Marshall Memo 706

A Weekly Round-up of Important Ideas and Research in K-12 Education
October 9, 2017

In This Issue:

Quotes of the Week

"Just as you can't learn to swim if you never get in the water," says Beghetto, "students won't learn how to respond productively to the unknown if we never give them opportunities to do so."

Ronald Beghetto (see item #1)

"Our students' twenty-first-century jobs will revolve around innovation, reasoning, sense making, and interpersonal skills. The algorithmic work taught in some classrooms perpetuates the idea that math is boring, nonsensical, useless, and unattainable. Worse still, students leave those classrooms unprepared for the work that follows."

Robyn Silbey in "Stamp Out Math Phobia" in *Teaching Children Mathematics*, October 2017 (Vol. 24, #2, p. 72)

"Although the merits of professional development from outside the walls of our schools are indisputable, my time as a coach taught me that some of the best learning opportunities are as close as the classroom next door. When we set aside time to observe teachers engaging with the same student population, the same reading and writing curriculum, and the same resources, there is much to learn from their unique talents and teaching strategies. All it takes to make this learning happen in our schools are strong relationships, a clear focus, and collaboration."

Sarah Valter in "The PD Next Door" in *Literacy Today*, September/October 2017 (Vol. 35, #2, p. 18-19), http://bit.ly/2wIzaS2

"We may also never find that common ground with people whose politics or faith conflicts with ours. But we owe it to one another to disagree agreeably, without anger or intimidation, whether on a front porch or a Facebook page. A little more grace among us all would go a long way toward healing the nation."

Erick-Woods Erickson in "Finding Grace Around the Kitchen Table" in *The New York Times*, October 1, 2017, http://nyti.ms/2wpDF45

1. Getting Students to Tackle Problems That Don't Have Easy Solutions

(Originally titled "Inviting Uncertainty Into the Classroom")

In this article in *Educational Leadership*, Ronald Beghetto (University of Connecticut) says teachers sometimes over-plan classroom learning experiences and don't give students enough experience dealing with uncertainty. "Just as you can't learn to swim if you never get in the water," says Beghetto, "students won't learn how to respond productively to the unknown if we never give them opportunities to do so." He suggests five ways teachers can address this:

• *View uncertainty as an opportunity*. Sure, there's such a thing as bad uncertainty – ill-defined tasks, students with no idea what's expected of them. But a challenging task with clear goals and just enough scaffolding and support is good for students. "Put simply," says Beghetto, "uncertainty is what makes a problem a problem. If you already know how to move from A to Z, then you don't have a problem…"

• *Try lesson unplanning*. By this, he means planning an activity with an uncertain outcome – it will emerge as students interact with the content. Students might be invited to come up with multiple ways to solve a math problem and then debate which is most efficient and accurate. "The more opportunities students have to practice working through problems when things are less spelled out," says Beghetto, "the more likely they'll be able to take on increasingly complex challenges."

• *Assign demanding tasks* – Some examples: writing a different ending of a short story while adhering to the author's style; dealing with under-the-radar bullying; planning a garden to provide homeless families with fresh produce; designing a robot to clean New York City's subways. With assignments like these, teachers need to break them into chunks and give appropriate support. But, Beghetto insists, "Students need to learn how to sit with the uncertainty of a thorny challenge, take time to explore the features of the task or situation, generate possible ways to address it, and evaluate the viability of those possibilities. Finally, students need to take action by choosing initial steps, taking those steps, monitoring progress, and making adjustments along the way."

• *Explore the backstory of famous solutions*. We teach students about how daunting scientific and social problems were solved, says Beghetto. "Focusing only on tidy solutions… doesn't allow students to understand how or why those challenges were identified in the first place or reveal the behind-the-scenes messiness and productive struggle that went into resolving them." Students need to read the history of some successfully solved challenges or

talk in person (perhaps via Skype) with accomplished professionals about how they have wrestled with real-world problems.

