THE EFFECT OF PERCEIVED LEARNER ADVANTAGES ON TEACHERS' BELIEFS ABOUT CRITICAL-THINKING ACTIVITIES

Edward Warburton
University of California–Santa Cruz

Bruce Torff
Hofstra University

To investigate teachers' beliefs about critical-thinking (CT) activities for different populations of learners, the Critical Thinking Belief Appraisal (CTBA) was administered to 145 practicing secondary teachers. Teachers rated both high-CT and low-CT activities as more effective for high-advantage learners than low-advantage ones, demonstrating strong "advantage effects." They also rated high-CT activities as more effective than low-CT ones for both high-advantage and low-advantage learners, demonstrating "pedagogical-preference effects" stronger for high-advantage learners than low-advantage ones. Although these results are inconsistent with the assertion that teachers favor low-CT activities over high-CT ones for low-advantage learners, the results suggest that low-advantage learners may receive fewer high-CT activities in schools, which may hinder their academic performance. Studies of the development of teachers' CT-related beliefs are needed, with the goal of establishing teacher-education practices emphasizing appropriate use of high-CT activities for low-advantage learners.

Keywords: *critical thinking; teachers' beliefs; advantage effects; pedagogical-preference effects*

Teacher educators have shown burgeoning interest in teachers' beliefs about learning and teaching (Calderhead, 1996; Fenstermacher, 1994; Nespor, 1987; Pajares, 1992; Richardson, 1994, 1996; Smylie, 1988). These beliefs have been found to exert considerable influence on how teachers structure classroom activities and interact with learners (Anning, 1988; Calderhead, 1996; Nespor, 1987; Richardson, 1996). A subset of this work has focused on beliefs about *critical thinking* (CT): "cognitive skills and strategies that increase the likelihood of a desired outcome . . . thinking that is purposeful, reasoned, and goal-directed—the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions" (Halpern, 2002, p. 6; see also Torff, 2003; Brown & Campione, 1990; Browne & Keeley, 2001; Ennis, 1987; Henderson, 2001; Kuhn, 1999; O'Tuel & Bullard, 1993; Perkins, 1992; Perkins, Jay, & Tishman, 1993; Pogrow, 1990, 1994; Raths, Wasserman, Jonas, & Rothstein, 1986; Resnick, 1987). Instruction that emphasizes CT ("high-CT activities") has been described as an approach to teaching that differs from direct instruction ("low-CT activities").

Theory and research on teachers' beliefs about high-CT and low-CT activities has focused on, among other things, the relationship between such beliefs and teachers' percep-

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tions of learners as "high-advantage" or "low-advantage" (i.e., differing in academic track, level of achievement, or socioeconomic status) (Torff, 2003; Oakes, 1990; Page, 1990; Pogrow, 1990, 1994; Raudenbush, Rowan, & Cheong, 1993; Zohar, Degani, & Vaakin, 2001; Zohar & Dori, 2003). According to a frequently cited assertion about teachers' beliefs, low-advantage learners often receive limited access to high-CT activities in schools because teachers purportedly believe that low-CT activities are more appropriate than high-CT ones for low-advantage learners (Pogrow, 1990, 1994; Raudenbush et al., 1993; Zohar & Dori, 2003; Zohar et al., 2001). Such an "advantage effect" may result in a self-fulfilling prophecy, according to this line of reasoning: high-advantage learners receive high-CT instruction that results in high-level academic performance that, in turn, makes still more high-CT lessons likely; but low-advantage learners receive few high-CT lessons, making them less likely to develop sufficiently strong academic skills to be deemed ready for high-CT instruction in subsequent lessons. This issue seems pressing given that contemporary testing practices increasingly emphasize CT skills (e.g., writing essays, designing science experiments) (Yeh, 2001).

In the first study on this issue, Raudenbush et al. (1993) examined the relationship between academic track and emphasis on high-CT activities in a study in which 303 secondary teachers identified their instructional goals for high-track and low-track classes and completed specially designed scales that assessed teachers' emphasis on high-CT activities in these classes. Results of regression analyses indicated that instructional objectives and use of high-CT activities differed across academic tracks. Teachers were more likely to focus on high-CT activities in high-track classes than low-track ones, especially in math and science. Attempts to analyze teachers' beliefs about low-CT activities were unsuccessful due to low reliabilities produced by the researchers' low-CT scales, making analyses comparing beliefs about high-CT and low-CT activities impossible. Based on the data for high-CT activities, however, the researchers concluded that differentiation of instruction based on academic track (i.e., an advantage effect) was deeply institutionalized in schools, with lower-track learners receiving comparatively little high-CT instruction.

