Marshall Memo 499

A Weekly Round-up of Important Ideas and Research in K-12 Education
August 26, 2013

In This Issue:

Quotes of the Week

"It's school. How else will I graduate and go to university and get a good job?"

The response from a student in Finland when asked why she works hard in school, quoted in an August 25, 2013 *New York Times* review by Annie Murphy Paul of Amanda Ripley's new book, *The Smartest Kids in the World – and How They Got That Way* (Simon & Schuster, 2013), http://nyti.ms/152UtaZ

"Over the years, I have seen so many math students shut down because they are so afraid of having the wrong answer and 'failing.'"

Alison Wright (see item #3)

"The traditional classroom with kids sitting at desks, sitting still, hands folded, face forward – we couldn't design a worse environment for kids with ADHD."

George DePaul (see item #4)

"Take students to see the mathematical sequoia, tell them how great it is, but don't force them to climb it until their arms go numb and they fall."

Nicholson Baker (see item #2)

"A study this year found that people reading on a screen tended to skip around more and read less intensively, and plenty of research confirms that people tend to comprehend less of what they read on a screen. The differences are small, but they may explain the persistent appeal of paper… The truth is that the book is an exceptionally good piece of technology – easy to read, portable, durable, and inexpensive."

James Surowiecki in "E-Book vs. P-Book" in *The New Yorker*, July 29, 2013, http://www.newyorker.com/talk/financial/2013/07/29/130729ta_talk_surowiecki

"If you ask Americans about the Common Core, chances are they will tell you they haven't heard of it. If they claim otherwise, there's a good chance they are either lying or severely misinformed."

Michael Brickman (see item #5)

1. Three Myths About Today's Students

In this thought-provoking article in *Educational Psychologist*, Paul Kirschner (Open University of the Netherlands) and Jeroen van Merrienboer (Maastricht University) attack three common beliefs about teaching and learning.

• *Belief #1: Today's students are information-savvy "digital natives."* The theory is that young people have been immersed in technology all their lives and are therefore able to multi-task (for example, simultaneously doing homework, chatting and texting online, and updating their Facebook pages), construct meaningful knowledge from audio-visual and textual information, solve problems, and direct their own learning, and that they can be trusted to manage their personal and academic interactions in the new technological world. This leads to the idea that traditional education is not well suited to *homo zappiens* (as kids have been dubbed) and needs to be redesigned to suit a radically different way of learning.

Kirschner and van Merrienboer believe this is largely a myth. "What we may actually be seeing," they say, citing a number of studies, "is a generation where learners at the computer behave as butterflies fluttering across the information on the screen, touching or not touching pieces of information (i.e., hyperlinks), quickly fluttering to the next piece of information, unconscious to its value and without a plan… This 'fluttering' leads – at best – to a very fragile network of knowledge."

As for the idea that exposure to technology has rewired young people's brains to make multitasking cognitively possible, Kirschner and van Merrienboer are utterly unconvinced. "When thinking or conscious information processing plays a role," they say, "people are *not* capable of multitasking and can, at best, switch quickly from one activity to another… It has been broadly shown that rapid switching behavior, when compared to carrying out tasks serially, leads to poorer learning results in students and poorer performance of tasks… This juggling leads to greater inefficiency in performing each individual task, namely, that more mistakes are made and it takes significantly longer as compared to sequential work." In fact, interruptions and distractions have been found to be major causes of errors among pharmacists dispensing drugs, doctors in emergency rooms, and airline pilots on runways and in crowded airspace.

• *Belief #2: Instruction should be geared to students' individual learning styles.* "This idea is intuitively appealing and has high face validity," say Kirschner and van Merrienboer. "Thousands of articles and books have been written on learning styles and their application in education." Building on this, a lucrative industry sells learning-style assessments and

workshops on how to match teaching with students' learning styles. But the authors believe there are three problems with this theory. First, people don't fit neatly into different learning styles; instead, each learning "style" exists along a continuum, confounding attempts to align instruction to a particular type of student. Nobody fits into a neat pigeonhole.

