JogNog Blog on Learning

Can You Resist the Marshmallow?

Delayed Gratification on Small Things Leads to Long Term Success

How learning self-control and delayed gratification can raise SAT scores by 210 points.

If you were four years old in the late 1960s, you could have participated in an interesting experiment in delaying gratification. If you attended the Bing Nursery School at Stanford University, a kindly professor of psychology, Walter Mischel, might have made you the following offer: "You can have a single marshmallow now, or two marshmallows if you can wait until I return." Would you have eaten the marshmallow right away or soon after, or waited a few minutes to double your marshmallow enjoyment? Your choice would have had profound implications for your future academic performance.

It turns out that even at age four, your willingness to delay gratification already was a powerful predictor of your success in life. In the Mischel experiment, about one third of the children resisted temptation and received their two marshmallows. What was truly remarkable, however, was how well this predicted traits and accomplishments of these children many years later. Those who could delay gratification as children were more likely to handle stressful situations, maintain friendships, and succeed in their occupation as adults. The academic differences were even more dramatic. Those children who could wait 15 minutes for their second marshmallow scored 210 points higher on their SAT tests when they were teenagers, compared to those children who succumbed to the second marshmallow in under a minute.

So how did the marshmallow delayers do it? Professor Mischel proposed that a common successful tactic was what he calls "the strategic allocation of attention." The successful resisters distracted themselves by singing songs or covering their eyes. Mischel summed up the successful strategy by saying: "If you're thinking about the marshmallow and how delicious it is, then you're going to eat it. The key is to avoid thinking about it in the first place." Those who sought to think of the marshmallow as a cloud or as imaginary did much better than those who stared straight at the marshmallow and tried to resist.

As I mentioned in an earlier blog post ("Should Your School Be Teaching Grit?"), Angela Lee Duckworth at the University of Pennsylvania is doing additional studies on delayed gratification, where she found that the ability to delay gratification was a far better predictor of academic performance than IQ. What is encouraging for those of us who might not have been able to wait is that delaying gratification can be learned.

I think the takeaway for you as a teacher is to look for opportunities to give your student to learn self-control and delayed gratification. For as Professor Duckworth has said: "I gradually became convinced that trying to teach a teenager algebra when they don't have self-control is a pretty futile exercise."

Are Unpredictable Rewards Better?

What happens if you are guaranteed to get a reward every time you do something? What happens if it is unpredictable? Turns out that you will be more interested and engaged if the reward is unpredictable.

There is some evidence that unpredictable rewards are better than predictable ones. This makes sense in the sense that if a reward becomes completely predictable then it just becomes your 'wage' for the job you are doing. It loses it sense of reward or bonus. Just like if you went to the local carnival when it was in town and went up to one of the gaming booths and that instead of purchasing three baseballs with which to knock down a stack of bottles for the chance to win a cheap stuffed animal – instead you just paid a little bit more and got your stuffed animal along with your three baseballs. What would be the fun in that? You get the stuffed animal whether you do well or not in throwing the baseballs.

How Many Wrong Answers Do You Need?

Are Single-Distracter Multiple-Choice Questions Better for Learning? Just one wrong answer rather than three may provide dramatically improved learning results and make it easier to create question.

JogNog recently conducted preliminary research at a Boston-area middle school to answer the question: "Is there a difference in the effectiveness for learning of multiple-choice questions when there is only one distractor (incorrect answer) in a question, as opposed to three?" If the answer to this research question is either that there is no difference or that single-distractor questions are superior, that could have a profound impact on learning because it would result in the faster creation of review questions, as well as faster learning when those questions are used (since there are fewer incorrect answers to read and process).

The preliminary results are quite promising and indicate that a larger experiment should be conducted. In a class of thirteen students, those who took tests using single-distractor questions achieved a score of 88% correct, and those with multiple-distracter questions scored 79% correct. While the research results are limited by the small population used in this experiment, the large difference in performance (effectively a difference between a "C+" and a "B+") warrants further consideration of this method and additional experiments with a larger population.

There are two advantages of single-distractor review questions:

1. They can be created much more rapidly than multiple-distractor questions (question writers often complain that the question and the right answer are easy to write - it is the distractors that take all the time). Thus, much more review content could be created for the same amount of human, time, and monetary resources spent.

2. Students can process single-distractor questions much more rapidly because they don't have to spend time on differentiating between other wrong answers. Thus, students can be exposed to more content and review within a fixed amount of study time.

JogNog will be continuing this exciting research, but we welcome others from academia and research labs to partner with us and share results.

Which Is the Best Motivator? The Carrot? The Stick? Or Purpose?

How often have you negotiated with a student or your own child with some form of the phrase "If you do this, you'll get that"? It often works . . . sort of . . . for a short time. But sometimes it doesn't work at all, ever. Or it works at first, but then, like repeated exposures to Pavlov's bell with no reward, it slowly fades away and stops working. These types of rewards that are external to the activity at hand (like rewarding a student for good grades with cash) sometimes work and sometimes don't. And other times, they work only when there is an escalation of the reward or punishment.

It turns out that this carrot-and-stick approach can work remarkably well sometimes, but it depends on the task. Daniel Pink, author of the book Drive and presenter at the 2009 TED conference in Oxford, England, points out that nearly half a century of research has shown that extrinsic rewards (rewards external to the task at hand) work fine for mechanical tasks that don't require a lot of creative thinking. It worked well for people tightening bolts on Henry Ford's production line and for his salespeople trying to sell a car. But it wouldn't have worked well for the engineers who were trying to design Ford's next car. This is still true today, and in fact, Pink points out that research now shows that strong extrinsic rewards can actually lower performance—dramatically.

So, if "extrinsic" rewards like money and the threat of firing (or, for young students, the prospect of getting an A or a D on their report card) don't work, then what does? The solution lies in "intrinsic" rewards, or rewards that are internal or more immediate to the task at hand. Pink divides these types of rewards into three types of motivation: Autonomy, Mastery, and Purpose. Daniel Pink defines Autonomy as "the urge to direct our own lives," Mastery as "the desire to get better and better at something that matters," and Purpose as "the yearning to do what we do in the service of something larger than ourselves." By motivating learners with these intrinsic rewards, they can be encouraged to accomplish complex learning tasks.

The JogNog quiz game carefully strikes a balance between intrinsic and extrinsic rewards. An extrinsic reward would be the long-term accumulation of coins and towers, and an intrinsic reward would be the immediate satisfaction of getting the right answer and completing enough questions correctly to get to the next level. JogNog is designed to help students stay motivated and interested in learning, using these three motivational types.

See the TED talk: "Dan Pink on the Surprising Science of Motivation."

Does Cash for Grades Work?

You will see in the literature that some folks are advocating paying students to learn, especially low incomes students and poor performers. This is not a simple question to answer. While it is almost certainly true that young people will motivate when they are provided with what is called an "extrinsic reward" – or a reward that is more temporally immediate and more obviously desirable. Consider the intrinsic rewards that come from being smarter after years of schooling versus the prestige received from being accepted to Harvard (something to aspire to but still far away for a teenager) vs. getting $20 or a meal at McDonalds if you get an A on the next quiz. Learning the material to help you do well on the quiz should be your reward but in reality the immediacy and pleasure received from a Big Mac for lunch might be much more compelling.

So extrinsic rewards do work – all parents and teachers have used them but there is a risk in them as well – they can sometimes incent bad behavior. Too strenuous a focus on memorizing facts for tomorrow's quiz without taking the time to understand the broader concepts. Then after the quiz everything is forgotten. And while the A on the quiz and the Big Mac are achieved, little long term gain has been achieved and in fact the student may have just learned the wrong lesson: that cramming for a test works.

Extrinsic rewards also have some effect of sucking the life out of the activity. This is almost a Zen thing where if you motivate yourself with other things you lose your passion for the thing you are doing. For instance if you have a passion and a love for painting but begin to sell your paintings and you begin to paint for money as well as passion – the extrinsic reward of getting money may seriously diminish the joy received from the process of painting.

Zen always teaches to stay in the moment. To intrinsically enjoy what you are doing and to keep only a very light control or thought of the future, since it is so hard to control any way.

What If a Girl Scout Understood How to Get a Mortgage?

