



InTASC Model Core Teaching Standards (April 2011)

Research Synthesis

This review of the research was conducted by Peter Youngs of Michigan State University. Please send any comments/feedback to Dr. Youngs by July 31st, 2011. He can be reached at pyoungs@msu.edu or (517) 353-4348.

A summary of the research by individual standard and a spreadsheet of research studies by standard are available at www.ccsso.org/intasc.

**Synthesis of Research Related to the
Updated InTASC Core Teaching Standards
April 25, 2011**

As part of the process of updating the InTASC Core Teaching Standards, InTASC commissioned a review of research from 1990 to 2011 on the main topics addressed by the standards. These topics include instruction, assessment, teacher knowledge, learning environment, technology, planning and reflection, and teacher collaboration. The purpose of the literature review is to a) identify areas within the updated InTASC standards that are supported by empirical evidence and b) identify areas within the standards that are supported by normative arguments (as opposed to empirical research).

This synthesis paper briefly summarizes research on instruction (including instruction in bilingual education and special education), assessment, teacher knowledge, learning environment, technology, planning and reflection, and teacher collaboration. In addition, InTASC has prepared the following companion documents available on the CCSSO website: a) a brief 2- to 3-page summary of the research reviewed for each InTASC standard and b) a master template featuring detailed summaries of each study reviewed for each InTASC standard.

The search strategies used in conducting this review are included below after the research summaries (and prior to the references).

Instruction

Standard 8 addresses teachers' instructional strategies and Standard 2 focuses on teachers' ability to address learning differences. This section of the synthesis briefly summarizes research on instruction in the areas of elementary literacy, elementary mathematics, secondary English/language arts, secondary mathematics, bilingual education, and special education.

Elementary Literacy. At the elementary level, several studies have documented an association between student achievement in reading and *coaching, high-level questioning, focus on meaning-making, and integrated language arts* (see, for example, Pressley, Rankin, & Yokoi, 1996; Taylor, Pearson, Clark, & Walpole, 2000; Taylor, Pearson, Peterson, & Rodriguez, 2003; Wharton-McDonald, Pressley, & Hampston, 1998; Xue & Meisels, 2004). In addition, a number of studies have shown an association between reading achievement and *direct instruction* in phonics, phonemic awareness, and other basic literacy skills (see, e.g., Beck & McKeown, 2007; Borman, Slavin, Cheung, Chamberlain, Madden, & Chambers, 2005; 2007; Coyne, McCoach, Loftus, Ziploi, & Kapp; 2009; Reis, McCoach, Coyne, Schreiber, Eckert, & Gubbins, 2007; Sadoski & Wilson, 2006; Skindrud & Gersten, 2006). Further, research has documented an association between the use of *peer-assisted learning strategies* (e.g., peer tutoring) and improvements in reading ability (see, e.g., Fuchs, Fuchs, Mathes, & Simmons, 1997; Mathes, Torgesen, & Allor, 2001).

Elementary Mathematics. In elementary mathematics, studies have demonstrated an association between student achievement in math and instruction that focuses on *transfer skills and schemas* (see, e.g., Fuchs, Fuchs, Finelli, Courey, & Hamlett, 2004; Fuchs, Fuchs, Finelli, Courey,

Hamlett, Sones, & Hope, 2006); as well as instruction that addresses *high-level intellectual work* (see, e.g., Gavin, Casa, Adelson, Carroll, & Sheffield, 2009; Hickey, Moore, & Pellegrino, 2001; Newmann, Marks, & Gamoran, 1996). Other studies have shown effects on student learning of *quantity of mathematics taught* (see, e.g., Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008; Rowan, Correnti, & Miller, 2002).

Secondary English/Language Arts. At the secondary level, studies have documented an association between student achievement in English/language arts and *discussion-based approaches* (see, e.g., Applebee, Langer, Nystrand, & Gamoran, 2003; Juzwik, Nystrand, Kelly, & Sherry, 2008; Nystrand & Gamoran, 1991); as well as *instruction that promotes student understanding* (see, e.g., Carbonaro & Gamoran, 2002; Langer, 2001).

