



Tests Worth Teaching To: Constructing State-Mandated Tests That Emphasize Critical Thinking

by Stuart S. Yeh

In this article, I argue that state-mandated tests should focus on critical thinking, defined as careful argumentation. This would mitigate the primary criticism of such tests—that they drive an instructional focus on rote factual learning. Conceptualizing critical thinking in terms of argumentation provides a simple, useful way to focus instruction and assessment according to the type of critical thinking that appears to be valued in the workplace. I give an example of how this concept could be translated into a forced-choice test item. A test that combines both open-ended and forced-choice items could be used to assess critical thinking in a practical, cost-effective way. If one accepts the premise that tests drive curriculum and instruction, perhaps the easiest way to reform instruction and improve educational quality is to construct better tests.

Increasingly, state-mandated tests are viewed as a means to foster improved educational outcomes. However, critics argue that many of these tests include items that require recall of obscure factual knowledge or vocabulary, forcing teachers to narrow the curriculum, focus on memorization, drills, and worksheets, and to reduce the already limited time available to focus on critical thinking skills (Ad Hoc Committee on MCAS, 1998; McNeil, 2000; Panta, 2001; Smith, 1991; Smith & Rottenberg, 1991). Therefore, many critics call for more authentic forms of

assessment. However, the cost of such assessments has been prohibitive. In this article, I argue that there are ways to adapt standardized state-mandated tests so that they focus on critical thinking while assessing content knowledge, akin to the best authentic assessments, but at far less cost. This could open the way to reform of state-mandated testing programs.

If state-mandated tests focused on critical thinking rather than rote recall of factual knowledge, teachers who feel pressured to teach to the test could focus on teaching critical thinking rather than the universe of items that students might otherwise be asked to recall. Arguably, well-implemented instruction that focuses on critical thinking is more likely to motivate and foster meaningful, memorable, connected learning of relevant domain-specific skills and knowledge.

Conceptualizing Critical Thinking

For the purpose of teaching and assessing critical thinking, I propose to build on a conceptualization of critical thinking as careful argumentation, a notion rooted in classical rhetoric and elaborated by Billig and Kuhn (Billig, 1987; Kuhn, 1991, 1992, 1999). Billig argued that sophisticated deliberation about an issue is characterized by silent argumentation, a dialogic consideration of both sides of the issue by one person. Kuhn argued that more systematic, precise definition and measurement of critical thinking is necessary if it is to be meaningful as an educational goal, and that argument is a central aspect of critical thinking.

A growing research literature provides empirical data regarding the nature of children's argumentation skills at different age levels, how they develop, and how they can be supported (Kuhn, 1991;

Educational Researcher, Vol. 30, No. 9, pp. 12–17

Kuhn, Shaw, & Felton, 1997; Means & Voss, 1996; Voss, 1990; Voss & Means, 1991; Yeh, 1998). Investigators have observed that the majority of children's social interaction, from age four onward, is spent in assertion, defense, and negotiation (Chittenden, 1942; Eckerman & Stein, 1982; Eisenberg & Garvey, 1981; Shantz & Shantz, 1985). By age five children understand the basic structure and nature of an interactive argument (Stein & Miller, 1991). Developmentally, learning to argue may be a crucial phase in learning to reason. Piaget (1959) suggested that children learn to justify themselves and fend off criticisms through quarrelling. Thus, it may be advantageous to build upon children's existing strengths in argumentation rather than to introduce critical thinking as a new concept (Kuhn, 1991, p. 288; Kuhn, 1999).

A Workplace Definition

A potentially useful way to define critical thinking is to examine what it means in the workplace. By articulating and targeting a workplace-derived definition, teaching and assessment can focus on what is important in the working world. Examples of occupations that are thought to demand critical thinking suggest that thinking is frequently conceptualized as *argumentation*.

For instance, "In the Bank (of Canada), most writing is analytic and argues a case. Writers pose and defend contestable ideas: they analyze and evaluate other people's ideas. . . . Young analysts and economists are often told that senior readers want analysis, evaluation, arguments" (MacKinnon, 1993, p. 53). "Executives expect a paper to focus on a specific issue: to state a clear position and support it with a succinct argument grounded in carefully selected quantitative data" (Smart, 1993, p. 136).