Zohar et al. (2001) obtained similar results in a study of 40 Israeli secondary teachers. Semi-structured interviews were conducted in which teachers discussed their instructional goals for learners identified by the researchers as low-achieving or high-achieving. The researchers separated these goals into three categories, two corresponding to low-CT activities ("knowledge" and "comprehension") and one corresponding to high-CT activities ("higher-order thinking"), although no attempt was made to statistically compare beliefs in these categories. Results indicated that 19 of 40 teachers judged high-CT activities to be inappropriate for low-achieving learners. According to the researchers, these 19 teachers judged high-achieving students to benefit most from high-CT activities and low-achieving students to profit most from low-CT activities because, in each case, the activities matched the developmental level of the learners. Although 21 of 40 teachers did not demonstrate an advantage effect, the finding that almost half of the participants did evince such an effect indicates that a meaningful portion of the teachers held beliefs about use of high-CT activities that varied as a function of perceived learner advantages.

Research reported by Raudenbush et al. (1993) and Zohar et al. (2001) examines beliefs about high-CT activities but not about low-CT ones. Hence, it remains unclear how teachers' beliefs about high-CT and low-CT activities compare. Such a comparison bears on the question of whether the advantage effect is particular to high-CT activities or is a function of more general beliefs holding that all kinds of educational activities are believed to be more effective with high-advantage learners than low-advantage ones. Only by examining beliefs about low-CT activities and comparing them to beliefs about high-CT ones (for both populations of learners) can it be determined the extent to which teachers prefer low-CT activities to

high-CT ones for low-advantage learners. This comparison is the focus of the study reported below.

METHOD

Participants

Participants were teachers at 50 randomly selected secondary schools on Long Island, New York. Three teachers at each school were randomly selected to participate in the study, yielding an initial pool of 150 teachers. Five teachers were absent when the scale was scheduled to be administered, leaving 145 participants in the sample. Among the 145 teachers, 96 were women and 49 were men. Their ages ranged from 22 to 56 years, with an average of 34 years and a standard deviation of 5.1 years. Teaching experience ranged from 2 to 32 years, with an average of 7.7 years and a standard deviation of 3.9 years. Men had 1 year more teaching experience than women, on average. The participants included 27 teachers of English, 23 of social studies, 21 of mathematics, 20 of science, 16 of languages other than English, 12 of visual/performing arts, 8 of physical education/health, 6 of business, and 12 of other subjects. More than 90% of the participants had earned a master's degree or higher in their content area or in education.