Second, virtually all learning-style inventories depend on self-reports, and Kirschner and van Merrienboer say "the relationship between what people say about how they learn and how they actually learn is weak… The individually preferred way of learning is often a bad predictor of the way people learn most effectively; what people prefer is often not what is best for them." Thus, providing instruction that meshes with people's preferred learning styles may be as unwise as giving children food that most say they prefer – for example, candy and soft drinks. In addition, a learning style that might be desirable in one situation might not be as helpful in another.

Third, there are as many as 71 different learning styles, which means, say Kirschner and van Merrienboer, "that it becomes totally impractical to take these differences into account in instruction, even if the previous two problems did not exist!"

• *Belief #3: Today's youth can and should educate themselves on the Internet*. "These self-educators can self-regulate and self-direct their own learning," goes the theory, "seeking, finding, and making use of all the information sources that are feely available to them." This implies that teachers should be demoted from bringing their teaching expertise and pedagogical content knowledge to bear on students who need them, say Kirschner and van Merrienboer, to "standing on the sidelines and guiding and/or coaxing a breed of self-educators… The premises underlying the idea of substituting information seeking for teaching is that the half-life of information is getting smaller every day, making knowledge rapidly obsolete, and because it is all out there on the Web, we should not teach knowledge but should instead let kids look for it themselves."

Nonsense, say the authors: "First, a distinction needs to be made with respect to the difference between knowledge obsolescence and information growth." Just because there's been an explosion of new, freely-available knowledge on the Web doesn't mean that all previous knowledge is obsolete and irrelevant. "The fact is that much of what has passed for knowledge in previous generations is still valid and useful. What is true is that there is an increasing amount of new information becoming available, some of it trustworthy, some not. To adequately deal with a stream of new information that increases in size and tempo daily, one must be able to search, find, evaluate, select, process, organize, and present information."

To handle this, students need an extensive skillset: "Searching, finding, and processing information is a complex cognitive process that requires identifying information needs, locating corresponding information sources, extracting and organizing relevant information from each source, and synthesizing information from a variety of sources," say Kirschner and van Merrienboer. Students need to be able to tell good information from bad, truth from lies, genuine information from scams and cons. Most important, they need to know what they *don't* know. Prior knowledge, or an awareness of its absence, is crucial when searching the Internet.

The idea that schools should step back and act as mere guides as students explore the Web is wrong for three reasons, say the authors: "The first problem relates to placing the locus of control with the learner. This is due to (a) not having the necessary standards upon which to judge their learning state, (b) not having the necessary knowledge to monitor their own state in comparison with the standards, and/or (c) not being able to initiate the proper processes to change their current state when their behavior falls short of the standards."

Second, students often choose what they prefer, which is not always the best choice – for example, doing what they like doing or are comfortable doing rather than what is best for the situation.

The third problem is the so-called paradox of choice. "People appreciate having the opportunity to make some choices," say Kirschner and van Merrienboer, "but the more options that they have to choose from, the more frustrating it is to make the choice. It is, thus, important to give learners limited rather than unlimited control, because having to choose from too many options is perceived as frustrating." The best compromise is shared control – teachers thoughtfully limiting choices, students making choices, and teachers gradually releasing control until learners are able to navigate the world on their own.

"Do Learners Really Know Best? Urban Legends in Education" by Paul Kirschner and Jeroen van Merrienboer in *Educational Psychologist*, June 2013 (Vol. 48, #3, p. 169-183), http://www.tandfonline.com/doi/pdf/10.1080/00461520.2013.804395; Kirschner can be reached at paul.kirschner@ou.nl.

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2. Should Algebra II Be an Elective?

In this provocative article in *Harper's*, author Nicholson Baker asks why mathematics, which is extolled by those who love it as "great and timeless and beautiful," is disliked by so many people. "In particular," asks Baker, "why do so many high-school students hate algebra?" Here are some recent blog statements written by beleaguered students:

- From middle school until I graduated, math lessons were like Vogon poetry. I only survived by gnawing one of my own legs off.
- Algebra needs to die. I have been on honor roll since 4th grade! And I got my first C in algebra, now I have an F with grades about to close and I don't get it. I just want to cry. Nothing makes sense. Where is this going to get me in life?
- Is poking my eye with a pencil an acceptable substitute for my algebra homework?
- Algebra is the huge *#! dam that prevents me from flowing, and being a better person.
- Pray for the girl in perpetual algebra hell.
- I'm stressing to the point where my hair is falling out.

