Marshall Memo 586

A Weekly Round-up of Important Ideas and Research in K-12 Education
May 11, 2015

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Quotes of the Week

"It turns out that a lot of things kids are expected to have learned earlier, they don't retain."

James Pellegrino, University of Chicago Learning Sciences Research Institute, quoted in "Researchers Target Ways to Design Better Mathematics Text Materials" by Sarah Sparks in *Education Week*, May 6, 2015 (Vol. 34, #26, p. 8), www.edweek.org

"Scientific reasoning – observing, hypothesizing, experimenting, evaluating evidence – is a staple of childhood. Kids are eager to test, say, the explosive properties of a breath mint dropped into a soda bottle. But something changes. Curricular convention in schools often restricts serious science courses to students who excel in math… Eventually the child's impulse to explore and wonder shrivels before a wall of arcana."

Don Berrett (see item #1)

"Even more important than the financial implications of unmanaged time are the implications about student learning. From academic growth to arts enrichment to social-emotional learning, nearly all of the things that we value most require time. For adults too, professional growth and continuous learning require not only large investments of time, but thoughtful and expert use of that time."

Nathan Levenson and Daniel Goldberg (see item #4)

"Getting computing devices into schools is relatively easy; changing classroom practice with technology is really, really hard."

Tom Daccord and Justin Reich (see item #5)

"If iPads are the answer, what was the question?"

Dan Meyer (quoted in *ibid*.)

"[I]n the world beyond K-12 classrooms, no professor or boss is likely to hold your hand and direct your every action."

Jay McTighe and Tom March (see item #6)

1. Scientific Literacy – How Much Is Enough, and How to Teach It?

In this *Chronicle of Higher Education* article, Don Berrett reports on how an astronomy lecturer at the University of Oregon, Scott Fisher, tries to make science interesting and accessible to students who enter college with a shaky knowledge base, low self-confidence, and no plans to pursue STEM majors and careers. Every year, Fisher confronts the widely-held belief "that many otherwise intelligent, capable people simply don't have what it takes to learn science (or math) – and that it's OK if they never do," says Berrett. "It doesn't have to be that way. Scientific reasoning – observing, hypothesizing, experimenting, evaluating evidence – is a staple of childhood. Kids are eager to test, say, the explosive properties of a breath mint dropped into a soda bottle. But something changes. Curricular convention in schools often restricts serious science courses to students who excel in math… Eventually the child's impulse to explore and wonder shrivels before a wall of arcana."

Jon Miller of the University of Michigan has been giving a true-false/multiple-choice test of scientific literacy to adults around the world since 1988. Here are some of the questions:

1. The center of the Earth is very hot.
2. Lasers work by focusing sound waves.
3. Electrons are smaller than atoms.
4. Antibiotics kill viruses as well as bacteria.
5. The universe began with a huge explosion.
6. The continents on which we live have been moving their location for millions of years and will continue to move in the future.
7. Human beings, as we know them today, developed from earlier species of animals.
8. The earliest humans lived at the same time as the dinosaurs.
9. Which travels faster, light or sound?
    - Light
    - Sound
    - Both the same
10. How long does it take for the Earth to go around the Sun?
    - One day
    - One month
    - One year
11. A doctor tells a couple that their genetic makeup means that they've got one in four chances of having a child with an inherited illness. What does this mean?

- If their first three children are healthy, the fourth will have the illness
- If their first child has the illness, the next three will not.
- Each of the couple's children will have the same risk of suffering from the illness.
- If they have only three children, none will have the illness.

The bad news is that on the full test, only 27.3 percent of U.S. adults met the standard for scientific literacy. The good news is that we were #2 in the world, with only Sweden scoring higher (with 35.1 percent scientifically literate). Finland had 22.2 percent, France 17.0, Britain 14.1, Ireland 9.4, and bringing up the rear was Turkey with 1.5 percent. Here are the correct answers to the questions above and the percent of Americans who got each one right: 1. True (80%), 2. False (48%), 3. True (54%), 4. False (55%), 5. True (30%), 6. True (72%), 7. True (37%), 8. False (47%), 9. Light (86%), 10. One year (67%), 11. Each of the children… (72%).