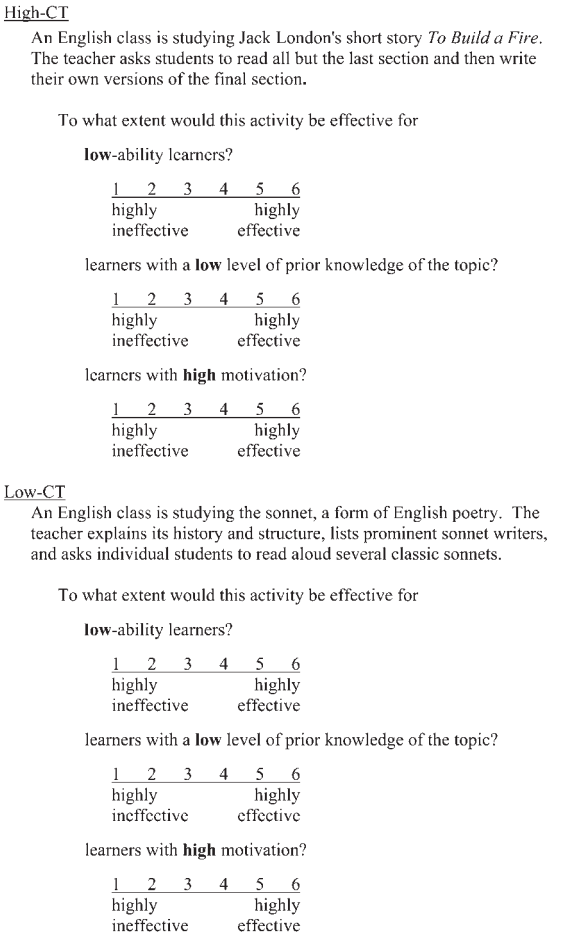

FIGURE 1: Sample Prompts and Items From the Critical Thinking Belief Appraisal

Procedure

Participating teachers were initially contacted by telephone and asked to complete a brief "opinion survey." None refused to do so. To collect data, research assistants traveled to the schools at which the participants were employed. Participating teachers were instructed that the survey had no correct answers and responses were confidential. They had no knowledge of the research design or hypothesis and were not compensated.

Participants completed the Critical Thinking Belief Appraisal (CTBA), a four-factor scale that taps teachers' beliefs about high-CT and low-CT activities for high-advantage and low-advantage learners (Torff & Warburton, 2004). The CTBA is comprised of a series of 12 prompts—vignettes describing classroom activities in English, math, science, social studies, and languages other than English. These prompts include high-CT activities and low-CT ones (see Figure 1).

The design of the CTBA allows teachers' beliefs to be assessed specifically for high-advantage and low-advantage learners. The scale uses a contextualized assessment format drawing on characteristics that teachers typically take into consideration as they judge learners to be high-advantage or low-advantage. The three "advantage characteristics" employed by the CTBA are *ability* (learners' capacity for academic achievement when dealing with the specific topic to which a given

prompt refers), *prior knowledge* (the extent of learners' knowledge about the specific topic to which a given prompt refers before learners participate in additional activities), and *motivation* (how much interest and attention learners demonstrate when dealing with the specific topic to which a given prompt refers) (Archer & McCarthy, 1988; Dweck, 1986; Givvin, Stipek, Salmon, & MacGyvers, 2001; Madon et al., 1998; Moje & Wade, 1997; Nolen & Nicholls, 1994; Pintrich & Schunk, 1996; Tollefson, 2000). Each prompt is followed by three assessment items—either a high-advantage item or a low-advantage one for each advantage characteristic. For example, prompt 1 is followed by a low-ability item, a low-prior-knowledge item, and a high-motivation item. Each item is scored using a 6-point, Likert-type scale from 1 (*highly ineffective*) to 6 (*highly effective*).

Based on a four-factor model, the CTBA assesses teachers' beliefs concerning the effectiveness of (a) high-CT activities for high-advantage learners (high-CT/high-adv.), (b) high-CT activities for low-advantage learners (high-CT/low-adv.), (c) low-CT activities for high-advantage learners (low-CT/high-adv.), and (d) low-CT activities for low-advantage learners (low-CT/low-adv.). The 36-item scale presents 6 high-CT and 6 low-CT prompts; it has 18 items referring to high-advantage learners and 18 to low-advantage ones; and it includes 12 of each of the three advantage characteristics (6 for high-advantage learners and 6 for low-advantage ones).