The Girl Scouts have officially recognized that many young students don't know much about personal finances. A lot of girls don't know how to save money, how much to save, or how much things cost. They don't know the difference between an ATM card and a credit card, or that the house they live in is probably made possible through a mortgage from a bank.

But the Girl Scouts have also decided to do something about this. To celebrate their 100th anniversary, the organization has created thirteen new merit badges, all of which focus on personal finance, savings, and money management. The girls involved work with adult mentors to learn simple concepts such as checking and savings accounts, and they are even challenged to determine if the career they choose will generate enough income to support the kind of house they want to live in—some twelve-year-olds were

surprised how difficult it would be to get a mortgage for their $2.5 million dream house!

It is great to see a highly esteemed national organization like the Girl Scouts aggressively and methodically taking on the important topic of personal finance.

Could Picking a College Major Be as Easy as Getting a Date?

Do you have a student who has already picked her college major? Has a boy in your class decided what his future profession should be? These rare students, who know exactly what they'd like to be when they grow up, are probably also some of the most focused and motivated kids in your classroom. What if there were a way to help all students cultivate an interest and passion for a subject with an eye on long-term success? As I've written in this blog, doing this could result in them being eight times more likely to turn in an extra credit assignment!

I mentor a successful Massachusetts nonprofit called Learning Unlimited, which provides the infrastructure and training to run programs where middle and high school students can come to MIT for a weekend and go to classes taught by volunteers from the ranks of the school's undergraduates. The programs, which work with other colleges besides MIT, vary from how to build a web page to how to build a nuclear device (but not everything you need to know to build a nuclear bomb—don't worry). The programs are a huge hit with students, both in terms of what they learn and because they expose these young people to different occupations and majors. This helps them to be motivated to go to college and to learn today.

You may consider exposing your students to programs like Learning Unlimited, even if they are just in middle school. The more information about the choices they will have (and that they will have to make) as they enter college and eventually pick a career, the better. Certainly the evidence shows that students motivated by knowing where they are headed are more attentive, more curious, and more likely to excel in school.

And when these students get to college, they might also end up using ConnectEDU (sometimes referred to as "eHarmony for college matchmaking"). This computer application looks at the profile of a given student and then, by using sophisticated data mining technology, compares that profile to millions of other student profiles and recommends college majors to the student. See The Chronicle of Higher Education, "Colleges Mine Data to Tailor Students' Experience".

What If You Could Get a Merit Badge for Learning the Quadratic Equation?

The John D. and Catherine T. MacArthur Foundation is investing millions of dollars to create a system that makes learning large and difficult tasks easy.

One of the most powerful learning and motivational devices in games is the possibility of acquiring badges or advancing to higher levels when the player achieves some new skill or competency. The idea is not new, nor is it limited to games. Football coaches,

military personnel, and the Boy Scouts and Girl Scouts have long used the technique as a way to build a ramp of small steps toward some great achievement. Now this idea is being implemented online for people who would like to learn a skill and be certified. Once they earn a digital "merit badge," they can place it on their website and display evidence of their skills to their friends, parents, teachers, or possible future employers.

The challenge in building such a system is twofold: 1) How do you monitor the quality of the digital badges and prevent cheating? 2) How do you make the badges ubiquitous and use them in a consistent manner?

To solve these problems, the MacArthur Foundation will be awarding about $2 million to several dozen winners of its "Badges for Lifelong Learning" competition. This program will make it easy for someone to learn some small skill (for instance, my 16-year-old neighbor recently needed to play the ukulele in a performance and downloaded a $0.99 app to learn how) and then certify proficiency. Other badges could be for using tables in Microsoft Word, creating a wiki, or learning the quadratic equation.

By breaking down lifelong learning tasks into small pieces that can be learned and then certified, the system can turn the often-daunting task of learning new skills into a smooth progression of simple steps. The MacArthur Foundation makes their selections in March 2012, so stay tuned and get ready to collect some badges!

Check out the New York Times article by Anne Eisenberg, "For Job Hunters, Digital Merit Badges".

Go here to see the 60 winners of the first round of the MacArthur competition.

And here's a description of the Badges for Lifelong Learning competition from the MacArthur Foundation.

Should Stanford University Have Its Own High School?

Stanford University (yes, the prestigious one in California) has opened its own high school – or, more specifically, an online high school.

This shouldn't be all that surprising. More and more students are going to high school online. Currently about 275,000 students in the United States are enrolled full time in an online school. And Stanford is not alone. Other big-name universities, like the University of Nebraska, Lincoln, George Washington University, and the University of Missouri, already have online high school programs of their own.

Not surprisingly, when Stanford lends its name and reputation to a high school, it doesn't come cheap. Stanford charges $15,000 per year, whereas some of its peers like Nebraska charge far less ($2,500). But, as they say, "the proof is in the pudding" – or, as Stanford might correct: "the proof of the pudding is in the eating" – and in this case, going to Stanford's online high school gives you a strong competitive edge when you apply to college. Thirty-three

of the seventy-five recent graduates of Stanford High School now attend Stanford University or an Ivy League college. So it's expensive, but it's also valuable.

But one question remains: How does Stanford control the quality and make sure that students are actually doing the work, since there are no actual classrooms? Stanford solves this problem by requiring all tests to be carefully monitored and overseen by a Stanford-approved proctor. However, this arrangement creates a strange synergy between universities, which need money, and online schools, which need qualified educational content and credibility.

Where does it end? Since online education is growing so rapidly and is crazy lucrative, you can bet that Stanford's high school program will continue to expand, so long as the quality stays high. But why stop at high school once the dollars start coming in? Why not an online Stanford undergraduate degree, or Stanford Middle School? Why not? We'll have to see how this plays out, but the conversion of university heavyweights moving into the high school arena (and soon middle school) will be an interesting experiment to watch.

Make It Harder to Read to Learn Better?

In recent research, volunteers were asked to read for 90 seconds about two mythical species (the Norgletti and the Pangerish). One group was given the text in a difficult-to-read font (Comic Sans), and the other group got an easy-to-read font (Bodoni). Fifteen minutes later, the group with the difficult-to-read text answered questions correctly 86% of the time. The group with the easy-to-read font? Only 73% correct. Here is the article from The Economist.

This is a paradoxical result, as one would expect that making it easier for the students to read would allow them to spend more time and focus on the most important new information in the text. But this finding is consistent with other research that we recently mentioned in this newsletter that showed that making students struggle a bit to remember a new fact made the fact stick in their memories much more securely. At JogNog, we believe in continuously challenging students. Our strength at JogNog is in providing the perfect balance between too much and too little challenge. The result keeps the students motivated and learning as fast as they can.

Teach Like a Champion #44: Precise Praise for Students

"… the culturewide misuse of praise has a documented perverse effect… They [students] see cheap praise as a marker of failure, not success." – Doug Lemov, author of Teach Like a Champion

You may remember from an earlier blog post ("Should You Cold Call Your Students?") my recommendation of the book Teach Like a Champion by Doug Lemov. It is a remarkable book because it provides 49 small and easy-to-implement techniques that have been proven to be successful because they have been used by successful teachers. What makes the book unique is that Lemov

went out and actually videotaped successful teachers and analyzed what they were doing well in the classroom.

This week, I am recommending technique #44, which Doug Lemov calls "precise praise"; this is part of his chapter on character and trust. As you may know, JogNog features the "Praise Me!" button, which allows players to solicit praise (and rewards) from a parent or teacher when they complete the studying of one of the JogNog quiz towers. We didn't invent the idea of praise, and neither did Doug Lemov, but he and JogNog have very similar philosophies. The main takeaways from this technique in Lemov's book are the following:

- Try to give three praises for every one criticism or correction.

- Don't confuse praise and acknowledgment. For example, it is good to acknowledge that Scott remembered to bring his pencil to school today. However, to praise such a simple act will only dilute the praise you give Scott when he achieves a truly exceptional action or result.

- Don't praise a student when your intent is to shame or remind another student. For instance, don't praise Ellen for sitting in her seat just to remind Bobby to sit in his seat.

- Avoid insincere praise. So many parents and teachers overuse praise for things that are not truly exemplary that many kids now actually associate praise with poor performance.

