Issue 1 Fall 2013

CORE Academic Quarterly

Welcome to the New CORE *Academic Quarterly*!

CORE is proud to announce a new look and title for our quarterly client newsletter. We are introducing a new format by combining the CORE *Reading Expert* and the CORE *Marvelous Mathematician* into one newsletter, the CORE *Academic Quarterly*. Both the *Reading Expert* and *Marvelous Mathematician* will still remain as featured columns with up-to-date news and commentary about research-based trends in the field for each content area. However, an additional column to tie both content areas together will include an introduction by CORE CEO Linda Diamond, or CORE Chief Academic Officer Dale Webster, or both.

INSIDE THIS ISSUE

Newsletter Introduction

by Linda Diamond and Dale Webster

In this inaugural issue of the CORE *Academic Quarterly*, we are pleased to introduce the first book in a series by Professor John Hattie, a researcher and Education Professor at the University of Auckland in New Zealand, *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement* (Routledge, 2009). In this book review, Lauren Greenberg, CORE's Senior Adolescent Literacy Coordinator, highlights Professor Hattie's synthesis of over 800 meta-analyses related to educational practices in our schools. His publications *Visible Learning for Teachers* (2011) and *Visible Learning and the Science of How We Learn* (2013) extend the synthesis to over 900 meta-analyses and provide practical school-based applications. A subsequent volume of this newsletter will include a review of Hattie's newest book.

In the *Reading Expert*, Lauren Greenberg gives you a taste of some of Hattie's findings. We hope you find this book review interesting enough that you will purchase this excellent resource. It makes clear that certain teaching practices—**how** we teach—have greater impacts on achievement than others. We must be vigilant, therefore, in using those practices for which we have evidence of results. Hattie's synthesis and the United States' standing among other nations' performance on the PISA (Programme for International Student Assessment) remind us that it is not enough to leave instruction up to what feels right or is appealing; rather, we must employ those practices that have been proven to be more effective than others. It is as simple as that!

In the *Marvelous Mathematician*, Dean Ballard, CORE's Director of Mathematics, writes about the importance of reading, writing, talking, and vocabulary in mathematics instruction in order to help students master the rigorous Common Core State Standards for Mathematics. Dean describes two Standards for Mathematical Practice that exemplify why writing and talking are critical to successful mathematics instruction. He points out the similarities to literacy standards, and concludes with an argument that these skills apply not only to literacy, but also to successful mastery of mathematical concepts and competencies.

Register now to attend this CORE event!

Explicit Instruction: Your Path to the Common Core

with Dr. Anita Archer

March 3–4, 2014
Hyatt Regency SFO
Burlingame, CA

Click here to register.

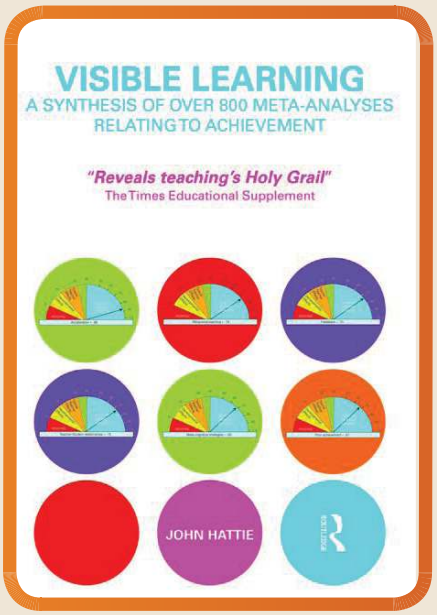
While teachers unpack the Common Core State Standards (CCSS), it's important to remember that standards don't change performance. Only intensive, effective, and efficient instruction leads to standards mastery. Dr. Anita Archer will share her insights into 30 years of explicit instruction research. She'll show you how the major findings can impact your daily practice in implementing the CCSS.

Dr. Anita Archer is an educational consultant to state departments, county agencies, and school districts on explicit instruction and literacy instruction. She's nationally known for her presentations and publications on instructional procedures and literacy instruction. Dr. Archer recently co-authored a book entitled *Explicit Instruction: Effective and Efficient Teaching*.