In science, journal articles are argumentative to the extent that each writer's conclusions constitute the writer's thesis and his or her research evidence constitutes the support. In history, critical thinking involves weighing conflicting evidence and views from different sources, formulating a point of view about the weight of the evidence, and presenting this point of view persuasively—in other words, making an argument (Holt, 1990). Literary criticism is "argumentative in its purposeful support of claims and in its attempt to gain its audience's adherence" (Fahnestock & Secor, 1991, p. 78). Even in nonprofessional and nonacademic occupations, workers need to sift through information, weigh alternatives and formulate well-supported conclusions and arguments.

While critical thinking is not usually considered a unitary ability, much of what is meant by critical thinking is careful argumentation. For example, analysis is an argument that "X" may be broken down into units "A," "B," and "C." Synthesis is an argument that "A," "B," and "C" are related. Inference is an argument that "X" follows from "A," "B," and "C." Interpretation is an argument about what "X" means. Evaluation is an argument that "A" is better than or equal to "B" (an evaluation that a car is "good" must involve an implicit or explicit comparison with other cars in the same class). Reasoning involves an argument that "A" implies "B," which implies "C," and so on until the solution is found.

By careful argumentation, I mean that a central claim is well supported, and important counterarguments are addressed, either explicitly or implicitly (in the view of a sophisticated audience). That is, it is possible to make a poor analysis, synthesis, inference, interpretation or evaluation that lacks support, overlooks im-

portant counterarguments (i.e., lacks open-mindedness), and is synonymous with a lack of critical thinking. But a well-argued, well-supported analysis, synthesis, inference, interpretation or evaluation that considers important counterarguments would necessarily involve critical thinking.

Some critics might object that my definition of argumentation is much broader than commonly accepted definitions of argumentation as formal, conscious arrangement of claims and evidence to achieve persuasion. But argumentation cannot be limited to the construction of formal arguments. This would deny the existence of informal arguments, by far the most common type of argument and the area where the most important work on argumentation has occurred, at least since Toulmin (1958) pioneered the analysis of informal arguments.

When a broad conception of argumentation is adopted, it is easy to see it as a fundamental component of all forms of critical thinking. By clarifying the nature of critical thinking as argumentation and recognizing it as a skill that can be developed through conscious, formal training, it may be possible to improve critical thinking. For example, teachers could teach students to think in terms of a series of mini-arguments as they collect evidence; to ask, "What claim, potentially, could this piece of evidence support? What are supporting reasons for that judgment? What claim is contradicted by that piece of evidence? What reasons support that conclusion?" In this way, students could be taught to think critically about the process of collecting evidence. On the other hand, lack of clarity about what is meant by "critical thinking" may hinder both instruction and assessment. Practice and feedback may have limited effectiveness when students do not know what it means to think critically.

Another possible objection to a definition of critical thinking as argumentation is that it may appear to be too narrow. For example, Ennis (1987) argues that critical thinking may involve a host of other abilities, such as clarification, as well as dispositions. But underlying a request for clarification are three implicit arguments: an analysis that an issue is composed of elements, an evaluation that some elements are clear and others are unclear, and an inference that clarification of a particular element will facilitate the process of arriving at a supportable claim or conclusion. To the extent that these underlying arguments are strong, a request for clarification would involve critical thinking. But to the extent that the underlying arguments are faulty, such a request might appear naïve or uncritical. While it may be useful to include clarification as a step in achieving critical thinking or developing a strong argument, a request for clarification is not synonymous with critical thinking.

Dispositions are important because a student might be able to think critically but might lack the disposition or motivation to do so. But while a given individual might lack the disposition to think critically, it is possible that he or she could exhibit critical thinking on a particular occasion (see Fisher & Scriven, 1997, pp. 45–46). The lack of disposition does not mean that the individual did not exhibit critical thinking.

Currently Available Tests of Critical Thinking

Currently available tests of critical thinking and their operational definitions of critical thinking are also problematic. The multiple choice items largely call for responses to artificial questions

lacking resemblance to the type of argumentation that is equated with critical thinking in the workplace, according to the examples given above. Thus, these tests could be considered to lack content validity.