- Praise the work, not the child. For instance, if a child does an exemplary job on a book report, consider saying "You did impressive work researching your topic, Sally," as opposed to "Wow, Sally, you are really smart!" Praising children can make them feel special, but it also could make them feel like they have something to lose. This, in turn, may make them risk-averse and afraid to try new things. Praising the behavior will encourage the behavior and reward the fact that they took a risk to try something new.

Try these techniques in your class, if you aren't already. I think you will find them a great way to motivate your students to the highest levels of performance.

Why Didn't Someone Think of Asking Questions Before?

SQ3R has been around since 1946, and Socrates was teaching with questions in 400 BC.

Recent groundbreaking research has shown that the best way to study is by asking questions. It results in far superior test scores in a shorter amount of time compared to the more standard techniques of reading, summarizing, and reviewing. But why hasn't anyone ever thought of this before? Well, it turns out they have. There is a strong history supporting the power of using questioning to learn.

Consider that Socrates was teaching Plato in 400 BC with the Socratic method, where the teacher and the student would ask each other questions to foster a debate that in turn would eliminate ideas that were false by pointing out contradictions. In 1946, Francis Pleasant Robinson wrote the book Effective Study, where he introduced a method called SQ3R (standing for "Survey, Question, Read, Recite, Review") for improving reading comprehension. At its essence, the SQ3R method challenges students to ask themselves questions before they begin reading a chapter. Questions such as:

- What do I need to learn?

- What is this chapter about?

- What will I do with this information?

By posing these questions, readers create a need and a use for the information that they are about to acquire by reading; and as we have explored in this newsletter, knowing why you are learning something can have a profound effect on the motivation of the student.

Asking questions before reading also has an effect on the brain, whereby it effectively creates a waiting receptacle for the knowledge when it is acquired. The new fact or concept is actively organized within the brain for better retrieval or building into higher-order thinking rather than just rote memorization. Questioning before reading makes the reading active and promotes critical reasoning skills, rather than just passive absorption of new information.

There are also other techniques similar to SQ3R, such as PQRST (Preview, Question, Read, Summary, Test) and KWL (Know, Want to Know, Learned). The KWL technique encourages readers to write down what they know about a subject and what they want to learn before reading – and then to review what they learned after reading.

Best Way to Study Is to Ask Yourself Lots of Questions

"Testing yourself repeatedly before an exam … is more effective than re-reading a textbook." – Jeffrey Karpicke, assistant professor of Psychological Sciences, Purdue University

In a recent article in the Wall Street Journal, the study technique of repetitively answering review questions was cited as a critical component in preparing for and excelling on academic tests. The article also offered other key suggestions, such as reviewing the hardest material just before bedtime, not studying with music or TV on in the background (new research confirms that doing that is less efficient), and having a good breakfast of a bowl of oatmeal before the test.

The sometimes-controversial suggestion of repeatedly practicing questions on a topic rather than spending that time reviewing or rereading the material has had some spectacular successes. Consider Keenan Harrell from Cary, North Carolina. He raised his SAT scores from 1200 to 1800 by buying an SAT practice book of

30 tests and taking them over and over until, as he says, "it became almost aggravating."

This may be a good short article to share with your students as they prepare for standardized tests or important tests within your classroom. If they want to see the article "Toughest Exam Question: What is the Best Way to Study?" by Sue Shellenbarger, it's here at http://online.wsj.com/article/work_and_family.html.

Intrinsic and Extrinsic Motivations in Video Games

"Games don't need to be violent to be compelling. We found that achieving competence was the real driver of engagement." – Scott Rigby, co-author of Glued to Games

In their book Glued to Games: How Video Games Draw Us In and Hold Us Spellbound, Scott Rigby and Richard Ryan describe how video games use both intrinsic and extrinsic rewards to engage players. One of their main findings is that game play doesn't need to be violent in order to be compelling. It turns out that violence is just one possible way of fulfilling the deep need of a player to feel competent. If a game provides a way to show competence, then it no longer needs violence to be compelling to the player.

In his talk at the Game Developers Conference Online® in Austin, Texas, this week, Scott Rigby showed that to be motivated to learn or to play a video game, players universally required the fulfillment of three psychological needs: autonomy, competence, and relatedness. He then gave examples of each. For autonomy, he noted how important it was for a game or other online learning technology to guide student players, but also to let them explore and discover for themselves. Players can meet the need for competence in the game as they progress through it and achieve the ability to unlock new portions. The need for relatedness is achieved all the time in games when players cooperate to achieve some larger goal, often with each player specializing in some important skill set that's necessary for the team's overall success.

Extrinsic rewards can be negative if they are set by others rather than by the student or the player. For this reason, they can drive performance through guilt, shame, and external pressures, which generally are not desirable motivators. But extrinsic rewards can be positive if they reflect the intrinsic desires of the person. For instance, if a college student is studying very hard for a biology test, she may be thinking that her parents were doctors and that she should go to medical school, too, so she has to do well on this test. This extrinsic goal puts a lot of pressure on this student, but she also could be studying hard for the test so that she can become a doctor and help people. In this case, the extrinsic reward does not produce pressure or stress because the desire for it comes from within.

This research by Rigby has been confirmed through many studies, which makes it all the more remarkable that these three psychological needs of autonomy, competence, and relatedness have been found to be so universal. The implications of these findings go far beyond video games — they can also be used by parents, teachers, and even businesspeople to motivate children,

students, and subordinates. The findings about intrinsic and extrinsic rewards are also groundbreaking in that they begin to quantify the limits of external rewards for motivating positive behavior.

What Is Mastery Learning? Why Aren't We Using It?

"The mastery learning classes had their average student performing at an equivalent level of the top 30% of the conventional class…" –Kelly Morgan, Author: Mastery Learning in the Science Classroom

When I was a freshman in college, I was shocked when I got a 40 (out of 100) on one of my first physics tests. I was even more shocked when I found out later that 40% was an A! I clearly didn't understand all the material I was being tested on, but I was one of the best in the class and everything was being graded on a curve. After that test, everyone in the class moved on to learn the next topic in physics, and of course, some of our understanding of that next topic would depend on the material on which we had just been tested.

It seemed strange to me that we would move on to the next topic given that most people in the class had not understood nearly 80% of what we had just been taught. Only a small percentage of the students had gained mastery of the topic, and they might even have been bored and looking for more of a challenge while everyone else had serious problems in understanding the basics. Yet we all moved forward to the next topic and the next test.

It struck me that the right thing would have been for none of us to move on to the next topic until we all had mastered what we had been taught. To me, moving on without understanding what we needed to know was like trying to climb a vertical cliff by jumping up to grab the next handhold without having firmly set your feet in your current position. It can be done, but it's pretty risky.

Mastery Learning Moves the Student from Average to Great

Mastery learning solves this problem. It is all about moving forward only when the student has mastered the topic. The content to be learned is broken down into smaller units that follow a logical progression. One unit is learned and then the next one is introduced, and no one moves to the next unit until he or she has displayed some predefined level of mastery (usually corresponding to a grade of at least an A or a B). When Benjamin Bloom formalized the concept of mastery learning in his seminal paper from 1968 (called Learning for Mastery), he made a number of predictions about the gains that would be achieved through this teaching technique. He predicted that 95% of the students would achieve the level of mastery previously achieved by only the top 5%. This means that the average student would end up being in the top 2% of a normal class. And these predictions of improved performance were mostly realized when mastery learning was implemented in the classroom.

Mastery Learning Failed Because It Was Hard to Implement

With this level of success, why isn't everyone using mastery learning? Why did mastery learning fail? Well in many cases, mastery learning did not fail. It was more difficult for the teacher to implement than normal teaching methods, but often it also was a victim of its own success. When implemented in the lower grades, mastery learning produced students who were far above the normal levels of learning that were expected for later grades. When these students moved to higher grades, they found it difficult to adjust to their new classes—they were bored and unmotivated. The current school structure could not accommodate having students at different levels of mastery in the same classroom.

Learning Technology Makes Implementation Possible Today

This is no longer the case today. There are tremendous technological innovations that allow students to move at their own pace. The benefits are that students learn the requisite material at a level of mastery that makes it much easier for them to learn the next level of material in that topic area. Mastery learning also has a personal benefit—when students achieve mastery, they begin to enjoy their proficiency and reach a state of "flow" that corresponds to a high skill level and high levels of challenge. Therefore, mastery learning is not only beneficial for the current topic, but it also produces students who genuinely enjoy the topic they are learning rather than being frustrated when their skill level falls below the challenge level. Students who have mastery begin to become self-motivated to learn.