Audience: Grades K–12 educators

Book Review: *Visible Learning* by John Hattie

by Lauren Greenberg, CORE Senior Adolescent Literacy Coordinator



This issue's review is not of a single research article but instead of a book that summarizes **all** of modern educational research. The book is *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement* (Routledge, 2009) by John Hattie. Hattie is a professor of education at the University of Auckland in New Zealand. Both Kevin Feldman and Anita Archer have raved about this book and cited Hattie's findings for a couple of years, so I thought I would take a closer look. But first I will whet your appetite with a little two-part quiz. Which of the following factors do you think have the strongest influence on student achievement? Rank them from 1 to 6 in the order you think they influence achievement, starting from strongest influence (1) to weakest (6).

___ Student's prior achievement
___ Class size
___ Teacher expectation
___ Reciprocal teaching
___ Home environment
___ Student motivation

Now take a stab at the same question, but this time look at six different contributions from various approaches to teaching. Again, rank them from strongest influence (1) to weakest (6).

___ Concept mapping
___ Feedback
___ Individualized instruction
___ Teaching test taking and coaching
___ Spaced vs. massed practice
___ Questioning

Where would you go to find the answers to such questions? This book! Hattie has provided a summary or synthesis of over 800 meta-analyses relating to educational achievement, which looked at over 50,000 separate studies that reported 146,142 effect sizes about the influence of some academic program, policy, or innovation. Hattie's purpose is to find those factors that are the most effective. He points out that despite the plethora of knowledge about "what works," our schools look much the same as they did 200 years ago. He develops "a method such that the various innovations in these meta-analyses can be ranked from very positive to very negative effects on student achievement."

In order to rank and compare various influences, Hattie converts all findings to a common scale. The key indicator that he looks at is effect size. Here's a quick statistics review: an effect size of d=1.0 indicates an increase of one standard deviation on the outcome of improved school achievement. This increase of one standard deviation is equivalent to advancing student achievement by two or three years. Not surprisingly, effect sizes of d=1.0 are very rare; most effect sizes are much smaller. Hattie reports the surprising finding that just about every program or innovation—almost 90%—has had a positive effect on student learning. Thus, he remarks, it is not surprising that just about all teachers report that their methods are successful! Hattie states that it is absurd to set the bar at zero. It is not enough to get a positive effect, but instead we want a significant effect. Since the average effect size of all programs and innovations is d=0.40, Hattie proposes to set the bar there. He suggests that for the most part, we implement only those innovations that have an effect size of 0.40 or greater, which is the point at which we can notice a "real-world difference."

After a lengthy introduction to the purpose and methodology of Hattie's research synthesis, the rest of the book is a discussion of each of 138 influences that he has studied. He divides the influences into six major spheres of influence: the child, the home, the school, the curricula, the teacher, and the approach to teaching. It is important to read the discussion of each factor, for sometimes there are moderating factors that are very important. For example, the overall effect size of homework is d=0.29, which is not particularly high. But the effects are not uniform: primary students gain very little from homework (d=0.15), while secondary students have a much more significant gain of 0.64, well

Book Review: *Visible Learning* (cont.)

above Hattie's threshold of 0.40. Hattie spends most of his time discussing those factors that we can actually influence—that is, those having to do with classroom teaching.

Hattie has come to some powerful conclusions about what teaching factors are most effective. He states that he "realized that the most powerful single influence enhancing achievement is feedback . . . the most important feature was the creation of situations in classrooms for the teachers to receive more feedback about their teaching—and then the ripple effect back to the student was high." (12) Hattie states that his major message is that what teachers do matters, especially when teachers instruct in a most deliberate and visible manner. "Visible teaching and learning occur when learning is the explicit goal . . . when there is deliberate practice aimed at attaining mastery of the goal, when there is feedback given and sought, and when there are active, passionate, and engaging people participating in the act of learning." (22)

The bulk of the book provides evidence for this thesis. Appendix A lists the 815 meta-analyses that were studied. Appendix B provides four extremely interesting pages—here Hattie lists all 138 topics or spheres of influence according to rank order from greatest influence to least.