A series of validation studies supported the theoretical and practical utility of the construct and measure of teachers' beliefs about high-CT and low-CT activities for high- and low-advantage populations of learners (Torff & Warburton, 2004). To begin with, in preliminary pilot testing that assessed the extent to which the prompts successfully reflected high-CT and low-CT activities, 20 professors in the School of Education and Allied Human Services at Hofstra University classified each prompt as high-CT or low-CT, as expected. In Study 1, the prompts and items were administered to two groups of teachers (N = 40) known by supervisor nomination to differ in support for use of CT in the classroom. MANOVA procedures resulted in selection of 12 prompts and 36 items that strongly discriminated between groups (with F values ranging from 12.11 to 77.96, ps < .0025) and yielded satisfactory internal consistency (with alpha levels of .91, .79, .96, and .92 for the scale's four factors). ANOVA procedures produced group differences for each of the four factors, with F values ranging from 13.26 to 68.59 (ps < .001). In Study 2, the scale was administered to 381 secondary teachers, with principal axis factoring with varimax rotation used to explore the factor structure of the ratings produced by the scale. Results of examination of the scree plot, the eigenvalue-greater-than-one rule, and a parallel analysis (Thompson & Daniel, 1996) revealed a four-factor set collectively accounting for 62% of the within-group variance and individually producing alpha levels ranging from .76 to .90. The results also supported the use of the three advantage characteristics—factor-analytic results and internal-consistency correlations (ranging from .74 to .96, ps < .05) indicated that ability, prior knowledge, and motivation had little effect as independent factors but collectively were reliable indicators of teachers' perception of learner advantages. In Study 3, the factor structure of the scores produced by the scale was replicated with 308 preservice teachers using similar factor-analytic techniques as in Study 2. These techniques revealed a factor structure consisting of four factors that accounted for 63% of the within-group variance and produced alpha levels ranging from .84 to .92. In Study 4, the scale was administered to 100 preservice teachers along with measures of CT ability (Facione, Facione, & Giancarlo, 2000), CT disposition (Cacioppo & Petty, 1982; Cacioppo, Petty, Feinstein, & Jarvis, 1996), and social desirability (Crowne & Marlowe, 1964). The scores produced by the CTBA were found to have suitable discriminant validity, with low correlations (ranging from .02 to .28, p < .05) between each of the four factors and measures of CT ability, CT disposition, and social desirability. In Study 5, in-service teachers (N = 72) produced scores with satisfactory predictive validity, with an overall correlation of .72 (p <

TABLE 1 Means and Standard Deviations for Dependent Variables

Variable	M	SD
High-CT activities for high-advantage learners	4.59	.86
High-CT activities for low-advantage learners	3.28	.77
Low-CT activities for high-advantage learners	4.11	.93
Low-CT activities for low-advantage learners	2.91	.67

NOTE: CT = critical thinking. All variables were assessed on 6-point scales (1 = *highly ineffective*, 6 = *highly effective*).

.05) between ratings of observed classroom CT use and the subset of CTBA items that match the learner characteristics of the classroom observed (as determined by the teacher).

In the study reported in this article, the four factors yielded by the CTBA served as dependent variables. In addition, five independent variables were employed as covariate measures. The three categorical independent variables were gender, educational level (bachelor's, master's, master's plus 30 credits, doctoral), and content area (business, English, languages other than English, mathematics, physical education/health, science, social studies, visual/performing arts, other). The two continuous independent variables were age and teaching experience.

RESULTS

Table 1 presents means and standard deviations for the dependent variables. Evaluation of assumptions of normality of sampling distributions, linearity, homogeneity of variance, homogeneity of regression, and reliability of covariates were satisfactory. No univariate within-cell outliers were obtained at alpha = .001. Low correlations between dependent variables indicated a lack of common variation (rs < .48). The covariates age and teaching experience were highly correlated, with a squared multiple correlation (SMC) (R^2) of .76. Age was deleted as a covariate from the analyses to reduce the potential for multicollinearity and focus the analyses on teaching experience, the more conceptually relevant variable.

Within-participants MANCOVA procedures were conducted to investigate differences across the four measures of CT-related beliefs. Teachers' beliefs differed significantly across the four-factor model (F[3, 142] = 15.54, p < .0001; eta-squared = .16). With the exception of a small effect of level of educational attainment in the subject taught (F[3, 142] = 5.69, p < .001; eta-squared = .05), no statistically significant main effects or interactions were found between the covariates and the dependent variables.

In the first of a series of post hoc comparisons employing least significant differences tests, teachers rated high-CT prompts as more effective with high-advantage learners than low-advantage ones (F[1, 144] = 156.79, p < .0001; eta-squared = .63). Teachers also rated low-CT prompts as more effective with high-advantage than low-advantage learners (F[1, 144] = 102.74, p < .0001; eta-squared = .53). These large effect sizes indicate powerful advantage effects in which teachers appeared to believe strongly that both high-CT and low-CT activities were more effective for high-advantage learners than low-advantage ones. The advantage effect was somewhat stronger for high-CT items than low-CT ones.

Teachers rated high-advantage learners as benefiting more from high-CT activities than low-CT ones (F[1, 144] = 27.72, p < .0001; eta-squared = .24). Similarly, for low-advantage learners, teachers favored high-CT activities over low-CT ones (F[1, 144] = 9.04, p < .01; eta-squared = .09). These results demonstrate "pedagogical-preference effects" in which teachers appeared to prefer high-CT activities to low-CT ones for both populations of learners, although the effect was stronger for high-advantage learners than low-advantage ones.