JogNog Makes It Easy to Implement Mastery Learning

JogNog has been designed with the mastery learning approach in mind. The topics have been broken down into smaller units, which we call "towers," that generally consist of 100 or so review questions. Those towers then are placed within landscapes that provide a path for students to build from one topic to the next. And because it is a computer game, JogNog is structured to require mastery before players can progress. No level can be completed without getting a minimum of 80% of the questions correct, so no child can finish a tower unless mastery has been achieved. Furthermore, JogNog requires and encourages players to maintain that mastery by encouraging review of previously learned topics. To do this, JogNog implements the spacing effect. It is also much easier for the teacher to use JogNog's built-in reports, which show individual performance on each tower and the questions each student is having difficulty with. This is an excellent way for a teacher to recognize where each student is in the classroom and to provide the corrective instruction required for that student to master the subject matter.

What do you think? Have you had any success in using mastery learning? Do you think JogNog could be helpful in implementing mastery learning?

Resources

Click here for a quick, one-page summary of mastery learning.

Also, check out the new book Mastery Learning in the Science Classroom: Success for Every Student, by Kelly Morgan (NSTA Press).

For a more detailed overview, see Mastery Learning in Public Schools, by Denese Davis and Jackie Sorrell.

For more information about the concept of flow and learning in challenging tasks, see the book Flow: The Psychology of Optimal Experience, by Mihaly Csikszentmihalyi.

Should Your School Be Teaching Grit?

"The idea of building grit and building self-control is that you get that through failure . . . and in most highly academic environments in the United States, no one fails anything." – Dominic Randolph, headmaster, Riverdale Country School

Martin Seligman of the University of Pennsylvania wrote a book with Christopher Peterson of the University of Michigan called **Character Strengths and Virtues: A Handbook and Classification**. This was an 800-page tome that researched the characteristics and traits that were successful from antiquity all the way through to the present, even categorizing the traits of video game characters like Pokémon and the Boy Scout handbook. They came up with 24 character traits that were important for success, including kindness, self-regulation, and gratitude. One of Seligman's graduate students, Angela Duckworth, joined his department in 2002, and in her application essay, she wrote the following (I include it here in its entirety because I think it so important):

"The problem, I think, is not only the schools but also the students themselves . . . Here's why: learning is hard. True, learning is fun, exhilarating, and gratifying – but [it] is also often daunting, exhausting, and sometimes discouraging. . . To help chronically low-performing but intelligent students, educators and parents must first recognize that character is at least as important as intellect."

What Angela Duckworth then proceeded to do was to create something that she called the "Grit Scale." In this simple, self-administered test, six questions relate to the consistency of the students' interests, and another six relate to their perseverance of effort. Duckworth found that people who are truly successful in life were focused and were not daunted by failure when they were trying to achieve their long-term goals. This simple Grit Scale was tried by West Point to predict which incoming cadets would best handle the grueling, initial physical fitness and leadership training required by the school. Then West Point compared the Grit Scale to the "Whole Candidate Score" that it had developed and had been using for some time. The Grit Scale turned out to be the more accurate predictor of which candidates stuck with the program and which candidates dropped out.

Here are some examples of statements people were asked to rate on the Grit Scale questionnaire:

- My interests change from year to year.
- I often set a goal but later choose to pursue a different one.
- I finish whatever I begin.
- I have achieved a goal that took years of work.

The idea of measuring grit and character has begun to take hold at more mainstream schools, too. At the KIPP Infinity Middle School, in Manhattan, its cofounder, David Levin, also believed that character was the key to success, and he created the C.P.A. (Character Point Average) to go with the usual G.P.A. for each student. He then proceeded to focus on character within his school through "dual-purpose instruction," where character lessons were integrated with the normal school curriculum. For example, when a girl was caught in class chewing gum by a teacher and lied about it, the teacher reinforced the importance of character by reminding her that chewing gum was a minor problem, but lying was a major character problem, and that the student had disappointed the teacher with her behavior.

I think these results on perseverance, focus, and character are not surprising. They are common sense, and yet these personal qualities have been hard to measure. For that reason, it's even harder to measure their impact. But what could be a more important predictor of a student learning than whether he or she is interested, committed, and willing to work hard? There are those who have not yet developed these qualities of focus and determination who believe that the "brilliant" and "successful" don't have to work hard, or sacrifice, for success in life and learning. In doing so, they may overestimate the innate abilities others possess and underestimate their own ability to achieve their dreams through the nurturing of their own character or, as Duckworth calls it, "grit".

Try This with Your Students or Children

Consider reading Duckworth's journal article below and trying out some of her questions on your children or students. How do they rank? How can you instill in them a passion to achieve focus, determination, and hard work? Not an easy task, I agree, but it is fundamentally the most important one.

Read the articles:

What If the Secret to Success Is Failure? (New York Times)

Grit: Perseverance and Passion for Long-Term Goals (Journal of Personality and Social Psychology)

Is Knowing Where to Look for Columbus as Good as Knowing 1492?

". . . when people don't believe they will need information for a later exam, they do not recall it at the same rate as when they do believe they will need it." – Betsy Sparrow, Columbia University

Some recent research papers propose that with the advent of Google and the internet in general, our brains are adapting and evolving to become good at looking up information, but not at actually knowing and recalling things.

Some groundbreaking research just published in August in the research journal *Science* supports this idea. Betsy Sparrow of Columbia University and her coauthors report that:

1. When people expect to be able to look up information easily, they are less likely to remember and know that information.

2. When people expect information to be stored someplace online, they have better recall of where it is stored and how to look it up than of the information itself.

3. When people believe that information will not be stored or accessible in the future, they remember that information better and in more detail.

This research confirms what many of us already know: when you believe that you really will need to remember something in the future, you are much more likely to learn it. Is this a good thing or a bad thing? Sparrow et al. argue in the article that it might be just the natural extension and evolution of our brains. The computer and the internet effectively become our extended working memory, and we become symbiotic with our computer tools.

In a related article in the *Atlantic* titled "Is Google Making Us Stupid?", Nicholas Carr argues that this is not a positive development: the internet and Google are becoming more of a crutch than a trusted ally, and the easy access to information that they provide is causing us to think and learn in short, fragmented ways that keep us from forming higher-order thinking skills.

Oops … What's the Impact of $33 Million in Smart Boards?

"…acknowledging that the research on technology's impact was inadequate, the committee urged schools to adopt it anyhow." –New York Times article "In Classroom of Future, Stagnant Scores"

It turns out that no one really ever had any solid proof that more technology in schools leads to higher performance, either in the classroom or on standardized tests. Case in point: the Kyrene School District in Arizona. They spent $33 million on laptops, smart boards, wireless clickers, and other educational technologies, even as they hired fewer teachers and let their student-to-teacher ratio slip from 31:1 to 33:1 in some classes. The result? Math and reading standardized test scores in Kyrene remained flat, while scores across the state improved. It seemed the more cutting-edge technology the school used, the less it improved.

How is this possible? Isn't it a proven fact that all this technology is not only a good idea, but also necessary for our children to compete in the 21st century? Not exactly. As Matt Richtel writes in "In Classroom of Future, Stagnant Scores," a recent article in the *New York Times*, "In a nutshell, schools are spending billions on technology, even as they cut budgets and lay off teachers, with little proof that this approach is improving basic learning." It turns out that technology purchased just for technology's sake can encourage children to become distracted as much as it helps them to learn. Again, it comes down to the teacher, as Bryan Goodwin notes in the article: "Good teachers can make good use of computers, while bad teachers won't, and they and their students could wind up becoming distracted by the technology."

But wait — isn't this bad news for JogNog? It is an "educational technology," after all. Well, no, as it happens. JogNog is a study game that has been built on proven research that its approach works, and we continue to test it in real-world classroom situations to show its effectiveness (just read the past research articles in this blog). Our research has shown that students that use JogNog will achieve higher scores in the classroom and on standardized tests, in less time and with less stress. We would be pleased to compare the low cost and high effectiveness of JogNog to many of these much more expensive technologies that have yet to prove their impact in the classroom.