Why is our scientific literacy so low? After the Soviet Union's *Sputnik* satellite beat the U.S. into space in 1957, educators ratcheted up the rigor level of science and math courses and began to see them as weeding mechanisms, with high student attrition a necessary part of grooming the experts who would win back America's supremacy. But this left 80 percent of students in the dust, and the result is significant knowledge gaps among American adults, less and less interest in science, and declining public support for basic research and exploration. "It's a lack of ability to think like a scientist, to ask questions that can be answered empirically," says Rush Holt of the American Association for the Advancement of Science. "We have really divided our society into people who can think like scientists and those who don't."

A number of universities are working on the problem, trying to make science accessible to all students. One approach is renaming courses, for example:

- People, Rocks, and Fire (Geology)
- Bread 101
- Science of Sex
- Physics of Life
- Citizen Science
- Habitable Worlds
- Science, Policy, and Biology

More importantly, college teachers are trying to improve pedagogy so the content sticks, including frequent checking for understanding with clickers, immediately addressing misconceptions, "flipped" classrooms, and drafting exam questions after each class to better align teaching with assessment. At the first meeting of his course on the solar system, Scott Fisher reassures students that he's not recruiting majors (prompting a big sigh of relief in the lecture hall) and gives them an extra-credit assignment: addressing a postcard to him with his full location in the universe. The winning postcard positioned him in in the Laniakea system of galaxies (of which the Milky Way is a small part).

"Our goal is, five years hence, they've graduated and can pick up *The New York Times* science section and find it interesting and not intimidating," says Judith Eisen of the University

of Oregon's Science Literacy Program. They understand foundational concepts like atoms, DNA, hypotheses, probability, peer review, and scientific theories, which open the door to everything else. If they want to learn more, they know how to find reliable information.

The challenge in such courses is how much specific information to ask students to absorb and remember. Should they be able to recite Newton's third law or know how to think empirically? With science knowledge increasing at a rapid clip (doubling roughly every nine years), we're moving from a "warehouse" model of storing lots of information to a "just-in-time" model of accessing information (often via Google) when we need it.

Another challenge is the way some topics – the origins of the universe, evolution, climate change, vaccinations – have become enmeshed in cultural divisions, with some students feeling their sense of identity is at risk if they accept what's being taught. The way teachers ask questions can make a big difference – for example, students with strongly held religious beliefs are far less likely to answer correctly when asked if humans developed from earlier species, but if the question is tweaked to ask if that statement is true "according to the theory of evolution," fundamentalists do just as well as nonbelievers. "They have comparable knowledge, but only some choose to believe it," says Berrett. "Highly educated people also have their blind spots. They use their knowledge not necessarily to help them reach a more-informed conclusion… but to support their previously established views."

Some science teachers have found that coming across as infallible authorities with all the right answers is not helpful. With that approach, says Ariel Anbar of Arizona State University, "We end up teaching exactly what science isn't." Much better to "rub students' noses in the fact that science is about the unknown rather than the known."

"Teaching Science So It Sticks" by Dan Berrett in *The Chronicle of Higher Education*, May 8, 2015 (Vol. LXI, #34, p. A18-A21), http://bit.ly/1dWUdqe for subscribers

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2. Perceptive Supervision of Science Classes

"Identifying good science instruction during classroom observations isn't the same as identifying good practices for English or social studies," say Todd Hutner and Victor Sampson (University of Texas/Austin) in this *Kappan* article. With the shift embodied in two recent curriculum documents – *Next Generation Science Standards* and *A Framework for K-12 Science Education* – Hutner and Sampson believe supervisors need to focus on five key elements. "Principals don't need to see evidence of the five indicators every day," they say. "But over the course of a school year, they should see a preponderance of evidence showing the presence of these indicators:

• *Motivation.* Beyond writing the objective on the board, the teacher must provide a structure that creates a need to learn.

Things to look for during classroom visits:

- Is there a challenge students need to solve or a question to they must answer?
- Was there a discrepant or puzzling event?
- Do students have a choice in what they're doing?

- Does the content relate to students' experiences inside and outside school?

Questions to ask students:

- Why are you doing this assignment?
- What do you hope to accomplish?
- Is this interesting?
- How often are you interested in what you're doing in class?