• *Launch legacy projects*. Most school projects are over when they're over, says Beghetto. "What if instead of limiting projects to the classroom and viewing them as coming to an end, we engaged students in projects that address authentic, complex challenges and that make a lasting contribution beyond classroom walls…?" An example: high-school students working with their world language department to translate public information into Spanish and deliver it to people in the community. Taking on a challenge like this involves addressing four "deceptively simple" design questions:

- What is the problem?
- Why does it matter?
- What are we going to do about it?
- What lasting legacy will our work leave?

"Such efforts," Beghetto concludes, "can go a long way in helping students learn how, why, and when to unleash their problem-solving skills on complex challenges – and even when it's better not to do so."

"Inviting Uncertainty Into the Classroom" by Ronald Beghetto in *Educational Leadership*, October 2017 (Vol. 75, #2, p. 20-25), http://bit.ly/2yHD3Y5; the author can be reached at Ronald.beghetto@uconn.edu.

Back to page one

2. Introducing Multicultural Novels in Ways That Hook Students' Interest

In this article in *English Journal*, Danielle Lillge (Missouri State University) and Diana Dominguez (a community organizer) suggest ways to successfully launch a young-adult novel with high-school students. Here's how a teacher handled the opening lesson on the novel *Out of Darkness* by Ashley Hope. The teacher's central question was, *What does it mean to be heard and understood?* "In your writer's notebooks," instructed the teacher, "reflect on a time when you felt you were truly heard and understood." After students had written a paragraph, the teacher said, "What you wrote is personal. I know that some of you may feel uncomfortable sharing. So, I'd like you to reread what you wrote. Decide how much of what you wrote you could share with classmates."

Students thought about this and shared (or didn't) in groups of three. The teacher then pulled the class together and said, "As you think about your triad conversation, what elements seem key to the kinds of situations where people feel heard and understood?" She wrote students' responses on the board, and they discussed the benefits of being heard and understood. One student asked, "But what about when someone wants their feelings heard, but their beliefs are wrong?" "What do you mean by *wrong*?" asked the teacher, sparking a debate about a better word than *wrong* and ways of respecting or rejecting offensive points of view. "Let's keep these important questions in mind as we get ready to read," said the teacher.

But before beginning the novel, she played a music video of the Mexican-American Grammy Award-winning song, *Hasta La Raiz*. "What is being communicated or happening in

the video?" she asked. "And how is this message being communicated?" Students read the lyrics in Spanish and English, discussed those questions with a partner, then came together to talk about *voice* and what gets lost in translation.

Finally, the teacher introduced *Out of Darkness*, a historical novel about the deadliest school explosion in U.S. history and a love affair between a Mexican-American girl and an African-American boy. "This novel is about many issues and themes relevant today," explained the teacher, "including segregation, sexual violence, love, family, and trust." She read the prologue aloud and then asked small groups of students to read excerpts of early chapters and draw inferences about the narrator of each. After groups shared character findings and theories, she said, "Based on these discussions, I want you to generate a list of questions that you are eager to find answers to as we begin reading." The teacher posted students' questions and they moved on with the unit.

Lillge and Dominguez believe this teacher was successful in accomplishing several key objectives as she launched the novel:

• *Building connections* – Linking the topics, themes, characters, and conflicts of a novel to previous literacy learning and events outside the school. The key question: *What does this text have to do with what I already know or have experienced?*

• *Creating space to respectfully name and consider multiple perspectives* – Rather than using a gimmicky movie trailer, the teacher got students thinking, writing, and talking about thought-provoking issues linked to the book they were about to read. Key questions: *What do we gain when we consider multiple, multicultural perspectives in relation to one another or to our own perspectives? Why will reading this book matter to me?*

• *Stitching together a line of inquiry* – "Too often," say Lillge and Dominguez, "we fail to share with students a clear vision for where we're going with a particular text. Or we fail to co-construct that vision with students." This teacher's launching activities set a clear purpose and established questions that motivated students to keep reading and discussing. Key questions: *What is this book really about? What does it help us contemplate?*

• *Fostering a sense of community* – In this novel launch, say the authors, "students' development of connections, interpretive readings, theories, and questions were all done in community with classmates… Together classmates discussed and contemplated how insider and outsider status is ascribed or usurped." Key questions: *How does this book help us interact with one another? How does it help us think about the role of community in our own and others' lives?*

• *Attending to language* – The student's question about "wrong" beliefs was a teachable moment that made the teacher think on her feet and produced a good discussion about meanings carried by seemingly ordinary words.