This is not a book to be read in a single sitting, nor is it an easy read. But once you have read the introductory chapter and understand the purpose and methodology of the synthesis, you can read individual sections or even jump around to look at specific influences. In the end, the book provides a very useful synthesis of a huge amount of educational research and lets you know which practices are most useful. It will support many of the core beliefs you have probably held for years. For example, among curricular options, Hattie reports the following effect sizes:

Vocabulary programs: 0.67
Phonics instruction: 0.60
Direct Instruction: 0.59
Exposure to reading: 0.36
Whole language: 0.06

If you find this kind of information interesting, you may want to check this book out. I find myself returning to this book again and again.

Quiz Answers

Here are the answers to the quiz questions from the beginning of the book review:

Mixed Topics

Influence	Effect Size	Rank
Reciprocal teaching	0.74	1
Student's prior achievement	0.67	2
Home environment	0.57	3
Student motivation	0.48	4
Teacher expectation	0.43	5
Class size	0.21	6

Approaches to Teaching

Teaching Practice	Effect Size	Rank
Feedback	0.73	1
Spaced vs. massed practice	0.71	2
Concept mapping	0.57	3
Questioning	0.46	4
Individualized instruction	0.23	5
Teaching test taking and coaching	0.22	6

CORE Marvelous Mathematician

The Importance of Reading, Writing, Talking, and Vocabulary in Math for the Common Core State Standards for Mathematics (CCSSM)

by Dean Ballard, CORE Director of Mathematics

The CCSSM are articulated in two general categories: the Standards for Mathematical Practice and the Standards for Mathematical Content. All key parties in the creation of the standards, training of the standards, and assessing for the standards (including the two assessment consortia, PARCC and SBAC) clearly and consistently point out that these two categories have equal weight in the teaching and learning of mathematics. Therefore, teachers must understand both the Mathematical Practice and Mathematical Content standards.

Essentially, the Mathematical Practice standards articulate how students learn, communicate, and understand math. The Mathematical Content standards describe the specific concepts and skills students must learn. Furthermore, embedded within the Mathematical Content standards are progressions or trajectories for learning about various strands, such as whole number operations, fractions, algebraic reasoning, and so on. These progressions can be seen only by viewing the Mathematical Content standards vertically. From this perspective, you can recognize the key steps in learning that lead from introduction to a concept and related foundational concepts and skills, to proficiency with the concept and related skills. Documents describing these progressions are being created (and are available online) at the University of Arizona under the leadership of William McCallum. Together, the Mathematical Practice and Mathematical Content standards describe what, when, and how students are to learn math and to what level of rigor.

Reading, writing, talking, and understanding key vocabulary are important tools for understanding math. While the CCSSM do not describe the explicit teaching of reading, writing, and vocabulary, the standards do explicitly state the importance of these skills or tools for learning math.

Of the eight standards for Mathematical Practice, two clearly describe the importance of writing and talking about the math.

Mathematical Practice Standard 3: Construct viable arguments and critique the reasoning of others

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete

You Be the Judge:
Are These Math or ELA Standards?

Notice what happens if you read these two practice standards without explicit references to math. Can you tell if they are math or ELA standards?

Students . . . understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements. They justify their conclusions, communicate them to others, and respond to the arguments of others, . . . making plausible arguments that take into account the context from which [they] arose.

Students . . . communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose . . . By the time they reach high school they have learned to examine claims and make explicit use of definitions.

referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades.
Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

Mathematical Practice Standard 6: Attend to precision

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

These could easily pass for ELA standards. These standards call for writing, talking, and precise use of vocabulary. We also know that reading is a critical skill for improving writing, talking, and use of vocabulary. Additionally, the ability to analyze the arguments of others to some extent implies the ability to read and understand the arguments of others. Research into informational texts identifies math texts as the most dense informational texts students will ever read. Explicitly helping students with reading, writing, discussing, and using correct vocabulary, and requiring these skills from students, are essential for math learning.

Many content standards explicitly call for the use of specific vocabulary. For example, standard 6.EE.A.2b, *Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient),* further highlights the importance of vocabulary building in math.