Questions for teachers:

- How do you motivate students? How do you make it relevant to them?

• *Students' thinking is made visible.* Students enter science classrooms with lots of preconceptions, some of which are wrong – for example, heavy objects fall more quickly than light objects or the heart makes blood. Students' ideas need to be surfaced and discussed before they can begin to understand the theories, laws, and models of science.

Things to look for during classroom visits:

- Did students make a prediction or state a hypothesis?
- Are students representing science content?
- Are students explaining their thinking orally or in writing?

Questions to ask students:

- How often does your teacher ask you to explain your thinking?
- How often do you need to give a reason for your answer?

Questions for teachers:

- How do you know what students are thinking?
- How do you decide when to move on?

• ABC – activity before content. Students need to explore a natural phenomenon before being formally presented with scientific facts, formulas, theories, or other content, say Hutner and Sampson. In other words, the beginning of a unit is often the best time to do a lab.

Things to look for during classroom visits:

- Are students collecting, analyzing, or displaying data?
- Did students make a prediction or state a hypothesis?

Questions to ask students:

- Has your teacher explained this to you before?
- Do you know what's supposed to happen, or what the result will be?
- How often do you do this type of activity?

Questions for teachers:

- When did you do the lab?
- Did students know what was going to happen during the lab?
- When did you introduce vocabulary?

• Students engage in scientific practices as they learn content. They're asking scientific questions, planning and carrying out investigations, analyzing and interpreting data, engaging in argument from evidence, and obtaining, evaluating, and communicating information.

Things to look for during classroom visits:

- Did students plan investigations?

- Did students analyze data?
- Did students share their findings with others?
- Did students justify their claims using data?

Questions to ask students:

- How often does your teacher have you design your own investigation?
- How often do you agree or disagree with anything other students are saying? Why?
- What happens if students disagree?

Questions for teachers:

- How do you determine procedures for labs and ways to analyze data?
- What happens if students disagree about the results of an investigation?

• Students actively negotiate meaning. Rather than being passive recipients of teachers' lectures or demonstrations, students take charge of processing content and get involved in presenting it in meaningful ways – for example, analyzing alternative fuel sources or writing a letter to an elected official advocating for the adoption of a specific type of energy.

Things to look for during classroom visits:

- Who is engaged in discourse during the class?
- Are students actively thinking about science content?
- Is the teacher asking questions to scaffold student thinking?

Questions to ask students:

- How did you justify your thinking?
- What types of work do you do when you're in groups?

Questions for teachers:

- How do you ensure students are thinking deeply about science content?
- What kinds of questions do you ask students? What types of answers do you expect?

"New Ways of Teaching and Observing Science Class" by Todd Hutner and Victor Sampson in *Phi Delta Kappan*, May 2015 (Vol. 96, #8, p. 52-56), www.kappanmagazine.org; Hutner can be reached at thutner@gmail.com.

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3. Well-Chosen "Hinge Questions" to Check for Student Understanding

In this *Improving Teaching* article, history teacher Harry Fletcher-Wood explains the "hinge question" – a carefully crafted check for understanding mid-way through a lesson to see if students grasp the central concept, need to have it briefly clarified, or need the teacher to start all over again. The four key characteristics of good hinge questions, according to British researcher Dylan Wiliam, are:

- They're concise: students can respond in under two minutes.
- The question is worded so that that students can't get the right answer for the wrong reasons; common errors and misconceptions are made visible.
- The teacher can see responses from every student by using mini-whiteboards, Plickers, clickers, or some other form of all-class response system.
- The teacher can assess the responses and decide what to do in under 30 seconds.

What were Fletcher-Wood's reactions when he started using these in his classes? "Hinge questions have transformed my teaching," he says. "Firstly, and most dramatically, I learned far more about the errors students were making… Had I not 'sought error' in this way, I would not have been aware of these understandable misconceptions, nor would I have been able to correct them.

"Secondly, it slowed teaching dramatically – indeed, a handful of lessons were brought almost to a standstill as I kept trying to talk through student misconceptions. This risked disengaging… and reinforces the importance of only trying to change two or three things at once… Additionally, they allow me to discuss and correct student misconceptions in a safe environment for students to make mistakes – because almost all of them will make mistakes at some point.