"Launching Lessons: Framing Our Approach to Multicultural, Multivoiced YA Literature" by Danielle Lillge and Diana Dominguez in *English Journal*, September 2017 (Vol. 107, #1, p. 33-40), access for NCTE members at http://bit.ly/2y75Soy; the authors can be reached at daniellelillge@missouristate.edu and dominguezd2011@gmail.com.

Back to page one

3. How an Elementary School's Individualistic Ethos Affected Students

In this *American Educational Research Journal* article, Holly Link (University of Pennsylvania), Sarah Gallo (Ohio State University), and Stanton Wortham (Boston College) report on their five-year study of a cohort of Mexican-American immigrant children as they moved from kindergarten to fourth grade in an urban Pennsylvania school.

The researchers' focus was on how children, in a school intently concerned with high-stakes test results, "become autonomous, rational individuals – the type of person envisioned in the European Enlightenment and generally imagined as the outcome of Western schooling." Link, Gallo, and Wortham were especially struck by how one student, Gregorio, did well as he moved through the grades and became a grade-conscious, competitive student – and how another student, Abi, did poorly and lost confidence in herself. Here's how this played out:

- Kindergarten and first grade – Children participated in flexible, heterogeneous activities with frequent collaborative, cooperative peer interaction. They were able to choose from a large selection of books and "play teacher" in unstructured ways. Both Gregorio and Abi got off to a good start in these grades, with both frequently collaborating with classmates.
- Second grade – There was more teacher-centered instruction and deliberate socialization to test-taking practices. "In this phase," say the authors, "children started to become independent learners, with some new forms of regulation, normalization, and surveillance around testing."
- Third and fourth grades – Most of each day consisted of whole-class instruction followed by periods of individual, independent work. "In this phase," say the authors, "there was a heavy emphasis on individual achievement and competition based on grades, test preparation, and test scores." Students received individual grades and there was much less collaborative work.

Gregorio and Abi were very different students by the end of fourth grade. Gregorio was seen by his teachers as a model child, high-achieving, conforming, and competitive, sometimes volubly comparing his grades to those of his classmates. But there was a downside: he, like some of the other high-achieving students, rushed though his work to finish first and showed little deep engagement in reading and writing.

Abi, more recently arrived from Mexico and less confident with her English, nevertheless showed "tremendous enthusiasm for learning, strong leadership skills, and linguistic dexterity," say the authors. But she didn't buy into the competitive ethos of the class, was somewhat nonconformist, and was seen by her teachers as a struggling student, deficient in important ways.

"The contrast between these cases," conclude Link, Gallo, and Wortham, "shows how educational practices in elementary school shape the types of people that students become. This matters for all students but most importantly for those who orient to other ways of learning and being that are not recognized within this narrow model of schooling… We question the value of these practices that focus on testing performance and mold children into autonomous, rational individuals, often further marginalizing those who do not fit this model…

We believe that without a critical analysis of such processes and the kinds of students that school is structured to produce, new reform efforts will do little to ameliorate schooling inequities."

Link, Gallo, and Wortham believe there are three ways the negative effects they observed might be alleviated:

- Scripted curriculum materials can be adapted and supplemented to make more connections to children's lives.
- Teachers can adapt standard practices to provide more support for students like Abi and help them flourish.
- Principals can strike a balance "between pressuring teachers to implement unilateral top-down reforms and relinquishing their decision-making power to teachers."

"The Production of Schoolchildren As Enlightenment Subjects" by Holly Link, Sarah Gallo, and Stanton Wortham in *American Educational Research Journal*, October 2017 (Vol. 54, #5, p. 834-867), http://journals.sagepub.com/doi/abs/10.3102/0002831217706926; the authors can be reached at hlink@gse.upenn.edu, gallo.85@osu.edu, and worthams@bc.edu.