Key Vocabulary from CCSSM Grade 6 Mathematical Content Standards

Mathematical terms include the following: *ratio, rate, unit rate, unit pricing, constant speed, percent, percent of, common factor, greatest common factor, integers, positive numbers, negative numbers, rational number, opposite value, inequality, absolute value, coordinates, coordinate plane, quadrants, numerical expression, exponent, variable, algebraic expression, term, coefficient, evaluate expressions, Order of Operations, properties of operations, distributive property, equivalent expressions, equations, inequalities, substitution in an expression, making an equation or inequality true, constraint, dependent and independent variables, right triangle, volume, right rectangular prism, edge, face, vertex, surface area, nets for finding surface area, variability, measure of center, median, mean, measure of variation, range, interquartile range, deviation, dot plot, histogram, box plot.*

Similar lists can be derived by looking through any other grade-level content standard.

Conclusion

Reading, writing, talking, and the correct use of vocabulary are not only ELA skills to be learned by students, but also critical skills students use for learning math. How to use these skills within math is not obvious to some students, and in many cases the application is specialized for math, as it is for other content areas. As you learned in the preceding section, there are numerous math terms and expressions students need to understand and use with precision. Math texts and math problems, especially word problems, are uniquely difficult to read and comprehend. Writing and talking about math are necessary skills for communication, as described in the Mathematical Practice standards.

We cannot expect nor rely on ELA teachers to teach students specialized vocabulary and reading skills for each content area. However, math teachers can use strategies for helping students read, write, and talk about math, and understand key vocabulary in ways that are built into and promote learning math. Doing so is essential for meeting the demands of the Common Core State Standards for Mathematics.

CORE Leadership Corner

Many district and school site leaders are concerned about how best to lead their staffs in implementing the Common Core State Standards (CCSS). With the official start of the two CCSS tests (PARCC and SBAC) in the spring of 2015, schools across the country are feeling the pressure to implement. The following three leadership documents and websites may be useful. These resources provide critical guidance for assisting administrators to implement the CCSS in a systematic and sustainable way.

The Oregon Department of Education has released an administrator toolkit. According to the ODE, "The purpose of the Administrator Toolkit is to assist with implementation of the Common Core at the school and district level. The toolkit uses a sequential process and is organized into four phases: Awareness, Transition, Implementation, and Evaluate & Refine."
http://www.ode.state.or.us/search/page/?id=3760

The California County Superintendents Educational Services Association (CCSESA) just released a document that was the result of a collaborative effort by several state-level stakeholders. This document discusses the critical first steps for implementing 10 key components that range from Capacity Building, to Curriculum and Instruction, to Fiscal and Human Resource Realignment. While it is a California-specific document, the information provided can be contextualized for any state or district in the country.
http://www.ccsesa.org/index/attachments/LeadPlanGuide_WEB.pdf

Two joint action briefs created collaboratively by Achieve, the College Summit, the National Association for Secondary School Principals (NASSP), and the National Association for Elementary School Principals (NAESP) provide step-by-step support for CCSS implementation at the school site level—one document for the elementary level and one for the secondary.

Elementary Leader Guide: **http://achieve.org/files/RevisedElementaryActionBrief_Final_Feb.pdf**

Secondary Leader Guide: **http://achieve.org/files/RevisedSecondaryActionBrief_Final_Feb.pdf**

Regardless of the resource used, administrators should keep the following points in mind:

- The standards are NOT a curriculum; therefore, identifying the sequence of instruction in each grade—what will be taught and how long—requires concerted effort and attention.
- It may be preferable to use existing published materials or select strong new materials and augment them rather than writing lessons from scratch; however, most lessons will need to be refined and aligned more purposefully.
- The focus on instructional practices requires carefully planned and personalized professional development and ongoing support.
- A comprehensive assessment system with training to effectively use data to adjust instruction and intensify as needed within an RtI structure is important—this includes progress-monitoring measures at K–3.
- Teachers will need time to collaborate, plan, and refine their instruction.

About CORE
CORE serves as a trusted advisor at all levels of preK–12 education, working collaboratively with educators to support literacy and math achievement growth for all students. Our implementation support services and products help our customers build their own capacity for effective instruction by laying a foundation of research-based knowledge, supporting the use of proven tools, and developing leadership. As an organization committed to integrity, excellence, and service, we believe that with informed school and district administrators, expert teaching, and well-implemented programs, all students can become proficient academically. For more information about CORE, please visit our website at www.corelearn.com.