Secondary Mathematics. In secondary mathematics, studies have shown an association between student achievement in mathematics and *the quality of math instruction* (see, e.g., Brenner, Mayer, Mosely, Brar, Duran, Reed, & Webb, 1997; Newmann, Marks, & Gamoran, 1996; Stein & Lane, 1996).

Bilingual Education. Several studies have demonstrated associations between bilingual student achievement and *instructional quality* and *opportunity-to-learn* (see, e.g., Abedi & Herman, 2010; Cirino, Vaughn, Linan-Thompson, Cardenas-Hagan, Fletcher, & Francis, 2009). In addition, studies have shown associations between bilingual student achievement and *supplemental instruction* (see, e.g., Gunn, Biglan, Smolkowski, & Ary, 2000; Gunn, Smolkowski, Biglan, & Black, 2002; Gunn, Smolkowski, Biglan, Black, & Blair, 2005; Linan-Thompson, Vaughn, Hickman-Davis, & Kouzekanani, 2003). Further, studies have documented associations between bilingual student achievement and *direct instruction* (see, e.g., Vaughn, Cirino, Linan-Thompson, Mathes, Carlson, Hagan, Pollard-Durodola, Fletcher, & Francis, 2006; Vaughn, Mathes, Linan-Thompson, Cirino, Carlson, Pollard-Durodola, Cardenas-Hagan, & Francis, 2006).

Special Education. A number of studies have shown an association between gains in the writing ability of students with disabilities and *self-regulated strategy development* (see, e.g., Asaro-Saddler & Saddler, 2010; MacArthur & Phillippakos, 2010; Jacobson & Reid, 2010). Also, studies have demonstrated an association between the achievement of students with disabilities and *peer tutoring* (see, e.g., Fuchs, Fuchs, Mathes, & Simmons, 1997; Gersten, Baker, Smith-Johnson, Dimino, & Peterson, 2006; Rafdal, McMaster, McConnell, Fuchs, & Fuchs, 2011).

Assessment

Standard 6 addresses assessment including the quality of teachers' assignments, their use of formative assessment, their use of questioning strategies, and student self-assessment. Several studies have documented an association between the *quality of assignments* and student achievement or the quality of student work (see, e.g., Clare & Aschbacher, 2001; Matsumura, Patthey-Chavez, Valdes, & Garnier, 2002; Newmann, Bryk, & Nagaoka, 2001; Newmann, Marks, & Gamoran, 1996). In addition, a number of studies have shown an association between teachers' use of *formative assessment* and student achievement (see, e.g., Fuchs, Fuchs, Hamlett, & Stecker, 1991; Fuchs, Fuchs, Karns, Hamlett, & Katzaroff, 1999; Schunk & Rice, 1991).

Further, studies have demonstrated an association between teachers' use of *questioning strategies* and student achievement (see, e.g., King, 1991; King & Rosenshine, 1993; Taylor, Pearson, Peterson, & Rodriguez, 2003). Finally, studies have shown an association between involving students in *self-assessment* and student achievement (see, e.g., Declos & Harrington, 1991; Fontana & Fernandes, 1994; Schunk, 1996).

Teacher Knowledge

Standard 4 addresses teacher knowledge including knowledge of content and knowledge of content pedagogy. In terms of mathematics, several studies have documented associations between student achievement in mathematics and teachers' *mathematical knowledge* (see, e.g., Mullens, Murnane, & Willett, 1996; Rowan, Correnti, & Miller, 2002; Sowder, Phillip, Armstrong, & Shappelle, 1998) as well as teachers' *mathematical knowledge for teaching* (see, e.g., Hill, Rowan, & Ball, 2005; Hill, Ball, Blunk, Goffney, & Rowan, 2007; Hill, Blunk, Charalambous, Lewis, Phelps, Sleep, & Ball, 2008; Jacob, Kane, Rockoff, & Staiger, 2009).