For example, the *Watson-Glaser Critical Thinking Appraisal* (Watson & Glaser, 1980), one of the most widely used tests of critical thinking, assesses students on component skills including induction, identifying assumptions, deduction, drawing conclusions, and evaluating arguments. The validity of this approach is doubtful if the criterion is the type of critical thinking that is valued in the workplace. According to the research previously cited, what appears to be valued is the ability to sift through available data, evidence, or examples, to reconcile conflicting views, and to construct strong arguments that explicitly or implicitly address possible counterarguments. Tests of component skills bypass the requirement to weigh and select evidence. These tests involve “sequestered problem solving” (Bransford & Schwartz, 1999, p. 68). Just as juries are often sequestered in order to protect them from exposure to “contaminating” information, test respondents are usually sequestered from contradictory views and information. As a result, these tests do not assess the ability to sift evidence. Bransford and Schwartz argue that sequestered problem solving does not adequately assess the thinking skills that employers want in their workers (p. 68). Employers seek workers who know how to sift through data and evidence in knowledge-rich environments.

A valid test item might present source material containing data, evidence or examples, perhaps with conflicting views about how to interpret, synthesize, analyze, or evaluate the material, and ask respondents to construct a strong argument or select the strongest argument that also addresses important counterarguments. A test composed of such items would be more likely to have content validity because the test items would be representative of the types of real-world tasks where critical thinking is valued and evaluated. Such a test would aim for systemic validity (Frederiksen & Collins, 1989): encouraging behaviors on the part of administrators, teachers, and students that encourage the learning of desirable critical thinking skills. A systemically valid test leads to good educational practices and worthwhile learning; a systemically invalid test leads to ineffective or corrupt educational practices. (See also Messick, 1989, regarding the facet of validity involving the consequential basis for test use.)

In contrast to these ideals, currently available tests of critical thinking assess respondents’ performances on an assortment of component skills. The problem is that an assessment of these subskills may not accurately predict performance on the criterion task, defined as careful argumentation. It is entirely possible for a student to perform well on subskills, especially if he or she is drilled on those subskills, but to be unable to construct a sound argument. To make an analogy, a tennis player might perform very well on isolated drills involving the serve, ground strokes, volley and overhead, yet the player might be unable to consistently select the best shot in game situations and assemble the component skills in a way that wins matches against opponents who probe for weaknesses. In fact, most professional tennis players possess extremely strong component skills, yet relatively few players consistently win matches. Similarly, it doesn’t matter if a student scores well on component skills, such as deductive reasoning or assumption identification or discriminating fact from

opinion, if critical thinking calls for students to sift through data, evidence, and examples, decide which claim is best supported and why alternative claims are not well-supported.

Although it is important to develop strong component skills that students may draw upon when needed, a far more important skill is the ability to weigh various claims according to the available data, evidence, and examples, select the strongest claim, and arrange the supporting material in a way that builds a sound argument, such as an argument about what decision to make or how to solve a problem. This can only be tested by giving students source materials and asking them to construct arguments, just as the only way to test a tennis player is through competitive matches.

What this suggests is the need for authentic assessments of critical thinking. Examples include *The Ennis-Weir Critical Thinking Essay Test* (Ennis & Weir, 1985), *The ICAT Critical Thinking Essay Test* (Sonoma State University, 1996), and *Critical Thinking* (University of Cambridge, 1996). These tests ask students to read and evaluate arguments through written essays. At the present time, however, the cost of applying this approach to large-scale assessments has been prohibitive. Below, I suggest that forced-choice test items (multiple-choice test items) can be designed to ask students to weigh evidence and draw conclusions, as more traditional authentic assessments do, but at a much lower cost. This could open the way to cost-effective reform of state-mandated tests.

Constructing Standardized Tests That Emphasize Argumentation

I suggest four basic principles for constructing tests of critical thinking. First, if the goal of a test of critical thinking is to determine whether children can *use* facts, rather than *recall* them, it is necessary to supply important facts, quotes, examples, formulas, and evidence that children may use to support inferences and respond to counterarguments. Second, the available evidence must lend itself to alternative interpretations. If a cursory review of the evidence correctly supports one conclusion, it is hardly a test of critical thinking. However, for testing purposes, it is desirable that the evidence, after a critical review, primarily supports a single interpretation, so that the test is perceived as fair. Third, the most stringent test of critical thinking is to ask respondents to explain how their answers would change if certain pieces of evidence are found to be faulty or new evidence is uncovered. Fourth, test questions should elicit content knowledge that is worth learning.