I'd also recommend the book *Silicon Snake Oil*, written by astrophysicist and international cybercrime investigator Clifford Stoll. He has been warning us since 1995 to be careful about embracing new technology without assessing its educational impact.

How Do We Bring Creativity Back to the Classroom?

If you've been wondering about how to spark creativity in your classroom in the age of the standardized test, I recommend this video called "Changing Education Paradigms" by Sir Ken Robinson, author of the book Out of Our Minds: Learning to Be Creative. Robinson is an engaging speaker, and the use of an artist and whiteboard to choreograph his talking points makes this a lively and memorable presentation.

According to Sir Ken, our schools are based on an outdated industrial model of education, what he calls a "production-line mentality" — in particular, moving students on to new coursework based almost entirely on their age rather than their abilities or mastery of the necessary subject matter. He believes that this broken paradigm is increasingly about conformity and standardized testing, and that if you subscribe to what he calls the "model of learning," you must go in the exact opposite direction.

Here's where things get really interesting. Robinson describes creativity and its relationship to divergent thinking, which he calls an "essential capacity for creativity." He quotes a well-known study of 1,500 kindergartners in which 98 percent scored at the "genius" level for divergent thinking. The genius percentage dropped precipitously as the children aged. Sir Ken summarizes the takeaway message for educators and policy makers and offers a prescription for a new paradigm that is dramatic, rational, and myth-busting.

Learning Abstract Concepts through Rapid Exposure to Many, Many Examples

"In the beginning, it was difficult, having to work so quickly; but you sort of get used to it, and in the end, it's more intuitive."

- Wynn Haimer, 17-year-old math student

You want your students to learn abstract concepts and higher-order thinking skills, so of course you teach them the theorems, the rules, and the concepts. But somehow, it takes your students forever to learn the concepts, and then they can't apply them to new situations. It seems obvious that in order for the students to learn abstract concepts, you should teach them abstract concepts, and then once students master these concepts, they can be applied to many different types of problems. But in actuality, this is not the case. New research shows that you should do what doesn't make sense: expose your students to large numbers of examples and problems that they don't have the higher-order concepts to solve, and let them try to figure these problems out by building intuition long before the higher-order concepts are acquired or can be verbalized.

Intuitively, this makes sense. Card players can "feel" when a card deck is getting hot long before they know the rules of counting cards. Likewise, a chess player has an intuition that her king is in danger long before she can verbalize the sequence of moves that might make that happen, and a French child can speak about a past event in French without knowing the technical rules of grammar, like the pluperfect tense. They can do this because they have been exposed to many, many previous situations and examples.

Consider these classroom examples:

1. You could teach your math students the equation for a parabola until they master the concept.

2. You could teach your art students the nuances of van Gogh's style and how he differed in technique from Gauguin.

3. In physics, you could teach the equation that relates velocity to acceleration.

Alternatively, you could do the following:

1. Rapidly show graphs of different parabolas and have students pick the right equation that matches the graph.

2. Show many, many examples from 12 different post-Impressionist artists and have students match each image to the name of the artist who created it.

3. Give simple examples of moving objects in real-world situations and have students pick the correct acceleration.

How could students get any value from these exposures if they aren't taught the equation first, or the concept, or the underlying technique? Well, new research in the field of perceptual learning shows that not only do students learn concepts by seeing examples first, but they actually learn them better, retain them longer, and (most paradoxically) build stronger higher-order thinking skills. And the skills they acquire are much more robust and more likely to be applied to new examples than if they initially had learned them directly from a teacher.

In the article "Brain Calisthenics for Abstract Ideas," Benedict Carey of the *New York Times* provides a powerful overview of the research going on at the UCLA Human Perception Laboratory, the University of Pennsylvania Institute for Research in Cognitive Science, and the Indiana University Cognitive Science Program. Click here to read the article.

Try this with JogNog in your classroom: The next time you are starting a new topic or chapter in class, find the most relevant JogNog tower and have your students play it before you introduce any of the new material. Some students (especially your perfectionists) may be frustrated by this new technique until they see the benefits, so make it optional and fun. Set expectations low, but try to get your students to plow through the questions, get exposure, and build their intuition. You will be rewarded with students who come to class already having mastered the facts and armed with basic intuitions and instincts that will allow you to teach the higher-order thinking skills necessary to truly master the material. And the students will be rewarded with a basic familiarity with the material you are presenting that will make it comfortable and enjoyable for them to learn more. Good luck. Let me know how it goes.

What If You Had 58 Students in Your Class? What If You Had 58,000?

In the fall of 2011, Stanford University professor Sebastian Thrun and Google's Director of Research, Peter Norvig, will be teaching a course on artificial intelligence. The class currently has 58,000 students registered to attend - four times the number of all the students attending Stanford. How is this possible?

The course is being held online for free. The students will be logging in from more than 175 different countries to listen to the lectures, work on problem sets, and even ask the teachers questions. A new service from Google called Google Moderator will be used to allow the students to vote on the best questions to put to the professors so the professors won't be overwhelmed. Even though the students will not receive Stanford grades or credit for attending the class, they will be ranked in their performance and given a certificate of accomplishment.

Where an A- is the New C: The Crisis in College Accountability

"What good does it do to increase the number of students in college if the ones who are already there are not learning much?"

- Thomas H. Benton

Here's a truly startling statistic: 36 percent of college undergraduates showed no improvement in critical thinking, complex reasoning, and writing skills after four years of college. This is one of the findings reported on in the book Academically Adrift: Limited Learning on College Campuses by Richard Arum and Josipa Roksa.

Thomas Benton, an associate professor of English at Hope College in Michigan, writes about these problems in two recent articles published in the Chronicle of Higher Education. He points out that not only are college students not learning, but they are arriving at college grossly unprepared. They also arrive with very high expectations of their abilities, which make them resistant to criticism and "nearly unteachable."

As much as we worry about K-12 education and its problems, at least we do have some accountability. Love them or hate them, there are standardized tests that evaluate student competence.

Similarly, there must be accountability upon graduation from college. There should be standardized certificate programs, such as those in place for becoming a CPA or passing the bar. Then the value of the product (four years of college) can be measured. Without an unbiased measure of the value of education, we are being sold a product that promises one thing but delivers another.

President Obama has called for more Americans to go to college so we can be competitive in the international marketplace, labeling this our "Sputnik moment." But if large numbers of students are emerging from college with a bachelor's degree but no better educated, then maybe our real Sputnik moment is to find a way to make colleges and universities accountable for the quality of their product. Then parents and students can choose wisely those institutions that provide a solid education, not just great sports teams, easy classes, and a diploma.

See both of Thomas Benton's articles in the *Chronicle of Higher Education*.

"A Perfect Storm in Undergraduate Education, Part 1"

"A Perfect Storm in Undergraduate Education, Part 2"

Has America Ever Been Number One?

You may have heard reports expressing despair that the United States has fallen to below average in the world in education in recent years. But it turns out we didn't have far to fall–we've always been below average. A February 2011 report from the Brown Center on Educational Policy at the Brookings Institution shows that it is a myth that the United States was at one time the leader in performance on international achievement tests. The report points out that in the first international assessment in 1964, the United States ranked 11th out of 12 countries in math. The report also includes research that shows that the states that are most highly rewarded with government funds as part of either "No Child Left Behind" or "Race to the Top" may not be the top performers. Positively, the report calls out seven states and the District of Columbia for making larger-than-expected improvement (Florida, Hawaii, Kentucky, Maryland, Massachusetts, New Jersey, and Pennsylvania).

I highly recommend reading this report. It is excellent research that questions some of our long-held views on the world of education, myths such as "The U.S. was number one," "Finland is number one," and "Federal funding is going to the best performing schools."

Read the full report: "How Well Are American Students Learning?"

What If Class Time Was Used for Problem Solving?

". . . the biggest performance boost ever documented in educational research . . ."

–Dr. Louis Deslauriers, University of British Columbia

What if your students listened to your lectures at home and did their homework in class? What if class time was spent having the students solve problems in small groups? What if background information and fact memorization were done at home, and the students arrived in class ready to work with their teachers to build higher-order thinking skills? What if you had some preliminary evidence that changing to this approach had raised test scores by more than 80 percent?