Back to page one

4. Fractions – the Most Problematic Part of the Elementary Curriculum

In this *Psychology Today* article about elementary students' perennial struggles with fractions, David Ludden (Georgia Gwinnett College) starts with a Mark Anderson cartoon: a boy hands in a paper to his teacher and says, "To show how well I understand fractions, I only did half of my homework." No joke! A recent study found that U.S. students in an eighth-grade advanced math class performed poorly on a test of fractions. Many grade-school teachers have difficulty explaining why we need a common denominator when adding and subtracting fractions and why, in division, we invert the second fraction before multiplying. There's also lots of confusion about decimals and percents – and their close relationship to fractions.

All this matters because of how frequently fractions are used in the real world. Statistical information from polls, surveys, the census, and economic reports is often presented as fractions, decimals, and percents. And 82 percent of white-collar workers, 70 percent of blue-collar workers, and 40 percent of service workers say they regularly use fractions on the job.

So what is it that makes this part of the math curriculum so difficult for teachers and students? Ludden says there are two built-in mathematical reasons:

• *It's difficult to understand what rational numbers mean*. Students have little trouble understanding whole numbers, even big ones. But it's not obvious why 1/2, .5, and 50% all represent the same quantity. "Even more confusing," says Ludden, "any rational number can be represented by an infinite number of different fractional expressions. The numbers in the series 1/2, 2/4, 3/6, and 5/10 appear to be getting larger. After all, both the numerators and the denominators are increasing. And yet they all represent the same quantity."

• *Arithmetic operations with fractions are inherently challenging*. Early-elementary whole-number addition, subtraction, multiplication, and division are fairly straightforward, and

have the added advantage that they can be manipulated and counted with physical objects. But the way fractions are computed is complex and often counterintuitive. "Why do you need to find the lowest common denominator when adding and subtracting but not when multiplying them?" asks Ludden. "And why do you have to invert the second fraction and multiply when dividing? Dunno, just the way it's done."

In addition to these mathematical difficulties, there are cultural explanations for why fractions are more challenging for Westerners than for people in East Asia:

• *Language* – The Chinese number system (also used in Japan and Korea) doesn't have confusing number names like eleven, twelve, and twenty; instead, these numbers are expressed as *ten-one, ten-two, two-ten* (and so on). "As a result," says Ludden, "Chinese children learn to count at a much earlier age than North American or European children." Fractions are also expressed more clearly: one-third in Chinese is "one of three parts," making the meaning of the fraction explicit.

• *Textbooks*– Korean books devote far more pages and practice problems to fractions than their U.S. counterparts. Practice makes perfect.

• *Teacher knowledge* – Elementary teachers in China, Japan, and Korea can explain what is meant by 7/4 ÷ 1/2 while most U.S. teachers struggle. "It's hard to provide quality instruction to your students," says Ludden, "when you only half understand the concepts yourself."

All this points to some clear solutions: Better teacher training and PD, improvements in textbooks and classroom materials, and ways of compensating for our linguistic disadvantages by understanding what East Asian educators do to prepare their students more effectively.

"Why Is Doing Arithmetic With Fractions So Difficult?" by David Ludden in *Psychology Today*, September 30, 2017, http://bit.ly/2fJWc7U; Ludden is at dludden@ggc.edu.

Back to page one

5. How to Get Students Writing in Math Classes

In this *Teaching Children Mathematics* article, Janine Firmender (Saint Joseph's University), Tutita Casa (University of Connecticut/Storrs), and Madelynn Colonnese (University of North Carolina/Charlotte) suggest ways of getting students to explain and justify mathematical ideas and make their reasoning clear. A report recently suggested that students should do four kinds of math writing:

• *Informative/explanatory* – To describe or explain, focusing on higher levels of conceptual understanding, seeing connections, highlighting strategies, observing patterns, and explaining generalizations. Some possible prompts:

- Define the meaning of the equal sign, giving examples.
- Describe patterns in the hundreds chart.
- Describe the differences and similarities between triangles and triangular prisms.
- What does the remainder in a division problem mean?
- Explain the difference between the "2s" in 1/2 and 2/5.