An important aspect of critical thinking is identifying significant issues. To prepare children to think critically, we must teach them to identify what is significant. Because the test content often drives instruction, it is desirable to model this thinking process in the classroom, during instruction, through assignments, in preparing for tests, and in the content of the test itself. There are too many important social, scientific, and historical issues and topics to waste time on trivialities. Children are bored in school when the content is boring. Perhaps they can be engaged by asking the big questions. How can society be improved? How did life originate? What is the meaning of friendship? What are the causes of war? By aligning test content with worthwhile questions in science, history, and literature, it may be possible to rescue assessment and instruction from the current focus on trivial

material. Below, I illustrate how these principles may be incorporated into test items that emphasize critical thinking.

Designing Forced Choice Items

State-mandated tests serve several functions, including assessments of whether or not students can demonstrate minimum competencies as well as critical thinking skills. In some cases, carefully selected and carefully designed forced-choice items are appropriate for assessing minimal competencies and core knowledge. Therefore, a portion of a well-designed state-mandated test could involve fact-oriented forced-choice items. Another section of the test could focus on open-ended test items that would test critical thinking. For practical reasons, including the cost of scoring open-ended items, it may be desirable to limit the length of this section. But the rest of the test would not need to fall back on conventional forced-choice items that encourage instruction based on rote memorization of large numbers of facts. Instead, it is possible to design forced-choice items that test reasoning and critical thinking, defined as argumentation and illustrated by the example in Table 1. Items could be created for a range of subjects and levels of difficulty, with different forms of the test tailored to specific types of student populations.

The test item in Table 1 could be used with upper level high school students in a suburban high school who have taken a course in American History covering the Vietnam War.¹ The item can be answered without additional information, so there is little incentive for teachers to drill students on factual knowledge. At the

same time, teaching geared to this item would be helpful and, arguably, desirable as well. Preparation for this type of test item would necessarily involve critical reading and discussion rather than rote learning. However, reading and analysis in preparation for critical discussions of important questions would require learning of factual knowledge in order to make and support arguments and respond to counterarguments. Students who are familiar with the content and skills that are tested would be advantaged, but it would not be necessary for students to memorize particular facts in order to perform well.

Students would be instructed as follows: “Each item contains pro and con arguments. You may assume that the statements of fact in each argument are correct. Select the *best* answer for each item. *Note that other answers may be plausible and correct but are not as complete and balanced as the best answer.*”

Preparation for this item would not require familiarity with specific quotations from Fitzgerald’s or Sheehan’s books and therefore would not necessarily be biased against students who have not read the books, but it would be helpful to have a strong understanding of the arguments for and against American intervention in foreign countries, such as Vietnam. This type of critical thinking about the limits of American foreign policy is, arguably, an essential element of every student’s education, if only because he or she will be responsible for choosing leaders who will decide when and where to send American soldiers. This item satisfies the criterion of content worth learning and teaching.

Answer (a) is incorrect because Americans have supported military intervention, at least since World War II, when a convincing case can be made that American interests are threatened. Both answers (b) and (c) are correct, as explained in (e), so (e) is the best answer. Answer (d) is incorrect because the success of U.S. intervention in World Wars I and II is reasonably regarded to be of low relevance to arguments about intervention in Vietnam. A subsequent item could ask students how their answers would change if an analysis by a historian shows that all of the available leaders in South Vietnam were weak or corrupt.

A possible criticism is that more than one answer to this item is defensible. This possibility is acknowledged in the instructions to the test-taker. However, as demonstrated by the analysis of the item above, it is possible to articulate (and thus teach) clear principles for evaluating the “best” answer among a set of choices. Clearly, problems exist in the real world that do not have a single best answer, but for the purpose of testing critical thinking, it is possible (and desirable) to create test items with one best answer among several defensible choices. For students at lower grade levels, it would be possible to create items that preserve the format but are less demanding, with simpler requirements for vocabulary, arguments, answer choices, and background knowledge.

A more general concern that has been raised about forced choice items is that the keyed answers presume that the designer of the test is always correct. However, it is possible that the designer simply overlooked a good justification for one of the “incorrect” answers. This possibility can be reduced through field-testing of the test items, where test-takers are asked to provide verbal justifications for their answers.