At the University of British Columbia, a team led by Nobel Prize-winning physicist Carl Wieman took aim at the traditional chalk-and-talk approach to teaching. Team members Dr. Louis Deslauriers and Ellen Schelew used the technique of "deliberate practice," where class time is spent on problem solving and building intuition and students read the material and memorized facts before they came to class. For 850 students taking a compulsory physics course, the difference between "traditional lecture" and "deliberate practice" was 41 to 74 percent. Dr. Deslauriers cited this as the "biggest performance boost ever documented in educational research."

The research that lies behind JogNog supports deliberate practice and aids the teacher in transferring the memorization of facts and content to the home so that students can focus on building higher-order thinking skills in the classroom. We recommend that JogNog be used by students at home as they read a new textbook chapter and that classroom time be used to weave that content together. With motivation provided by the game, JogNog encourages students to become exposed to material before the teacher presents it in class. The preliminary results of JogNog research are confirming what Deslauriers discovered: dramatic increases in speed and quality of learning.

The research study was published in the May 13, 2011 issue of Science. Articles about the research can be found in Science Now("A Better Way to Teach"), the New York Times ("Less Talk, More Action: Improving Science Learning"), and The Economist ("Applying Science to the Teaching of Science").

I've Got 30 Minutes to Study. Should I Quiz Myself or Re-Read the Chapter?

Last week, a JogNog research team began a series of experiments to see if they could replicate the results of recent learning research. This research had shown that if students have a limited amount of time for studying, students performed better when they spent that

time answering questions in a game format rather than reviewing the material from a book. Further evidence from our previous article: Less Studying, More Testing.

JogNog researchers assembled a small group of students from the fifth through eighth grades. They were told that they would be taught a new topic, allowed to study, and then … take a 15-question test. They would receive a $10 gift card when they finished the test, and the highest-scoring student would receive an extra reward. They were all taught a new topic (ancient Africa) by an experienced teacher for 30 minutes and then separated into two groups. The first group could access the textbook and the teacher to study for the test. The second group could do the same, but also could play a 100-question JogNog review tower on the topic.

There were two interesting results:

1. The students who used JogNog scored higher on the test than the ones who did not (85% vs. 63%).

2. The students who used JogNog allocated more time to preparing for the test (24 minutes vs. 8 minutes).

While this is a case study of only a few students, it is an interesting indication of the power of learning games to both encourage students to study longer and to achieve higher scores on a final test. An unexpected result was that all the students were overly optimistic about their readiness to take the test–but those playing JogNog got an immediate reality check on their preparation when they could see how many questions they got right or wrong in the tower as they played.

Stay tuned for follow-ups to this research. JogNog will be conducting similar studies over the summer. If you or any of your students would be interested in participating, please contact Kris Carlson at kcarlson@jognog.com. Read the draft report here.

Why Don't We Teach With Failure?

At the Games for Learning conference recently held at Endicott College, I had the privilege to kick things off with a short talk about the important role that failure plays in encouraging and motivating students to learn. Sounds paradoxical, doesn't it? Yet video game developers use failure all the time to make a game immersive and completely grab the players' attention. I believe that by using the proven game techniques of failure and friendly competition, we can reverse the trend of the United States dropping to 26th in the world on international assessment tests like the Programme for International Student Assessment (PISA) and allow us to compete with those at the top of the board, like Finland and China.

If Americans were asked to identify the number one problem in the United States today, it probably wouldn't be education; it would be the economy. But as Secretary of Education Arne Duncan has pointed out, the two are one and the same: "The country that out-educates us today will out-compete us tomorrow." McKinsey and Co., the strategic consulting firm, makes an even bolder assertion – that the United States may have a "permanent recession," while those countries that are better educated than we are may well escape that fate.

Big problem. What should be done about it, then? What is the single most important challenge in education today? What one thing would shoot us up the world rankings in a matter of months if we could only overcome it? Not enough computers in the classroom? Not enough standardized tests? No – the number one thing, as reported by the research of Robert Samuelson in the Washington Post, is student motivation. While the technology, the teachers, the textbooks, and the classrooms were all getting better, the students themselves were moving in the other direction. They were getting less motivated. In 1984 (when I graduated college), 31 percent of 17-year-olds read every day, just for fun. In 2004, only 20 years later, only 22 percent were reading daily for fun; and you can bet that that number has dropped again since then. If students don't want to be in school, they are hard to teach, and as Samuelson states, "Students, after all, have to do the work. If they aren't motivated, even capable teachers may fail."

So the big problem is education, and the big challenge is motivation. What's the big solution? Well, it might just be failure. That sounds strange, perhaps, but failure is the one thing we don't let our children do very much anymore. We don't let them have what they would call a "big fail." I've coached my son and daughters in town soccer from the age of 6 to 18, and when the kids are younger, your greatest challenge as a coach is not teaching them soccer skills, but instead keeping them focused on practice rather than picking flowers, looking at the clouds, or talking to their friends.

But getting their attention is not hard on game day. They all want to do well. They all want to win the game. And this is the thing: In Massachusetts, the governing body for town soccer has decided that no scores will be kept, so no one will win a game – at least not at the younger ages. The intent of the rule – to keep kids from feeling bad when they lose – is good. But the reality is far different from the intent. All the kids know the score, even if you don't tell them. When they "win" the game, they are jubilant and excited; and when they "lose," they are often sad and even cry. But either way, they are all eating ice cream and talking about something else 15 minutes later. They are OK. But it is very confusing for them to have their coaches pretend that the score doesn't matter. Why are we so afraid to let them fail?

Video games are quite different. Video games don't leave any confusion about failure. When you don't succeed at a task, you immediately know it. But there is another big difference between failure in school and in video games. In school, failure on a test is (pardon the pun) "game over." That is a failure that can never be overcome – it is a mark on your permanent record. And this is grossly unfair to students. As [Keith Turner] pointed out in his talk at the conference, all the major life events for adults allow for multiple chances for success, including getting a driver's license, passing the bar, running for Congress, or (most perversely) passing the state teacher exam. In real life, you often get second chances and your failures don't matter – just your eventual success. In games, failure is even glorified sometimes as a badge of honor, but even if that's not so, it's always recognized as a step along the way

to eventual success. In video games, failure doesn't mean "game over" – it means "Congratulations. You lost. Try again."

If failure can be clear, viewed as positive, and delivered fairly, it can be a tremendous motivator in games. How important is it? Well, Eric Zimmerman of the NYU Game Center argues that a game is not a game without failure. It is not a nice-to-have. Failure is an absolute necessity to a game being fun and motivating. Many educators would like to have the motivational power of games but fear exposing students to failure. And yet, without possible failure, there is no risk; and without something being at risk, there is no fun, and without fun, there is no motivation.

As educators, we have a tremendous opportunity to use the powerful motivators that video games provide, but we can't do it if we are afraid of failure. Failure is a powerful and fun teacher, and every one of your students goes home and experiences it every afternoon when they play video games. Let us embrace failure and use it to motivate children to learn in a healthy and positive way. With the motivated students that it produces, we should move the United States right up the PISA rankings and make Arne Duncan a happy Secretary of Education.

Why Can't Educational Games Reach Everyone? (Best of JogNog Series)

One problem that many educational games suffer from is the inability to scale. They sometimes work for a narrow topic but not for anything else. The board game Monopoly, for instance, was originally conceived in 1903 to teach people how real estate tycoons created monopolies. But the game is limited in its ability to teach other subjects. Likewise, many online educational games require millions of dollars to create but teach only one or two concepts. To date, this has really been an unsolved problem for educational games. In her article "Bringing Game-Based Learning to Scale", Merrilea J. Mayo from the Kauffman Foundation details the challenges of producing educational games that cover broad areas of knowledge and are available to a wide spectrum of players.

At JogNog our message is "Everyone. Smarter." We mean to create an educational game that can be used by anyone, anywhere, with any background, to become educated about any topic. We believe that JogNog is an educational game that can scale in a way that has breadth, depth, and reach that has not been achieved by any other educational game to date.

You can read this highly interesting paper here.

Failure, Competition, and Motivation in the Learning Landscape

There is an abundance of educational content on the Internet these days. MIT has all of its course lectures online in its OpenCourseWare initiative. KhanAcademy.org has thousands of educational videos and was endorsed recently by Bill Gates. Curricki.org and BetterLesson.org allow teachers to upload and share teaching content and lesson plans. But like much of the Internet, these sites, while providing powerful content, could be much more useful. They suffer from a number of common problems, such as redundancy of information, lack of quality control, and incomplete coverage.