Prompts can be framed to help students grapple with common misconceptions.

• *Exploratory* – To make sense of a problem, situation, or an idea of one's own. An example from a sixth-grade class:

- How many times would three musical instruments play on the same beat after 1,000 beats? How would you know?

In this kind of writing, students are encouraged to jot ideas as they work on a task and use informal media like sticky notes to keep track of their thoughts.

• *Argumentative* – To construct an argument, persuade someone of a point of view, or critique the reasoning of others. Some examples:

- Explain in two different ways why 35 is less than 53.
- Convince Samantha that all squares are rectangles but not all rectangles are squares.
- Talia says she found three ways to add two numbers that equal ten. Do you agree or disagree that there is more than one way to make ten? Why or why not?
- Niko measured the length of a box with two different sizes of paper clips. Explain why his measurement will be inaccurate.
- Mario says that 1/3 is greater than 1/2 because 3 is greater than 2. Do you agree or disagree? Why?
- Jayleen says that 5 + 4 = 11 – 2 is false. Amelia says it's true. Who do you agree with and why?

Arguments often include a claim and evidence to support it; attending to key mathematical understandings and misconceptions is key.

• *Mathematically creative* – To document or elaborate on original ideas, problems, and/or solutions and convey fluency and flexibility in thinking. An example: Miranda claims that all squares are rectangles. Do you agree or disagree? Explain. To elicit creative thinking in math classes, five conditions are important:

- Students understand that math is more than memorizing concepts and implementing procedures.
- Students have plenty of time to generate multiple ideas.
- Students are encouraged to look at tasks or ideas from various perspectives.
- Students get support to elaborate on ideas and look for patterns and generalizations.
- Students' creative writing is recognized and appreciated.

"Write On" by Janine Firmender, Tutita Casa, and Madelynn Colonnese in *Teaching Children Mathematics*, October 2017 (Vol. 24, #2, p. 84-92), available for purchase at http://bit.ly/2xum6j7; the authors can be reached at Janine.firmender@sju.edu, tutita.casa@uconn.edu, and mcolonn1@uncc.edu.

Back to page one

6. Robust Discussions in Middle-School Math

"Strategic and carefully facilitated classroom discussions can foster a deep understanding of mathematics," say George Roy and Thomas Hodges (University of South Carolina) and Sarah Bush and Farshid Safi (University of Central Florida) in this article in

Mathematics Teaching in the Middle School. But for good discussions to happen, several questions need to be considered:

- Who is doing most of the talking?
- What role does the teacher play?
- How is student-to-student dialogue facilitated?
- Does the discussion help the teacher assess student understanding?

"One strategic way to build a classroom environment rich with mathematical discussions," say the authors, "is to engage students in mathematical tasks that require them to build their understanding on the reasoning of others. As students discuss a task [the article has a detailed account of a sixth-grade algebra class], the teacher's role is to continually work with them to negotiate what high-quality discourse sounds like." Ideally, all students will:

- Participate, even those who don't raise their hands;
- Explain and justify their thinking;
- Re-state a classmate's reasoning;
- Make sense of another classmate's reasoning;
- Ask a question if they're not sure they understand.

These expectations need to be explicitly introduced to students and may not take hold immediately. The objective, say the authors, is moving "from the teacher being the sole disseminator of mathematical knowledge to the entire classroom community taking responsibility for mathematical conversations. With this important shift, students realize that they are expected to be responsible for their own learning and to aid in the learning of their classmates." Here's an excerpt from a sixth-grade algebra discussion (described in detail in the article):

- *Teacher*: Hope? You have a thought?
- *Hope*: Yes, I kind of have a formula. Every time you multiply the outside number, you divide the inside numbers because if you multiply both of them, the number will go over what you need, and you need to keep it…
- *Teacher*: So does everyone agree with her? Cameron?
- *Cameron*: If you divide or multiply the number outside the parentheses, you use the inverse operation for the numbers inside the parentheses.
- *Teacher*: What did Cameron just say?
- *Jamie*: I honestly don't know.
- *Teacher*: Then ask him a question.
- *Jamie*: Can you repeat that please.
- *Cameron*: Whatever you do to the number outside the parentheses, either multiply or divide, you use the inverse operation for whatever is inside the parentheses.
- *Jamie*: OK.
- *Teacher*: What are you okaying?
  Jamie: I understand now.
- *Teacher*: What do you understand?