Implications for Assessment and Instruction

The value of defining critical thinking in terms of argumentation is that assessment and instruction can be simplified and focused

Table 1. Example of a Forced-Choice Item Testing Critical Reasoning in History

In her book on the Vietnam War, Frances Fitzgerald argues that the U.S. should not have sent soldiers to fight in Vietnam because America could not hope to win the war. From her view, it was useless to support the corrupt South Vietnamese government against guerrillas who won the respect, loyalty, and support of the peasantry. But Neil Sheehan argues that America could have won the war if it had insisted on replacing incompetent South Vietnamese government officials. Success, according to Sheehan, required leaders who would focus on rural development policies, raise living standards, protect peasants, and reduce the ability of the Communists to recruit soldiers from among the peasants. Assume that Fitzgerald’s and Sheehan’s views are accurately represented here. Whose arguments are stronger?

a) Fitzgerald’s, because the U.S. should not risk the lives of American soldiers to fight a foreign war.

b) Fitzgerald’s, because the support of the South Vietnamese peasants was essential if American soldiers were to be effective.

c) Sheehan’s, to the extent that the U.S. had the power to install effective leaders, implement rural development, and protect the peasantry.

d) Sheehan’s, because World War I and World War II proved that American military intervention can be successful.

e) Both (b) and (c). If it were possible to accomplish what Sheehan suggests, the Communists would have lost their base of support among the peasantry. But if Sheehan’s suggestions were not feasible, the U.S. should have avoided military intervention.

on what counts in the working world. We tend to say that students display poor critical thinking skills when reasons are poor or counterarguments are not addressed. A simple way to improve critical thinking is to focus students' attention on the need to provide good reasons and consider counterarguments. This may seem obvious, but in the course of my own research, while observing students in the classroom, students told me that they had never been explicitly taught to bridge gaps between their reasons and claims. Furthermore, research demonstrates that argument quality can be improved through simple heuristics that focus on these elements (Yeh, 1998). The heuristics prompted children to generate the subarguments linking reasons to claims. When children spelled out their reasoning, they frequently realized the need to modify their claims and reasons, ultimately resulting in stronger arguments and improved reasoning.

Perhaps as early as the fourth grade level, assessment and instruction of critical thinking could take oral debate as a model. Students who prepare for debates typically read, analyze, synthesize, and evaluate source material. They develop and support claims, considering and responding to counterarguments. Likewise, assessments judge the clarity of claims, strength of support, and adequacy of responses to counterarguments. In the process of debating particular topics, students can learn important facts about those topics and what it means to think critically within specific domains.

Conceptualizing critical thinking as argumentation directs students' and teachers' attention to time-tested strategies for developing and evaluating arguments. What claims could be supported by available evidence? Which claim is best supported by the evidence? How can counterarguments be addressed? Do claims need revision? Qualification? What is the warrant connecting premises to the claim? What subarguments support the warrant and premises? Are these adequate? Oral debate, classical rhetoric, and argumentation offer strategies for categorizing and supporting types of claims. Furthermore, if critical thinking involves argumentation, then practice involves practice in argumentation. The implications for pedagogy and assessment are clear. Instruction should focus on argumentation and tests should ask students to make and assess arguments. These thinking skills are important whether we are educating children to be electricians or astrophysicists.

Oral debate also provides a model for linking general strategies of argumentation with tactics that are specific to particular fields and topics. While textbooks teach general strategies for argumentation, preparation for particular debate topics involves immersion in the specifics of each topic. One learns to use general argumentation strategies as guides, recognizing the need to learn the tactics specific to particular topics, to gain familiarity with what has previously been said on the topic, how it has been said, and how relevant audiences have judged it.

Conclusion

In this article I have argued that state-mandated tests should focus on critical thinking, defined as careful argumentation. This could address the primary criticism of such tests—that they drive an instructional focus on rote factual learning. Conceptualizing critical thinking in terms of argumentation provides a simple, useful way to focus instruction and assessment according to the type of critical thinking that appears to be valued in the workplace. I gave an example of how this concept could be translated into a forced-choice test item. A test that combines both open-ended and forced-

choice items could be used to assess critical thinking in a practical, cost-effective way. If one accepts the premise that tests drive curriculum and instruction, perhaps the easiest way to reform instruction and improve educational quality is to construct better tests.