I will be discussing this topic and delivering a paper at our conference on June 28: Using Video Game Technology to Enhance Teaching and Learning. In this talk, I will introduce the concept of a "Learning Landscape," where complete coverage, high quality, and uniqueness of content are supported and encouraged. Learning Landscapes also have an important advantage: They provide the student with a path of what to do next and what should already have been accomplished. I look forward to the day when all of the content of the Internet can be mapped into a Learning Landscape, and I provide several examples of current successes.

Do Open Questions Lead to Higher-Order Thinking Skills?

As a teacher, do you ever find yourself battling to avoid just lecturing to your students? Isn't it easy to give in to the temptation to just stand up in front of your class and tell your students what they need to know? You'd like to guide them to discover answers by themselves, but that often takes more time to do. It certainly takes more patience. It looks like your instincts are right, though– leading your students and letting them discover facts themselves dramatically increases their motivation to learn.

Now there is further evidence that allowing students to self-discover can nearly double the time they spend learning on their own and the number of concepts discovered. A simple experiment was conducted by Elizabeth Bonawitz of the University of California, Berkeley, and Patrick Shafto of the University of Louisville and published in the journal Cognition. They took 85 four- and five-year-olds and introduced them to a new toy that had four different game functions hidden within it (a squeak toy, a light, music, and an inverting mirror). One group was introduced to the toy by a teacher saying: "Look at my toy! I'm going to show you how it works." And the teacher proceeded to show the children just the squeak noise. The other group was introduced to the toy with just a simple introduction: "Wow, see this toy? Look at this!" and then the teacher walked away to let the students explore. That latter group spent nearly twice as much time exploring on their own and found nearly twice as many hidden games as the first group.

This simple experiment shows that too much explanation can be a bad thing and can take away from the exploratory behavior of the student. I think it is interesting that the more-motivated group of kids was introduced to the toy with a question, while the other group was told about the toy with affirmative statements. This is just another example of the power of questions to engage and motivate young minds. Read the article "Now you know. When should you teach children, and when should you let them explore?" in the Economist.

Can Video Games Teach Higher-Order Thinking Skills?

In providing insights into a circular and non-linear process of relearning and learning anew, combined … a different concept of learning will be proposed: Digital Play-Based Learning. - Konstantin Mitgutsch, University of Vienna

It is a common concern to wonder whether video games can teach higher-order thinking skills, even when they are educational. The worry is that educational games can provide only simple linear structure for learning and can't provide the development of sophisticated thinking skills. Quite the opposite is actually true, though. Games, through play, fun, and even frustration and failure, can provide a rich environment for learning, re-learning, and exploration of complex concepts. In a recent paper called "Digital Play-Based Learning–A Philosophical-Pedagogical Perspective on Learning and Playing in Computer Games," Konstantin Mitgutsch reviews the literature and provides a great overview of the state of the art.

On June 28, Konstantin Mitgutsch will be speaking at the JogNog conference and workshop "Using Video Game Technology to Enhance Teaching and Learning" in Beverly, Massachusetts. He is one of a few preeminent researchers around the world who are expert in using video game technology to develop higher-order thinking skills through games. As a visiting professor at the University of Vienna, he is tasked by the Austrian government to provide insights and a plan for how video game technology can be used to accelerate learning and teaching in Austria. He is currently carrying out his research in the Singapore-MIT GAMBIT Game Lab at the Massachusetts Institute of Technology.

Read Konstantin's paper here or come to his talk on June 28 (conference information and registration here).

How Do You Motivate a Student? Use the Progress Principle!

The progress principle: Of all the things that can boost emotions, motivation, and perceptions during a workday, the single most important is making progress in meaningful work. – Teresa M. Amabile and Steven J. Kramer, Harvard Business School

I visit a lot of schools in working with teachers to implement JogNog. I see very good teachers going to extraordinary lengths to motivate their students. They are great teachers because they recognize that low student motivation is their number one barrier to learning. Teaching a student with no motivation to learn is like trying to feed a young child who won't open her mouth. It doesn't matter how nutritious or delicious the food is–if the child never tastes it, she'll never eat it. As a teacher, you can use the best teaching techniques, the best content, and the latest and greatest teaching technologies, but if your students aren't motivated to learn, they will not learn.

So, what does motivate people? In a previous article ("The Better Incentive for Learning: Porsche or Pizza?"), I wrote about the excellent research being done to determine how large the reward should be to motivate good studying behavior without "over-motivating" the students, which causes undesirable behaviors. In that article, we discussed that a slice of pizza given as an immediate reward for good behavior had a much greater benefit than promising a huge reward (like a new Porsche) for some positive result in the far-off future (like getting into a good college). New research, by Teresa M. Amabile and Steven J. Kramer at the Harvard Business School, now shows that there may be an even simpler and better way: a refinement of the small immediate reward principle.

Amabile and Kramer confirm the "pizza vs. Porsche" principle, but their research uncovers something even better, which they call "the progress principle." It states that the top factor in boosting positive emotions such as motivation is the feeling that you are making progress! Think about that for a second. The number one motivator isn't a big reward, or even a small reward. It isn't praise. It isn't even any feeling of superiority for having done better than someone else. The number one factor that solves teaching's number one problem is allowing people to feel that they are making progress on an important problem.

At JogNog, we have the "progress principle" deeply embedded into our game mechanics. Students continually make progress, brick by brick, through the JogNog games, building their towers and then their cities by learning the answers to important questions. After working in JogNog, they can see the progress that they have made as they see their towers and cities grow.

In the JogNog core beliefs, we state our philosophy as follows:

1. Small Steps. Great Results. We believe in the philosophy of the Boy Scouts merit badge system and the Japanese business process of continuous improvement called Kaizen. In both cases, simple small tasks that are easily accomplished result in great accomplishments over time.

2. Keep Moving! We believe that players should never be stuck for more than a short time without making progress.

This is JogNog's implementation of the "Progress Principle" which Amabile and Kramer have so diligently researched and so eloquently presented.

Read Amabile and Kramer's Harvard Business Review article on the Progress Principle here.

Should You Praise the A?

If your students work very hard and get an A on a project, should you praise them? Recent research described by Professor Carol S. Dweck of Stanford University suggests that the answer is: "Yes" (praise them for working hard); and "No" (don't praise them for being smart). It turns out that students who believe that they are "smart" tend to worry about how smart they appear to others and tend not to try challenging tasks that they might fail at. On the other hand, students who were praised for their efforts stayed in a growth mindset of looking for new challenges. At JogNog, we believe in praising effort and accomplishment, and the A's will inevitably follow the hard work.

See Professor Dweck's article "The Perils and Promises of Praise" in the ACSD journal Educational Leadership.

Educational Video Games: What Would Bill Do?

"We believe these exciting, world-class tools have the potential to fundamentally change the way students and teachers interact in the classroom, and ultimately, how education works in America." – Vicki Phillips, Director of Education, College Ready, The Bill and Melinda Gates Foundation

What does Bill Gates think of the promise of combining video game technology with education? He's just bet $20 million of his foundation's money that new technologies, including game technology, can revolutionize education. The grants range up to $3 million and support projects by the Pearson Foundation, Educurious Partners, Florida Virtual School, Institute of Play, Reasoning Mind, Quest Atlantis, Digital Youth Network, and EDUCAUSE.

The hope is that these initiatives from the Bill and Melinda Gates Foundation will help to move forward the use of technology to innovate education in fresh, exciting ways. To further this initiative, most of the grants are for projects built upon the Common Core State Standards that have been adopted by 42 of the 50 states.

Which Is More Powerful: Motivation or Native Intelligence?

Motivation, along with self-discipline, "are crucial," says University of Michigan professor Richard Nisbett. "A high IQ and a subway token will only get you into town."

Have you ever seen a student who you know is very "smart" yawning in class? With his or her head down on the desk? Completely disengaged? Have you ever wondered how that student might perform in class if he or she were just more motivated?

Recent research is now revealing that how "smart" you are (as measured by IQ) is influenced strongly by how motivated you are. By doing a meta-analysis of 46 previous studies, Angela Lee Duckworth of the University of Pennsylvania showed that giving a financial reward of $1 to motivate a student resulted in an increase of 2 IQ points, and that a reward greater than $10 resulted in an increase of 20 points in IQ. Further analysis showed that success in job achievement by adulthood (age 24) was 85% explained by motivation.