"With more experience, I learned to predict student misconceptions and create learning activities around them, to know when to move on with the group and help individuals later, and, most powerfully, to activate students to explain to each other or debate with each other and work towards a conclusion. At the simplest level, it involves breaking down questions into sub-questions, enabling students to isolate the characteristics of individual lessons."

Here are some examples of hinge questions from different subject areas, with students using mini-whiteboards to display their answers:

• In a math lesson on unlike denominators: *What is a fraction between 1/6 and 1/7?*

• In a solar system lesson: *How long does it take the Earth to travel around the Sun? To spin once on its axis?*

• In a climate lesson: *Why is the Earth colder in areas further away from the equator?*

- The Earth orbits the Sun.
- The Earth orbits the Sun at an angle.
- The Earth is a sphere.
- The Earth has a hot core.

"Do They Understand This Well Enough to Move On? Introducing Hinge Questions" by Harry Fletcher-Wood in *Improving Teaching*, August 17, 2013, http://bit.ly/1bKxc89

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4. Effective Use of Time in Classrooms and Professional Development

In this *District Management Journal* article, Nathan Levenson and Daniel Goldberg say that most schools and districts don't manage *time* nearly as carefully as dollars and cents. This is odd since 70-80 percent of K-12 resources are devoted to paying staff for their time. "Even more important than the financial implications of unmanaged time are the implications about student learning," say Levenson and Goldberg. "From academic growth to arts enrichment to social-emotional learning, nearly all of the things that we value most require time. For adults too, professional growth and continuous learning require not only large investments of time, but thoughtful and expert use of that time… In today's environment of higher standards, dwindling budgets, and increasing state and federal mandates, careful management of an organization's time is an opportunity too important to overlook."

Since the 1960s, many American schools have committed huge sums to increasing the length of the school day and improving the student-teacher ratio – but academic results compared to other countries are unimpressive and racial-economic achievement gaps within the U.S. have persisted. Levenson and Goldberg believe this is because we haven't addressed how time is *used*, and that's because of three factors:

- A culture of teacher autonomy – There's great latitude in many schools on how classroom time is spent, which has benefits (personalization of instruction, attracting professionals who appreciate professional discretion) but can also result in inefficient and ineffective practices in some classrooms.
- Difficulty gathering data – It's hard to get detailed information on how teachers, counselors, and administrators spend their time.
- Unsophisticated scheduling – In many schools, programming is done by amateurs, resulting in inefficiencies and poor use of human resources.

Adding time to the school day and year doesn't address these issues, say Levenson and Goldberg: "To maximize the benefits of staff and student time, districts need to carefully consider both the quantity of time available and how that time is spent." Their bottom line for the effective use of time:

- It ensures that each student is able to master rigorous material.
- Teachers and other educators work collaboratively and develop expertise in their crafts.

Here is Levenson's and Goldberg's three-part framework for optimizing the use of time in schools:

• *Audience* – Grouping students by specific academic criteria. For example, a Massachusetts fifth-grade math team began giving a common assessment every two weeks; they met to analyze the data using a sticky note for each student and formed four reshuffled groups based on students' needs: 35 students who were highly proficient worked on enrichment; 25 students struggling with place value worked with the teacher strongest in that area; 18 students struggling with fractions were with the teacher strongest at fractions; and 22 students who basically understood the chapter worked with a second-year teacher on extensions. The results were dramatic: within one year, the school's fifth-grade proficiency on the state test went from 38 to 68 percent.

• *How the time is used: Activity, amount of time, and actors* – First, what is the activity? (for example, dividing the elementary literacy block into phonics, word work, small-group work, and independent reading); second, what is the amount of time? (for example, 15 minutes for phonics and word work, 45 minutes for small-group work, and 30 minutes for independent reading); and third, who is the actor? (for example, reading is taught by the classroom teacher, assisted during small-group time by a highly skilled reading teacher).