DISCUSSION

In keeping with prior research pointing to an advantage effect in teachers' beliefs about high-CT activities (Raudenbush et al., 1993; Zohar et al., 2001), the results of this study show that teachers judged high-CT activities to be more effective with high-advantage learners than low-advantage ones. A large effect size (.63) is indicative of a strong belief on this point. Teachers' beliefs about low-CT activities evinced a strong advantage effect as well; teachers rated

low-CT activities as more effective with high-advantage learners than low-advantage ones, with a large effect size of .53. Teachers apparently judged both high-CT and low-CT activities to be considerably more effective for high-advantage than low-advantage learners, although this belief was slightly stronger for high-CT activities than low-CT ones.

The results also point to pedagogical-preference effects in teachers' beliefs. For high-advantage learners, teachers judged high-CT activities to be more effective than low-CT ones (with a moderate effect size of .24). This result is consistent with previous advantage-effect research (Raudenbush et al., 1993; Zohar et al., 2001). Teachers produced a pedagogical-preference effect for low-advantage learners as well. Although the effect was weaker (with a modest effect size of .09), teachers preferred high-CT activities to low-CT ones when teaching low-advantage learners, demonstrating an apparent preference for high-CT activities for low-advantage learners as well as high-advantage ones.

Teacher educators have suggested that teachers judge low-CT activities to be more appropriate than high-CT ones for low-advantage learners (Pogrow, 1994; Raudenbush et al., 1993; Zohar & Dori, 2003; Zohar et al., 2001), but such a result was not produced in this study. A more complex picture of teachers' beliefs emerged in which teachers evinced both advantage effects (indicating a belief that high-CT and low-CT activities alike are more effective with high-advantage than low-advantage learners) and pedagogical-preference effects (indicating a preference for high-CT activities over low-CT ones for both learner populations). At the same time, there is reason to conclude that high-advantage learners likely receive the lion's share of the high-CT instruction in schools. Teachers' preference for high-CT activities over low-CT ones was considerably stronger for high-advantage learners than low-advantage ones—the pedagogical-preference effect size was almost 3 times larger for high-advantage learners (.24) than low-advantage ones (.09). Moreover, the advantage effect was larger for high-CT activities than low-CT ones. This pattern suggests that teachers are more favorable to high-CT activities when teaching high-advantage learners than low-advantage ones.

Implications for Teacher Education

What constitutes the optimal blend of high-CT and low-CT activities for different learner populations is a disputatious matter. But there is evidence that high-CT activities can be effective for low-advantage learners (Pogrow, 1994; White & Fredriksen, 1998, 2000; Zohar & Dori, 2003). Such evidence makes inequitable access to high-CT activities problematic, according to teacher educators who suggest that all learners should have access to instruction that encourages them to think critically (Pogrow, 1994; Raudenbush et al., 1993; Zohar & Dori, 2003; Zohar et al., 2001), especially with testing practices increasingly emphasizing CT skills (Yeh, 2001). From this viewpoint, teacher-education practices are needed that promote more equitable use of high-CT activities in the classroom, with the goal of fostering use of high-CT activities for low-advantage learners.

There is no proven formula for fostering desired changes in teachers' beliefs (Richardson, 1994, 1996, 2002; Richardson & Placier, 2002) and no theory or research specifically devoted to changing teachers' CT-related beliefs, but a number of strategies have potential to induce teachers to reconsider beliefs inconsistent with equitable access to high-CT activities. To begin with, teachers might well be encouraged to analyze case studies of instructional planning, concerning both high-CT and low-CT activities, with the goal of examining the advantages and disadvantages of each type of activity for different populations of learners (Barnett & Sather, 1992; Blumenfeld, Hicks, & Krajcik, 1996; Morine-Dershimer, 1993). Second, presenting teachers with models of effective use of high-CT activities for low-advantage learners and encouraging teachers to analyze these models can provide specific techniques for using these activities with these learners (Anderson et al., 1995; Richardson & Hamilton, 1994). Third, teachers might well be afforded opportunities for guided participation in the design of vehi-

cles for curriculum, instruction, and assessment that promote equitable use of high-CT activities (Blumenfeld, Krajcik, Marx, & Soloway, 1994; Carter, 1990; Russell, 1995; Smylie, 1988; Wilson, 1996; Woolfolk Hoy & Murphy, 2001).