NOTE

I gratefully acknowledge comments by Robert Ennis, Edward Haertel, and Robert Swartz and support from the Spencer Foundation. The views expressed are the author's.

¹ The two books on which the question in Table 1 is based are Frances Fitzgerald's *Fire in the Lake: The Vietnamese and the Americans in Vietnam* (Boston: Little, Brown, 1972) and Neil Sheehan's *A Bright Shining Lie: John Paul Vann and America in Vietnam* (New York: Random House, 1988).

REFERENCES

- Ad Hoc Committee on MCAS. (1998). *Educators criticize new Massachusetts comprehensive assessment system (MCAS) exams*. FairTest. Available: <http://www.fairtest.org/pr/mcaspr.htm>.
- Billig, M. (1987). *Arguing and thinking: A rhetorical approach to social psychology*. Cambridge: Cambridge University Press.
- Bransford, J. D., & Schwartz, D. L. (1999). Rethinking transfer: A simple proposal with multiple implications. In A. Iran-Nejad & P. D. Pearson (Eds.), *Review of Research in Education* (Vol. 24, pp. 61–100). Washington, DC: American Educational Research Association.
- Chittenden, G. E. (1942). An experimental study in measuring and modifying assertive behavior in young children. *Monographs of the Society for Research in Child Development*, 7(1, serial no. 31). Washington, D.C.: Society for Research in Child Development, National Research Council.
- Eckerman, C., & Stein, M. (1982). The toddler's emerging interactive skills. In K. Rubin & W. Ross (Eds.), *Peer relations and social skills* (pp. 41–72). New York: Springer Verlag, Inc.
- Eisenberg, N. R., & Garvey, C. (1981). Children's use of verbal strategies in resolving conflicts. *Discourse Processes*, 4, 149–170.
- Ennis, R. H. (1987). A taxonomy of critical thinking dispositions and abilities. In J. B. Baron & R. J. Sternberg (Eds.), *Teaching thinking skills: Theory and practice* (pp. 9–26). New York: Freeman.
- Ennis, R. H., & Weir, E. (1985). *The Ennis-Weir critical thinking essay test*. Pacific Grove, CA: Midwest Publications.
- Fahnestock, J., & Secor, M. (1991). The rhetoric of literary criticism. In C. Bazerman & J. Paradis (Eds.), *Textual dynamics of the professions: Historical and contemporary studies of writing in professional communities* (pp. 76–96). Madison, WI: The University of Wisconsin Press.
- Fisher, A., & Scriven, M. (1997). *Critical thinking: Its definition and assessment*. Point Reyes, CA: Edgepress.
- Frederiksen, J. R., & Collins, A. (1989). A systems approach to educational testing. *Educational Researcher*, 18, 27–32.
- Holt, T. (1990). *Thinking historically: Narrative, imagination, and understanding*. New York: The College Entrance Examination Board.
- Kuhn, D. (1991). *The skills of argument*. New York: Cambridge University Press.
- Kuhn, D. (1992). Thinking as argument. *Harvard Educational Review*, 62(2), 155–178.
- Kuhn, D. (1999). A developmental model of critical thinking. *Educational Researcher*, 28(2), 16–26, 46.
- Kuhn, D., Shaw, V., & Felton, M. (1997). Effects of dyadic interaction on argumentative reasoning. *Cognition and Instruction*, 15(3), 287–315.
- MacKinnon, J. (1993). Becoming a rhetor: Developing writing ability in a mature, writing-intensive organization. In R. Spilka (Ed.), *Writing in the workplace: New research perspectives* (pp. 41–55). Carbondale, IL: Southern Illinois University Press.