"The reason these kids are upset," says Baker, "is that they are required to do something they can't do. They are forced, repeatedly, to stare at hairy, square-rooted, polynomialed horseradish clumps of mute symbology that irritate them, that stop them in their tracks, that they can't understand. The homework is unrelenting, the algorithms get longer and trickier, the quizzes keep coming. Sooner or later, many of them hit the wall. They fail the course and have

to take it again. And then again. And as a result, they feel angry, dumb, sometimes downright suicidal."

Baker turns his critical gaze on a new, widely-used Pearson textbook, *Algebra 2 Common Core*. It is, he says, "a typical, old-fashioned algebra textbook. It's a highly efficient engine for the creation of math rage: a dead scrap heap of repellent terminology, a collection of spiky, decontextualized, multistep mathematical black-box techniques that you must practice over and over and get by heart in order to be ready to do something interesting later on, when the time comes."

But isn't algebra important to future success, despite all this pain? Yes, says U.S. Education Secretary Arne Duncan, because it teaches students reasoning and logic in ways that boost achievement across the curriculum and correlate strongly with success in college and many technical occupations, including airplane mechanic, X-ray technician, and skilled factory jobs. That's why Algebra II was included in the Common Core State Standards.

But not everyone agrees. Curriculum expert Grant Wiggins says that algebra is acting as a "nasty gatekeeper course" – a sort of compulsory Greek grammar of our era. "I'm a math guy," says Wiggins. "It's not like I'm some fuzzy-headed humanist. You don't need algebra for the majority of jobs." DePauw University professor Underwood Dudley, who believes mathematics is essential to civilization – that some theorems and proofs are so beautiful they should have a place of honor in museums – agrees: "The vast majority of the human race, and the vast majority of the college-educated human race, never need any mathematics beyond arithmetic to survive successfully. We cannot justify teaching mathematics to 18-year-olds by asserting that they will find it useful. We cannot claim that we are presenting beauty, either. We are, of course, but what percentage of our students can see it, however dimly?"

The solution, says Baker, is to require all ninth graders to take a "teaser" course that introduces them to the highlights of high-school math, including:

- Some algebraic manipulation, including factoring and solving simple equations;
- Some mind-stretching geometric proofs;
- Some nifty things about parabolas and conic sections;
- "A hint of the infinitesimal, change-explaining powers of calculus;"
- Some scatter plots and data analysis;
- Some mathematical logic;
- Several representative topics on the history and appreciation of math.

"Would it hurt kids," asks Baker, "to learn that Boole, the inventor of modern logic, was almost entirely self-taught, or that the Bernoulli brothers competed between them to work out the brachistochrone problem, or that Sofia Kovalevskaya first become interested in math when she saw some strange differential equations printed on sheets of paper that had been used to wallpaper a room in her house, or that Cardano lost so much money and wasted so much time at the card table that it prompted him to write the first full study of the mathematics of probability?" He recommends having students read *The Joy of x* (Strogatz) or *Journey Through Genius* (Dunham).

In short, says Baker, "Take students to see the mathematical sequoia, tell them how great it is, but don't force them to climb it until their arms go numb and they fall." The rest of high-school math – algebra, geometry, and trigonometry – should be electives, just like music, art, and AP Biology. He also believes Algebra II should no longer be a requirement for college. As for Arne Duncan's argument that students who take Algebra II are more successful in college, Baker says this is a example of the age-old logical fallacy, *post hoc ergo propter hoc* – mistaking correlation with causation.