Other strategies involve encouraging teachers to engage in reflective thinking about their beliefs, based on the theory that such reflection has potential to galvanize belief change (Feiman-Nemser, McDiarmid, Melnick, & Parker, 1989; Hollingsworth, 1989; Holt-Reynolds, 1992; Placier & Hamilton, 1994; Richardson & Hamilton, 1994; Stallings, 1989). This goal may be reached through classroom conversations, journals, reaction papers, and portfolios. In particular, it may be advisable to encourage preservice teachers to observe, in their fieldwork, the discrepancies between the instructional approaches used by cooperating teachers to teach different learner populations. These discrepancies could be the focal point of specific questions provided to prompt journal entries or other reflective activities that aim to induce teachers to consider the outcomes, intended and otherwise, of the teaching they are observing (Mayer-Smith & Mitchell, 1997; Osterman & Kottkamp, 1992; Sparks, 1988).

Finally, it might be fruitful for teachers—especially preservice ones—to examine the assessment procedures in use in modern schools. Encouraging teachers to examine these increasingly CT-oriented assessments may motivate them to reconsider their beliefs about high-CT and low-CT activities for low-advantage learners. Baird, Fensham, Gunstone, Penna, and White (1991) suggested that the belief-change process results from an interaction among action, observation, evaluation, and reflection; according to this viewpoint, a combination of the strategies discussed above promise to encourage teachers to rethink beliefs that may lead to inequitable use of high-CT activities in schools.

LIMITATIONS AND FUTURE RESEARCH

A number of limitations of this study and directions for future research are noteworthy. To begin with, limitations are inherent in the use of categorical variables (high-CT versus low-CT, high-advantage versus low-advantage) for which the variables might otherwise be treated as continuous. Replication studies in other geographic areas may yield results different from those produced by this study's Long Island, New York participants. Moreover, it is plausible that elementary teachers and special education teachers may differ from the secondary teachers studied here. Similarly, among secondary teachers, differences may obtain across content areas (e.g., science and social studies teachers may hold different beliefs).

Although CTBA validation research supported the use of three advantage characteristics (ability, prior knowledge, and motivation) collectively as a measure of teachers' perception of learners' advantage status (Torff & Warburton, 2004), these factors individually may vary in influence on teachers' beliefs. Future research might well employ qualitative methods to investigate the full range of factors teachers take into account in making judgments concerning which kind of activities to use with different learner populations. Interviews with teachers have potential to reveal how CT-related beliefs are influenced by the kinds of experiences that teachers have following preservice education.

The findings of this study also point to the need for research investigating the origins and development of teachers' CT-related beliefs. It would be particularly informative to compare the beliefs of a control group of individuals who have not chosen the teaching profession, prospective teachers at the beginning of a teacher-education program, preservice teachers at the end of one, and practicing teachers with varying degrees of classroom experience and in-service education. Such a project would examine the initial CT-related beliefs with which individuals enter teacher education programs, the effect of these programs on teachers' beliefs, and the extent to which beliefs change as teachers gain in-service education and teaching experience.

Finally, future research might well endeavor to examine how beliefs about CT vary between expert teachers and randomly selected in-service teachers (Berliner, 1992, 1994). Classroom-observational research indi-

cates that experts use high-CT activities more than in-service teachers (Torff, 2003); however, it remains unclear how experts compare to in-service teachers in differentiation of classroom use of high-CT activities based on perceived learner advantages. Ultimately, research on teachers' beliefs may be helpful in the development of educational practices that promote optimal classroom use of high-CT activities and low-CT ones for both high-advantage and low-advantage learners.

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Edward Warburton *is assistant professor at the University of California–Santa Cruz. Dr. Warburton holds master's and doctoral degrees from Harvard Graduate School of Education. His research work includes statistical analysis and data design for the U.S. Department of Education, the use of motion capture for movement analysis, and investigation of teaching and learning in the arts.*

Bruce Torff *is associate professor of curriculum and teaching at Hofstra University in Hempstead, New York. He specializes in classroom use of critical-thinking activities, teachers' beliefs about learning and teaching, and the effect of student/teacher rapport on academic achievement.*