- McNeil, L. M. (2000). *Contradictions of school reform: Educational costs of standardized testing*. New York: Routledge.
- Means, M. L., & Voss, J. F. (1996). Who reasons well? Two studies of informal reasoning among children of different grade, ability, and knowledge levels. *Cognition and Instruction, 14*(2), 139–178.
- Messick, S. (1989). Validity. In R. L. Linn (Ed.), *Educational measurement* (3rd ed., pp. 13–103). New York: MacMillan.
- Panta, S. J. (2001, March 11). KHSD chief blasts exit test. *Californian*.
- Piaget, J. (1959). *The language and thought of the child*. London: Routledge and Kegan Paul.
- Shantz, C., & Shantz, D. (1985). Conflict between children: Social-cognitive and sociometric correlates. In W. Damon & M. Berkowitz (Eds.), *New directions in child development: Vol. 29, Peer conflict and psychological growth* (pp. 3–22). San Francisco: Jossey-Bass.
- Smart, G. (1993). Genre as community action: A central banks' response to its executives' expectations as readers. In R. Spilka (Ed.), *Writing in the workplace: New research perspectives* (pp. 124–140). Carbondale, IL: Southern Illinois University Press.
- Smith, M. L. (1991). Put to the test: The effects of external testing on teachers. *Educational Researcher, 20*(5), 8–11.
- Smith, M. L., & Rottenberg, C. (1991). Unintended consequences of external testing in elementary schools. *Educational Measurement: Issues and Practice, 10*(4), 7–11.
- Sonoma State University. (1996). ICAT Critical Thinking Essay Test. Rohnert Park, CA: Sonoma State University, Center for Critical Thinking and Moral Critique.
- Stein, N. L., & Miller, C. A. (1991). I win-you lose: The development of argumentative thinking. In J. F. Voss, D. N. Perkins, & J. W. Segal (Eds.), *Informal reasoning and education* (pp. 265–290). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Toulmin, S. E. (1958). *The uses of argument*. London: Cambridge University Press.
- University of Cambridge. (1996). *Critical thinking*. Cambridge, UK: University of Cambridge, Local Examinations Syndicate.
- Voss, J. F. (1990). Reasoning by argumentation. In H. Mandl, E. De Corte, N. Bennett, & H. F. Friedrich (Eds.), *Learning and instruction: European research in an international context, Vol. 2.1: Social and cognitive aspects of learning and instruction* (pp. 305–319). New York: Pergamon Press.
- Voss, J. F., & Means, M. L. (1991). Learning to reason via instruction in argumentation. *Learning and Instruction, 1*, 337–350.
- Watson, G., & Glaser, E. M. (1980). *Watson-Glaser critical thinking appraisal*. Cleveland, OH: The Psychological Corporation (a subsidiary of Harcourt Brace Jovanovich).
- Yeh, S. S. (1998). Empowering education: Teaching argumentative writing to cultural minority middle school students. *Research in the Teaching of English, 33*(1), 49–83.

AUTHOR

STUART S. YEH is a professor in the Lynch School of Education at Boston College; stuart.yeh@bc.edu. After January 14, 2002, he may be reached at the College of Education and Human Development at the University of Minnesota, Minneapolis, MN 55455. His research interests include educational testing, evaluation, and policy.

Manuscript received March 21, 2001

First revision received June 6, 2001

Second revision received September 25, 2001

Accepted September 26, 2001

The Teachers College Record

is stepping up production...
 ...With its *ALL-NEW*
ONLINE VERSION
www.tcrecord.org

Visit us for:

The latest developments in educational research published online weekly

The most complete coverage of opportunities for publishing your work in journals and books

A new section on tools and tutorials to aid educational researchers

Discussions on major topics in education and educational research

Full-text articles from the TCR record print journal

 **TCRecord.org**
 The voice of scholarship in education

AERA Minority Dissertation Fellowships

Call for Applications

Eligibility: An applicant must 1) be a member of one of the groups traditionally underrepresented in higher education in the United States, for example: African American, Native American, Alaskan native (Eskimo or Aleut), Native Pacific Islander, Filipino American, Mexican American, Puerto Rican; 2) be an enrolled doctoral student in an accredited university of the United States, have successfully completed most course requirements, and have an accepted PhD/EdD dissertation proposal; 3) be committed to working full-time on the dissertation; and 4) be interested in a career in higher education/educational research.

Awards: The program will support two minority fellows each year. The awards will be for \$10,000 per year and are designed to assist in the final two years of the doctoral program. Support funds are not intended to be used for payment of tuition.

Deadline: Application materials must be received by **March 1, 2002**. Awards will be announced in May 2002.

Application forms can be obtained through the AERA web site (www.aera.net) or by sending a self-addressed, stamped envelope to AERA, Minority Fellowships, 1230 17th Street, NW, Washington, DC 20036-3078; 202-223-9485.