The actors are particularly important when planning teachers' professional development. When grade-level or subject-area teacher teams meet to look at their students' interim assessment results, they need real expertise in the room to make the best use of data-analysis time. What happens, ask Levenson and Goldberg, when, "of the few teachers assembled in one room, *none* is a highly effective teacher? It is unclear how, by working

together, these teachers will ever become highly effective. By not carefully matching the 'audience' and the 'actor,' this school has squandered valuable planning time on activities that are likely to have no effect on professional growth or student learning. With teachers, as with students, *who* provides or leads teacher improvement efforts is key to effectiveness."

• *Monitoring and continuously adjusting* – Although many teachers are good at the first two areas above, some are not, and principals and district leaders struggle to supervise how classroom time is used. In the past, elementary teachers have received very little guidance on how they spend their time (aside from entry, lunch, recess, electives, and dismissal). Recently many districts have tightened this up, often requiring 90 minutes for literacy and 60 minutes for math and even specifying when in the day these instructional blocks should take place (usually morning for literacy). The next level is getting even more specific – for example, requiring elementary teachers to spend x minutes on comprehension or secondary social studies teachers to allocate time for note-taking and debate and Spanish teachers on speaking and writing.

"The point here is not that there is necessarily a right answer," say Levenson and Goldberg, "but that these data points raise a question: how should teachers and administrators manage the 'Three As' of activity, amount, and actor? Tracking this data along with student outcomes will provide valuable information as to what works best, and will allow for more-rapid scaling up of successful practices." One district gathered data on phonics instruction in kindergarten and first grade and found that some teachers were spending well over the recommended 100 minutes a week, cutting into other important activities, while others were teaching as little as 40 minutes. There were also significant variations in the quality of instruction. The data were very helpful in improving the delivery of instruction for all students.

Is extending the school day or year necessary? These questions should be answered first, perhaps leading to the conclusion that additional time isn't necessary:

- What is the goal? e.g., providing high-quality literacy instruction for all students.
- What is our approach? e.g., extending the core literacy block and providing intervention periods.
- How much time is required? e.g., 60 minutes per day
- Is there any time in the day that can be repurposed? e.g., extra-long lunch period, free periods, extra time in homeroom, PD days, time devoted to similar or related activities.

Is it possible to find more time for professional development without additional spending? Some key questions:

- Do you focus faculty meetings and other recurring meetings on improving teaching and learning?
- Do you use data on teachers' strengths and areas of opportunity to customize PD?
- Do you use scheduling experts to help program the school?
- Do you ensure that all teacher planning groups include at least one highly-effective teacher?
- Do your schools create and monitor schedules both for the building overall and for individual coaches/experts?

- Have you developed guidelines for how coaches and other experts should spend their time with teachers?

Finally, Levenson and Goldberg list ten mistakes to avoid:

- Don't assign scheduling to a non-expert. This is a complex and tremendously important task and should be done only by someone with experience and expertise.
- Don't assume time is being spent as planned. Perception rarely matches reality. Detailed study is needed to see what's really going on.
- Don't settle for the data you have. New methods are needed to gather data, including short, automated staff surveys.
- Don't forget to manage all the time in the district. This includes faculty meetings, PLC time, data team meetings, and other blocks of time.
- Don't hesitate to develop guidelines. These don't need to be rigid, but parameters are helpful.
- Don't spread time too thin. Quality, not quantity.
- Don't do it by hand. Computers can crunch data more efficiently than pen and paper.
- Don't add more time without repurposing existing time first. Many meetings are not as productive as they can be and can be tweaked for great impact.
- Don't forget to monitor continuously. Checking in on classrooms and meetings is vital.
- Don't overlook the importance of quality instruction. "Simply adding more ineffective time is not likely to result in improved outcomes," say the authors. Effective teaching is the single most-important factor in student achievement.