If we implemented a good ninth-grade smorgasbord course, he argues, "American science and technology would be unharmed, and a lot of poisonous math hatred would go away instantly… If Algebra II were an elective and colleges didn't ubiquitously demand it, fewer people would learn it. But fewer people would fail it, too, and fewer people might drop out of high school, and the level of cheating would go down, and the sum total of student misery would be substantially reduced. And those for whom Fourier analysis is a joy and a marvel, a way of hearing celestial music, would be in classes with other students who get a similar buzz. That's what should happen. Life's prerequisites are courtesy and kindness, the times tables, fractions, percentages, ratios, reading, writing, some history – the rest is gravy, really."

"Wrong Answer: The Case Against Algebra II" by Nicholson Baker in *Harper's Magazine*, September 2013 (p. 31-38), http://bit.ly/17TkFYG; see also the *New York Times* article, "Is Algebra Necessary?" by CUNY professor Andrew Hacker, summarized in Marshall Memo 446.

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3. How to Help Students Develop "Grit" in Math Classes

In this thoughtful *Education Week* article, Kentucky teacher Alison Wright describes how two students in her Algebra II class reacted when they got back a quiz on which each had the identical score: 6/10. The first student looked at the grade, rolled her eyes, threw the paper on the floor, and loudly complained that the test wasn't fair and shouldn't count. The second student read Wright's comments, reworked the problems to figure out her mistakes, and talked to her after class to set up an after-school meeting to go over the questions and discuss her study skills. "This scenario is troubling to me," says Wright. "Multiply this incident by how many classes the students take, by how many assessments they will have in each class, by how many years they are in school – the possible ramifications are staggering."

After doing some research, Wright came up with approaches she's going to implement in her classes this coming year:

• *Teach students that wrong answers are a helpful part of the learning process*. "Over the years, I have seen so many math students shut down because they are so afraid of having the wrong answer and 'failing,'" says Wright. She wants her students to be adventurous, to take control of their own learning, and not let fear of bad grades get in the way of learning. A helpful tool in this regard, she says, is Leah Alcala's Teaching Channel video, "My Favorite No" – https://www.teachingchannel.org/videos/class-warm-up-routine. Alcala has students write their answers to a math problem on 5x3 cards at the beginning of class, then quickly sorts

the correct and incorrect answers and displays her "favorite" wrong answer (without mentioning the student's name) and discusses with the whole class what was right and what was wrong. Alcala believes this is superior to using "clickers" because the teacher can make a judgment call on the most interesting and informative wrong answer – plus, it's cheaper.

• *Use cooperative group work as often as possible*. Wright gets groups working on Math Design Collaborative assessments - http://map.mathshell.org/materials/index.php – and finds this helps them grapple with the content and think about their own learning processes. "Not only are students developing social skills necessary for teamwork," she says, "but they are also constructing arguments and providing valuable feedback to each other in a non-threatening environment."

• *Use "A" and "Not Yet" as the only two possible grades*. Wright believes this might have helped the first student in the scenario above address her math learning issues rather than throwing a mini-tantrum about her grade.

"Developing Non-Cognitive Skills: A Math Teacher's Perspective" by Alison Wright in *Education Week*, Aug. 21, 2013, http://bit.ly/12mlcT2

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4. Ideas on ADHD

In this *Harvard Education Letter* article, Laura Pappano describes how Colorado teacher Kartal Jaquette organizes his third-grade classroom so students with ADHD can succeed:

- His mindset is that if some students are confused, it's his fault.
- When he is addressing the whole class, he sets a timer and tries to speak less than eight minutes.
- He keeps the pace of the class moving to convey urgency.
- He's particularly conscious about giving complex directions. "There is no fun way to do directions," he says. "But you need directions." To deal with this challenge, Jaquette uses routines – for example, right after recess, students always have a "Do now" math problem to write in their journal and solve, and then four students are called up to the board to explain their work.
- Homework also follows a predictable pattern: "Every homework is on the same sheet," he says." It is the same color; it goes in the same folder." And it's always available online if students forget it.

"I am the one who is in control of balancing attention spans in my class," says Jaquette. "I view ADHD as a tendency we can all have."

Pappano draws on recent research to make several other points:

• The percent of students with ADHD has probably not changed over time, but the increasing number of diagnoses is due to higher-stakes consequences of school failure.