- *Jamie*: OK, if you do multiplication on the outside, you'll have to do division on the inside, but if you divide on the outside, you'll have to multiply on the inside.

"Mathematics Discussions: Expectations Matter" by George Roy, Sarah Bush, Thomas Hodges, and Farshid Safi in *Mathematics Teaching in the Middle School*, October 2017 (Vol. 23, #2, p. 98-105), available for purchase at http://bit.ly/2xufnp4; Roy can be reached at roygj@mailbox.sc.edu.

Back to page one

7. Online Resources for Teaching About Current Events and Fake News

This *American Educator* article by the AFT Share My Lesson Team recommends six sites for teaching current events, spotting fake news, and keeping classroom discussions civil:

- "Today's News, Tomorrow's Lesson" http://go.aft.org/AE317sml1
- "How to Spot Fake News and Train Students to Be Educated News Consumers" http://go.aft.org/AE317sml2
- "Judging Fact, Fiction, and Everything" http://go.aft.org/AE317sml3
- "How to Teach Your Students About Fake News" http://go.aft.org/AE317sml4
- "The Trouble with Reality – Fake News" http://go.aft.org/AE317sml5
- "Civil Discourse in the Classroom" http://go.aft.org/AE317sml6

"Current Events in the Classroom" by the Share My Lesson Team, *American Educator*, Fall 2017 (Vol. 41, #3, p. 2)

Back to page one

8. Short Item:

An online site for students to publish their science research – In this article in *American Educator*, Olivia Ho-Shing describes the *Journal of Emerging Investigators*, a nonprofit online science publication to which middle and high-school students can submit original research, receive feedback from expert scientists, and have their work published. It's at https://www.emerginginvestigators.org.

"From Students to Scientists" by Olivia Ho-Shing in *American Educator*, Fall 2017 (Vol. 41, #3, p. 16-19), https://www.aft.org/sites/default/files/periodicals/ae_fall2017_ho-shing.pdf

Back to page one

If you have feedback or suggestions,
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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 48 years' experience as a teacher, principal, central office administrator, consultant, and writer, lightens the load of busy educators by serving as their "designated reader."

To produce the Marshall Memo, Kim subscribes to 60 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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- A collection of "classic" articles from all issues

Core list of publications covered

Those read this week are underlined.

All Things PLC
American Educational Research Journal
American Educator
American Journal of Education
American School Board Journal
AMLE Magazine
ASCA School Counselor
ASCD SmartBrief
District Management Journal
Ed. Magazine
Education Digest
Education Next
Education Update
Education Week
Educational Evaluation and Policy Analysis
Educational Horizons
Educational Leadership
Educational Researcher
Edutopia
Elementary School Journal
English Journal
Essential Teacher
Exceptional Children
Go Teach
Harvard Business Review
Harvard Educational Review
Independent School
Journal of Adolescent and Adult Literacy
Journal of Education for Students Placed At Risk (JESPAR)
Kappa Delta Pi Record
Knowledge Quest
Literacy Today
Mathematics Teaching in the Middle School
Middle School Journal
Peabody Journal of Education
Phi Delta Kappan
Principal
Principal Leadership
Principal's Research Review
Reading Research Quarterly
Responsive Classroom Newsletter
Rethinking Schools
Review of Educational Research
School Administrator
School Library Journal
Teacher
Teachers College Record
Teaching Children Mathematics
Teaching Exceptional Children
The Atlantic
The Chronicle of Higher Education
The Education Gadfly
The Journal of the Learning Sciences
The Language Educator
The Learning Professional (formerly Journal of Staff Development)
The New York Times
The New Yorker
The Reading Teacher
Theory Into Practice
Time Magazine