"Managing Time: Your Scarcest Resource" by Nathan Levenson and Daniel Goldberg in *The District Management Journal*, Spring 2015 (Vol. 17, p. 12-22), available for purchase at http://dmcouncil.org/index.php/publications/dmc-spotlight-managing-time-your-scarcest-resource

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5. Using Classroom Tablets in Powerful Ways

(Originally titled "How to Transform Teaching with Tablets")

"Getting computing devices into schools is relatively easy," say Tom Daccord and Justin Reich of EdTech-Teacher in this *Educational Leadership* article; "changing classroom practice with technology is really, really hard… With every generation of computing technology, a small group of educators has been able to use new tools in transformative ways, but on the whole, classroom practices have proven stubbornly resistant to change." In one iPad-using school, Daccord and Reich noticed that students were using their tablets mostly for note-taking. To avoid this kind of suboptimal use of powerful devices, and get beyond the complicated and time-consuming logistics of tablet adoption, the authors suggest three steps:

• *Articulate a clear vision of how tablets will improve instruction*. Three or four years after an iPad adoption, what will students be able to do that they can't do now? In the words of educator Dan Meyer, "If iPads are the answer, what was the question?" Far too many schools have no vision at all, different visions for different grades and departments, or a diktat imposed by a charismatic superintendent. The Arlington, Massachusetts schools came up with clear and

compelling goals: At the elementary level, tablets prepare students for learning, self-regulation, and collaboration using the Tools of the Mind curriculum; in secondary schools, they focus on discourse and reasoning from evidence.

• *Help educators imagine how tablets can support the vision*. What does awesome use of tablets look like? Shawn McCusker, a Chicago history teacher who previously assessed his high-school students by having them write formal analytical essays, decided to use iPads to allow more creativity in demonstrating understanding. One girl created a short video about Adam Smith, Karl Marx, and the Industrial Revolution which, after some additional work, found its way onto YouTube: https://www.youtube.com/watch?v=E4YlOyugato. New York City elementary teacher Kristen Paino joined with colleagues to create a community called Global Book Series featuring collaborative books authored by educators and students from around the world: https://itunes.apple.com/us/book/a-global-ibook/id710713861. Teachers and students told the stories of their schools through pictures, writing, audio, and videos, and students' interest in geography was piqued by hearing from students in New Zealand, Russia, and Chicago. *Where is Russia?* Paino's students wanted to know. *What's at Navy Pier in Chicago? Can we see Johnnie's school on a map?*

• *Support teachers and students to use tablets for curation, creation, and connection*. The first thing teachers tend to do with new technology is extend existing practices, and it takes support and a schoolwide vision to move beyond that. "From someday to Monday" is Daccord and Reich's mantra for helping teachers bridge the gap from vision to everyday practice. They preach a combination of teachers experimenting with small steps they can take right away (for example, using Socrative or Poll Everywhere to check for understanding) and radically rethinking their units or courses (when Daccord was a history teacher, he transformed a humdrum unit on the Depression by examining the period through the eyes of a well-documented group of teenage hoboes). In terms of timing, a mid-year workshop is best used for "Monday" tablet teaching ideas, while summer PD time is ideal for "someday" curriculum creation.

None of this can be done on the cheap, say Daccord and Reich: "If investments in technology aren't paired with investments in teacher capacity, change is unlikely."

"How to Transform Teaching with Tablets" by Tom Daccord and Justin Reich in *Educational Leadership*, May 2015 (Vol. 72, #8, p. 18-23), http://bit.ly/1cJzTZg; the authors can be reached at tom@edtechteacher.org and justin@edtechteacher.org.

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6. Apps to Promote Knowledge Acquisition, Making Meaning, and Transfer

(Originally titled "Choosing Apps by Design")

In this *Educational Leadership* article, author/consultant Jay McTighe and consultant/tech developer Tom March suggest that the best way to choose classroom apps is to focus on three distinct yet interrelated goals:

• *Acquisition* – Here teachers identify the knowledge and skills they want students to use and learn – factual information (number facts, vocabulary), basic concepts (vertebrate vs. invertebrate), and skills (drawing a picture, dribbling a basketball). McTighe and March have

two "gentle reminders": first, knowledge acquisition isn't an end in itself, but a means to meaning-making and transfer. Second, think beyond getting access to information and look for tools that support selecting, organizing, evaluating, and managing it. They suggest two digital tools to promote this goal: news feeds that funnel new content generated by blogs, podcasts, and video channels; and collaborative knowledge management tools like social bookmarking to immediately share information with others. Two school-friendly apps are Diigo www.diigo.com and Evernote https://evernote.com. "Whereas students might once have spent a class period individually surfing the Web and noting a few potentially helpful websites," say McTighe and March, "now they act as research team members who collaboratively collect, analyze, and annotate the relevant information they intend to use."