• While over-identification and angst are common, some specialists worry about students who are *not* picked up by superficial 10-minute assessments, especially in lower-income communities.

• Left unaddressed, ADHD can increase school failure, substance abuse, difficulty keeping jobs and maintaining relationships, and suicide. With effective treatment, people with ADHD can be successful in school and life.

• Teachers need to focus less on obedience than on learning, says George DePaul of Lehigh University. "The traditional classroom with kids sitting at desks, sitting still, hands folded, face forward," he says, "– we couldn't design a worse environment for kids with ADHD."

• Teachers should make expectations clear, let students choose among assignments, and give students immediate feedback on their performance and self-organization.

"Attention, Class! As ADHD Diagnoses Rise, Teachers Find Strategies That Can Help All Students" by Laura Pappano in *Harvard Education Letter*, September/October 2013 (Vol. 29, #5, p. 1-3), www.edletter.org

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5. What Americans Think About the Common Core

In this *Education Gadfly* article, Michael Brickman reports on three recent polls that tapped public opinion on school issues (Phi Delta Kappan/Gallup, Education Next, and PA-NORC). "If you ask Americans about the Common Core," says Brickman, "chances are they will tell you they haven't heard of it. If they claim otherwise, there's a good chance they are either lying or severely misinformed. That's not a knock on the standards themselves or their backers. John Q. Public will learn more as CCSS morphs from a wonky D.C. political issue to an active reshaper of their local schools and state report cards."

There has been an increase in opposition to the standards, says the Education Next poll – from 7 to 13 percent. But support has also climbed – from 63 to 65 percent. Polls consistently show that the more people know about the new standards, the more they like them.

"Three Pollsters Walked In a School…" by Michael Brickman in *The Education Gadfly*, Aug. 22, 2013, http://www.edexcellence.net/commentary/education-gadfly-weekly/#three-pollsters-walked-into-a-bar.html

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Do you have feedback? Is anything missing?

If you have comments or suggestions, if you saw an article or web item in the last week that you think should have been summarized, or if you would like to suggest additional publications that should be covered by the Marshall Memo, please e-mail: kim.marshall48@gmail.com

About the Marshall Memo

Mission and focus:

This weekly memo is designed to keep principals, teachers, superintendents, and others very well-informed on current research and effective practices in K-12 education. Kim Marshall, drawing on 43 years' experience as a teacher, principal, central office administrator, and writer, lightens the load of busy educators by serving as their "designated reader."

To produce the Marshall Memo, Kim subscribes to 64 carefully-chosen publications (see list to the right), sifts through more than a hundred articles each week, and selects 5-10 that have the greatest potential to improve teaching, leadership, and learning. He then writes a brief summary of each article, pulls out several striking quotes, provides e-links to full articles when available, and e-mails the Memo to subscribers every Monday evening (with occasional breaks; there are 50 issues a year).

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Core list of publications covered

Those read this week are underlined.

American Educational Research Journal
American Educator
American Journal of Education
American School Board Journal
ASCA School Counselor
ASCD SmartBrief/Public Education NewsBlast
Better Evidence-Based Education
Center for Performance Assessment Newsletter
District Administration
ED Magazine
Education Digest
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Education Week
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Educational Horizons
Educational Leadership
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Go Teach
Harvard Business Review
Harvard Education Letter
Harvard Educational Review
Journal of Education for Students Placed At Risk (JESPAR)
Journal of Staff Development
Kappa Delta Pi Record
Knowledge Quest
Middle Ground
Middle School Journal
NASSP Journal
NJEA Review
Perspectives
Phi Delta Kappan
Principal
Principal Leadership
Principal's Research Review
Reading Research Quarterly
Reading Today
Responsive Classroom Newsletter
Rethinking Schools
Review of Educational Research
School Administrator
Teacher
Teachers College Record
Teaching Children Mathematics
Teaching Exceptional Children/Exceptional Children
The Atlantic
The Chronicle of Higher Education
The District Management Journal
The Language Educator
The Learning Principal/Learning System/Tools for Schools
The New York Times
The New Yorker
The Reading Teacher
Theory Into Practice
Time
Wharton Leadership Digest