended. As Richard Paul (1985, p. 36) has suggested, this is like assuming that because, when we write or speak, we are writing or speaking about something, there can be no teaching of general writing or speaking skills. Harvey Seigel (1985) and Groarke and Tindale (1986) have made a similar point.

McPeck (1985, p. 49) replied that writing and speaking are different from critical thinking. So Paul, he urges, has not shown that what holds for writing and speaking also holds for critical thinking.

But the argument needs more than this. Because it makes the inference—from the proposition that critical thinking is about something—to the conclusion that general critical thinking instruction is impossible—it needs to make explicit and defend the connection between the two propositions. Why should the fact that critical thinking is always about something imply that we cannot have general critical thinking dispositions and abilities (and instruction of them) that can be applied to particular cases?

In his writing, McPeck provides us with an example of what he says is inconceivable. In his treatment of the work of Edward de Bono, McPeck explicitly employs the general principle taught in logic courses that affirming the consequent is a fallacy. He uses the phrase “affirming the consequent” and employs standard general symbols for

explaining the meaning of that phrase: “ $P \supset Q, Q \therefore P$ ” (1981, p. 101). To the extent that he learned the principle well and is able to apply it in a number of circumstances, McPeck has acquired a general critical thinking ability, the ability to identify the fallacy of affirming the consequent. Not only is someone’s having the ability not inconceivable, but we have evidence that someone has acquired this general ability. We could not have such evidence if it were inconceivable that he could have the ability.

Finally, the conceptual subject-specificity concept, subject, like the concepts domain and field, is too vague. Suppose that within a physics course students study about bending rods, stretching springs, and spheres rolling down inclined planes. Are these in different subjects or the same subject? If they are in different subjects, then no critical thinking ability that can be developed in one of these subjects can conceivably be applied in the other (because that would imply the existence of a general critical thinking ability). If they are in the same subject, then critical thinking instruction in one of these contexts would presumably help in the other. Which is it? Conceptual subject specificity needs a definition of “subject,” but does not provide one.

In summary, conceptual subject specificity appears to have no basis for its basic assumption, is in conflict with the facts, and is too vague.

### Summary and Comment

The purposes of this essay are to clarify the confusing topic of subject specificity and to sketch out some needed research. Crucial distinctions include those among the general, infusion, immersion, and mixed approaches to teaching critical thinking; among the empirical, epistemological, and conceptual versions of subject-specificity; between the topic and school-subject senses of “subject”; between content as a necessary condition and as a sufficient condition for critical thinking; between deep and shallow knowledge of a subject; between fields’ having no critical thinking principles in common and having some principles in common; between thinking about a particular subject and having a general ability to do that sort of thing in several subjects; between thinking critically without content (not possible) and teaching content-free principles of critical thinking (possible); and between

limiting teaching of critical thinking to subject-matter areas (as is recommended by the infusion and immersion approaches) and limiting testing to subject-specific critical thinking tests (a mistake if we want to test for transfer to daily life). These distinctions, though conceptually clear, often reduce to continuums and have borderline cases in practice.

The three versions of subject specificity differ in their strengths and weaknesses. Conceptual subject specificity has no basis and is too vague, but the other two versions incorporate valuable insights: They share an emphasis on the importance of background knowledge. Epistemological subject specificity notes that there are significant interfield differences in what constitutes a good reason (though its concept, field, is vague). Domain specificity sees the importance of deliberate teaching for transfer combined with frequent application of principles in many different areas, and warns us that a critical thinking aspect demonstrated in one situation will not necessarily be applied in another. But its concept, domain, like its sister concepts, subject and field, is vague.

Needed research includes the following:

- extensive specific studies of the degree of successful application to a topic of a critical-thinking aspect developed in one or more topics, with attention to the variables that affect this degree of success (one result will be giving meaning to the concept domain as used in the transfer principle);
- the study and development of new approaches and instruments for evaluating critical thinking;
- the broad, long-term study in realistic situations of the effectiveness of the four approaches to critical thinking instruction—with attention to the economic, political, and practical articulation problems impinging on their use; and
- the examination of the degree of commonality of the critical thinking aspects found in the different standard existing disciplines and school subjects.

To focus on concepts and interpretations, this discussion of subject-specificity leaned on thoughtful research reviews done by others. It assumed a broad conception of critical thinking, but it applies to more restricted conceptions and is adaptable to broader conceptions of thinking, like higher

order thinking, problem solving, and metacognition.

Subject specificity is a crucial, frequently confusing aspect of attempts to improve critical thinking and other thinking instruction and assessment. Let us hope that the distinctions and clarification presented in this essay will better enable us to proceed with the needed research and dissemination.

### Note

I deeply appreciate the suggestions and encouragement of Sean Ennis, whose frequent careful reading and insights have been especially helpful, Nicholas Burbules, Michelle Commeyras, Delores Gallo, Jana Holt, Robert McKim, Stephen Norris, Edys Quellmalz, William J. Russell, Robert Swartz, Marc Weinstein, Mary Anne Wolff, and the anonymous reviewers of *Educational Researcher*; and the support of the Spencer Foundation, the Center for Advanced Study in the Behavioral Sciences, and the Critical and Creative Thinking Program of the University of Massachusetts in Boston.

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