• *Making meaning* – Students need to focus on the big ideas by addressing well-framed Essential Questions such as:

- How do we know what to believe about scientific claims?
- What makes writing worth reading?
- How do the arts reflect, as well as shape, a culture?
- What do effective problem-solvers do when they get stuck?

McTighe and March suggest several digital tools that help students analyze, interpret, generalize, question, test, evaluate, and synthesize ideas: Padlet http://padlet.com is a shared space for students to brainstorm, and Thesis Builder http://tommarch.com/electraguide helps them develop a thesis statement and an outline for a persuasive essay. These tools are most helpful when students have become adept at basic information management and have developed a healthy disposition toward inquiry. Students might then use free productivity tools at Google Apps for Education www.google.com/enterprise/apps/education - word processing, presentation, spreadsheet, and graphics software – to construct knowledge and communicate ideas. A high-school American literature teacher might orchestrate the following:

- Students work in teams to complete a teacher-designed online form.
- Each team answers questions about the attitudes of authors from specific movements in American literature toward nature, mankind, government, and the American Dream.
- As teams submit their forms, the information goes to a spreadsheet that organizes insights chronologically by era.
- That night, students analyze the collaborative spreadsheet, add comments, and engage in a chat session to come up with individual thesis statements that explain their interpretation of how American attitudes evolved over time as illustrated by literature.
- The following day, students post and review one another's thesis statements through shared documents.
- Students publish their understandings in a composite slide presentation.

"Thus," say McTighe and March, "as students are introduced to, use, and choose from this suite of tools, they are empowered with the skills to tackle authentic tasks, collaboratively construct meaning, and communicate their understandings."

• *Transfer* – The three key goals here are (a) long-term retention; (b) being able to apply learning in new situations; and (c) being able to perform independently – all of which is

at the heart of college and career readiness. "[I]n the world beyond K-12 classrooms, no professor or boss is likely to hold your hand and direct your every action," say McTighe and March. They suggest ClassPortals http://tommarch.com/strategies/classportals, a Web tool that allows students and teachers to work together to create and publish content around a topic they're passionate about – for example, child slavery, natural disasters, people power revolutions, emerging technologies, tracking climate change, and fit for life. "An online presence provides an excellent platform for demonstrating transfer," say the authors. "Students can publish their latest thinking and creations for a global audience and receive feedback in the form of comments; they often find themselves participating in authentic learning communities in which people care enough about a topic to collaborate, disagree, and ultimately build new knowledge. What could be a better learning experience?"

"Choosing Apps by Design" by Jay McTighe and Tom March in *Educational Leadership*, May 2015 (Vol. 72, #8, p. 36-41), available for purchase at http://bit.ly/1HaqS5g; the authors can be reached at jaymctighe@verizon.net and tom@ozline.com.

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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 44 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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- About Kim Marshall (including links to articles)
- A free sample issue

Subscribers have access to the Members' Area of the website, which has:

- The current issue (in Word or PDF)
- All back issues (also in Word and PDF)
- A database of all articles to date, searchable by topic, title, author, source, level, etc.
- A collection of "classic" articles from all 11 years

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
AMLE Magazine
ASCA School Counselor
ASCD SmartBrief/Public Education NewsBlast
Better: Evidence-Based Education
Center for Performance Assessment Newsletter
District Administration
Ed. Magazine
Education Digest
Education Gadfly
Education Next
Education Week
Educational Evaluation and Policy Analysis
Educational Horizons
Educational Leadership
Educational Researcher
Edutopia
Elementary School Journal
Essential Teacher
Go Teach
Harvard Business Review
Harvard Education Letter
Harvard Educational Review
Independent School
Journal of Education for Students Placed At Risk (JESPAR)
Journal of Staff Development
Kappa Delta Pi Record
Knowledge Quest
Middle School Journal
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
School Library Journal
Teacher
Teachers College Record
Teaching Children Mathematics
Teaching Exceptional Children/Exceptional Children
The Atlantic
The Chronicle of Higher Education
The District Management Journal
The Journal of the Learning Sciences
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