With regard to science, a number of studies have shown associations between the nature and quality of instruction and teachers' *knowledge of science* and their *pedagogical content knowledge (PCK) in science*. For example, Lederman (1999) and Friedrichsen, Abell, Pareja, Brown, Lankford, and Volkman (2009) demonstrated an association between high school teachers' content knowledge and PCK (or lack of PCK) in biology, and the nature of instruction. In the area of chemistry, Clermont, Krajcik, and Borko (1993; Clermont, Borko, & Krajcik, 1994) have described the nature of PCK in chemistry while van Driel and colleagues (van Driel, de Jong, & Verloop, 2002; van Driel, Verloop, & de Vos, 1998) have shown how changes in teacher knowledge can affect chemistry instruction. In research on chemistry and physics teachers, Justi and van driel (2005; 2006) have also documented an association between changes in teacher knowledge and science instruction.

Learning Environment

Standard 3 addresses teachers' role in creating and maintaining a productive learning environment. This section of the synthesis briefly summarizes research on learning environments at the elementary and secondary level. At the elementary level, several studies have documented an association between student achievement and teachers' *classroom management skills* and the *emotional quality of teacher-student interactions* (see, e.g., Cirino, Pollard-Durodola, Foorman, Carlson, & Francis, 2007; Freiberg, Huzinec, & Templeton, 2009; O'Connor & McCartney, 2007; Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008). In addition, studies have shown an association between teachers' *expectations* for students and student engagement (see, e.g., Bohn, Roehrig, & Pressley, 2004; Skinner & Belmont, 1993; Wharton-McDonald, Presley, & Hampston, 1998). Further, studies have demonstrated an association between the *emotional quality of teacher-student interactions* and students' social competence (see, e.g., Pianta, Paro, Payne, Cox, & Bradley, 2002; Wilson, Pianta, & Stuhlman, 2007).

At the secondary level, studies have shown an association between *academic press* and student achievement (see, e.g., Phillips, 1997) and between *classroom climate* and student engagement (see, e.g., Patrick, Turner, Meyer, & Midgley, 2003; Raphael, Pressley, & Mohan, 2008; Ryan & Patrick, 2011).

Applications of Content

Standard 5 addresses teachers' ability to use technology and other resources to engage students in learning content. Several studies have demonstrated an association between the use of *computer-assisted instruction* and student learning (see, e.g., Erdner, Guy, & Brush, 1998; Fuchs, Fuchs, Hamlett, & Stecker, 1991; Mathes, Torgesen, & Allor, 2001). In addition, a number of studies have shown that students in *online high school Algebra courses* demonstrate learning gains and perform as well as or better than students in traditional Algebra courses (see, e.g., Cavanaugh, Gillian, Bosnick, Hess, & Scott, 2008; Hughes, McLeod, Brown, Maeda, & Choi, 2007; O'Dwyer, Carey, & Kleiman, 2007). Further, studies have documented associations between teachers' technology use and their *enactment of reform-oriented instructional practices* (Hickey, Moore, & Pellegrino, 2001; Penuel, Fishman, Yamaguchi, & Gallagher, 2007; Ross, Hogaboam-Gray, McDougall, & Bruce, 2002).

Planning and Reflection

Standard 7 addresses teachers' ability to *plan instruction* while Standard 9 focuses on their ability to *engage in professional learning* and to *reflect on and modify their teaching*. Research on teachers who have gone through the National Board for Professional Teaching Standards (NBPTS) assessment process provides some evidence in support of Standards 7 and 9. This is because the NBPTS assessment process focuses directly on teachers' ability to plan lessons and units, and to reflect on and modify their future teaching plans. In one study, Goldhaber and Anthony (2007) found that the students of NB-certified elementary teachers consistently outperformed the students of other teachers (who applied for, but did not earn NB certification) in both reading and math. In a second study, Cantrell, Fullerton, Kane, and Staiger (2008) reported that future NB-certified elementary teachers were not significantly more effective than non-applicants, while unsuccessful NB applicants were significantly less effective than non-applicants.

In a third study, Clotfelter, Ladd, and Vigdor (2007) found that prior to beginning the certification process, future NB-certified elementary teachers tended to outperform their peers by a significant margin. However, during and after the NB certification process, the NB-certified teachers did not demonstrate a significant improvement. In a fourth study, Harris and Sass (2009) reported that before, during, and after the NB certification process, the impact on student achievement of NB-certified teachers in grades 3 through 10 did not differ significantly from their peers. Finally, Vandervoort, Amrein-Beardsley, and Berliner (2004) compared the performance of students assigned to NB-certified teachers with that of students assigned to non-NB-certified teachers in the same school.

In 11 out of 35 comparisons, the NB-certified teachers significantly outperformed their non-certified peers.

Teacher Collaboration

Standard 10 addresses teachers' ability to collaborate with a) colleagues and b) parents to improve instruction and student learning. Several studies had documented associations between teacher collaboration and student achievement (Goddard, Goddard, & Tschannen-Moran, 2007; Saunders, Goldenberg, & Gallimore, 2009; Strahan, 2003); as well as changes in instruction (Garet, Porter, Desimone, Birman, & Yoon, 2001; Penuel, Riel, Krause, & Frank, 2009; Westberg & Archambault, 1997).

A number of studies have shown associations between student achievement and *teacher-parent relationship quality*, *teachers' expectations for students*, and *teacher support for students* (Benner & Mistry, 2007; Hughes & Kwok, 2007; Wentzel, 1998).

Search Strategies

In conducting this literature review, we focused primarily on research studies that were published in peer-reviewed journals between 1990 and 2011. Each study had to address an area(s) of teacher knowledge, a teacher disposition(s), and/or teacher performance(s) represented in the updated InTASC Core Teaching Standards. Some studies examined associations between teacher knowledge or performance and student achievement. Other studies investigated factors (i.e., predictor variables) associated with teacher knowledge or performance. In addition, we included studies from within and outside the United States; and we focused primarily on research on literacy, English/language arts, mathematics, and science; with limited attention to research on history/social studies and world/foreign language. In sum, the search criteria were as follows:

- Focus on peer-reviewed journal articles (1990 to 2011)
- Each study had to address an area(s) of teacher knowledge, a teacher disposition(s), and/or teacher performance(s) represented in the updated InTASC standards
- Studies had to examine a) associations between teacher knowledge or performance and student achievement OR factors associated with teacher knowledge or performance
- Studies from within and outside the U.S. were included
- Focus on research on literacy, English/language arts, mathematics, and science

As of April 2011, we have reviewed/started reviewing each of the following journals from 1990 to 2011 as part of this literature review:

1. American Educational Research Journal
2. American Journal of Distance Education
3. American Journal of Education

4. Bilingual Research Journal
5. British Journal of Education Psychology
6. Child Development
7. Comparative Education Review
8. Economics of Education Review
9. Educational Administration Quarterly
10. Educational Assessment
11. Educational Evaluation and Policy Analysis
12. Educational Policy Analysis Archives
13. Educational Research and Evaluation
14. Elementary School Journal
15. Exceptional Children
16. Gifted Child Quarterly
17. International Journal of Science Education
18. Journal for Research in Mathematics Education
19. Journal for the Education of the Gifted
20. Journal of Education Psychology
21. Journal of Educational Computing Research
22. Journal of Experimental Education
23. Journal of Learning Disabilities
24. Journal of Policy Analysis and Management
25. Journal of Reading Behavior
26. Journal of Research on Science Teaching
27. Journal of Research on Technology in Education
28. Journal of Special Education
29. Journal of Teacher Education
30. Measurement: Interdisciplinary Research and Perspectives
31. Reading and Writing: An Interdisciplinary Journal
32. Reading Research Quarterly
33. Research in the Teaching of English
34. Review of Economics and Statistics
35. School Science and Mathematics
36. Science Education
37. Scientific Studies of Reading
38. Sociology of Education
39. Teachers College Record
40. Teaching and Teacher Education

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