However, current research shows there are limits in using external motivators to drive learning. For instance, we find that employing games as motivation can be overused to the point that the students spend more time on the game than on the education. What does work, we find, is small immediate rewards.

Other research looking at motivators shows that students can become highly motivated if some time is taken to show them that success later in life is profoundly based on the amount of education they get.

The JogNog™ learning landscape is an education system where the education dominates the game – and motivation with small, immediate rewards is built into the game.

Read about the new research from the Proceedings of the National Academy of Sciences.

Can Social Gaming Improve Learning?

"Players of popular online games develop a sense of camaraderie that exceeds that found between peers in a traditional classroom…" – Andrew Hicks

Have you ever watched your students or your children at home working together when playing a video game? Have you seen them cooperate to achieve some goal in the game? If so, you have probably seen children who are highly motivated, alert, and interacting well as a team. All of these are desirable qualities for learning better, faster, and more deeply, and for achieving success in the real world.

Andrew Hicks of the University of North Carolina noticed this behavior as well, and he proposes that creating a sense of community through an online game might be used to improve learning. Hicks describes the following benefits of social gaming:

1. Improved learning – Hicks's initial results show significant increases in concept understanding.
2. Student involvement – Students become more deeply involved in the educational material.
3. A consistent metaphor – The same metaphor can then be applied to learn new concepts, thus leveraging the prior community-building experiences.

When you use the JogNog learning framework in your classrooms, you will often see students collaborating to finish their towers. This is interesting behavior because JogNog also encourages friendly competition among players. In our case study in Lynnfield last year, several of the teachers noted that the competition between classrooms actually built a very strong community within each classroom. Check out this short video to see children working together on JogNog.

Read a portion of Andrew Hicks's paper: "Towards Social Gaming Methods for Improving Game-based Computer Science Education."

Forget What You Know About Good Study Habits

A September 2010 article in the New York Times reinforces recent research showing that repeated testing strengthens learning: Forget What You Know About Good Study Habits.

But the testing should be relevant to what the students are currently working on. What if there were an educational computer game that mirrored the content of the textbooks a teacher was using in class? If you were working on "Chapter 6," your students could go home and quiz themselves on just what they were learning. Playing the game would reinforce what was taught in class. This is the power of the JogNog learning landscape.

What If You Could Try Until You Succeed in School?

I was recently at the conference for the New England League of Middle Schools (NELMS) in Providence, Rhode Island. There, I

met Keith Turner, who invited me to his talk called "A Fresh Start." Keith is a teacher at the Remington Middle School in Franklin, Massachusetts. He has a radical idea: What if every student who failed a test got a chance to study and take the test again? What if the student could keep trying until he or she mastered the material?

What Keith found was that not only were students willing to put in the extra effort to learn the material, but that the program could be initiated simply, with low cost and no added work for the classroom teachers. The students who participated in the program were able to raise their test performance by an average of 25%.

Keith started off his talk by handing out a simple four-question quiz for the audience to work on while we waited to start. It turned out that this "simple" quiz was not so simple unless you had recently studied electrical engineering for circuits. We all failed . . . and Keith made his point. If this conference talk were instead a typical school classroom, we all would have failed our test, never to see that material again. Instead, we would move on to the next topic before we had mastered this one.

Keith pointed out the irony that failing without a second chance is not the standard elsewhere in life. Lawyers fail, restudy, and retake the bar exam until they pass it. So did all of us when we got our driver's license. And the majority of teachers in Massachusetts got a chance to take, fail, and retake the MTEL until they passed and got their license. So why do we move students on when they might be willing to study more to get a passing grade?

Keith's solution is simple and elegant. He asks permission of parents, teachers, and administrators to allow students who fail a test to spend one hour after school each week with a special Fresh Start instructor reviewing and relearning the material they got wrong. After 4-5 weeks, if they have attended the reviews, they are allowed to retake the test that they failed. The cost to the school is an hour of extra teacher time once per week. There is no additional work for the original teacher who gave the test since the tests are standardized and can be easily modified by the Fresh Start instructor for the re-test.

At JogNog, we also believe in the importance of allowing students to achieve mastery before they move on to the next level of learning. We are also big believers in the importance of trying again after you fail. The philosophy of "Congratulations, you lost! Try again." is an important part of all video games, and we embrace this philosophy here.

Can You Motivate Students by Showing Them Their Future?

At JogNog, we view student learning as made up of three pieces: motivation, education and certification. Like an "education sandwich," the meat is in the education that is provided by teachers and textbooks. The JogNog learning framework supports teachers by focusing on the pieces of bread: motivation and certification. How important is motivation? In their study, researchers Mesmin Destin and Daphna Oyserman showed that students were more than eight times more likely to do extra credit homework if they were shown that their future occupation depended on school.

Read about their research in this Journal of Experimental Social Psychology article: "Incentivizing education: Seeing schoolwork as an investment, not a chore."

Could Our High School Dropouts Make America the Next Portugal?

What makes a country and its citizens wealthy? This is the question that great economists like Friedrich Hayek and John Maynard Keynes have argued about for centuries. But perhaps we should have been looking to our educators to answer this question, not to our economists. Consider these statistics:

1. Between 1640 and 1700, the literacy rate in Massachusetts was between 89 and 95% — probably the highest in the world at that time. (Amusing Ourselves to Death, Neil Postman). The United States went from being a poor, highly educated population in the 1700s to a prosperous, highly educated population in the 1800s.

2. Only 28% of the Portuguese population of working age has completed high school. Portugal is the poorest country in Western Europe.

3. One generation ago, Ireland was one of the poorest countries in the European Union (EU). But when Ireland joined the EU, it took its subsidy money and invested in technical education. Today, even after its banking collapse, Ireland is among the richest nations in Europe.

From these facts, and many others, a strong positive correlation is found between a country's willingness to invest in education (and its citizens to do the same) and the prosperity of that country. Erik Hanushek, a professor from Stanford University, has formalized this relationship between education and economics with his research. He has calculated that if Portugal could bring up its test scores to those of Finland, its long-term rate of economic growth would be 1.5% higher.

In the United States, 89% of our working-age population has graduated from high school. This puts us right up there with Germany and other "smart" countries. But that is not the whole story. The graduation rate of young Americans is much, much lower: 77%. By comparison, Ireland's rate is 96%, and even Portugal has brought its graduation rate of the young up to 63%.

So, if we believe Professor Hanushek and Neil Postman, we see an America whose population was among the most educated in the world at its founding, but that today has dropped to the middle of the pack and could move to an even lower ranking on the world stage.

At JogNog, we believe that the United States can find innovative ways to challenge and support our younger generation so that they all graduate from high school. Applying game technology to education can provide a way to do this in a way that reaches everyone, keeps learning fun and exciting, and is a great way to support teachers at a low cost.

Read the Wall Street Journal article by Charles Forelle: "A Nation of Dropouts Shakes Europe."

A Personalized Textbook for Twenty-Two Dollars?

As a teacher, how often have you exactly followed the structure of a textbook chapter by chapter from the first chapter through to the end of the book? Even if it is a text that you like, don't you often augment and rearrange the content to match your style of teaching? What if there was a way to create a textbook that matched your lesson plans exactly? What if it only cost $22? What if you helped to write it?

Rice University professor Richard Baraniuk describes such a possibility with his Connexions project. Connexions is an open-source, online educational system where teachers from around the world can collaborate to create content just like other authors create encyclopedia entries on Wikipedia. On Connexions, teaching content is created, edited, improved and augmented in a similar 'crowd sourcing' way – where the 'crowd' of people on the internet contribute the content rather than just one author and one editor. There is no publisher; instead, the books are printed on demand. The result can be excellent content, personalized for your needs, for a very low price. Check out Connexions at www.cnx.org.

As JogNog™ educators, we see the movement towards open-source educational content as a great idea and a good match for the JogNog learning landscape. Just as JogNog Smart Tower™ content can be created to match the content in existing text books, it is also possible to create or find Smart Tower test sets that match open source content. So after you have studied your music history on Connexions, you can go to JogNog.com to solidify and review what you have just learned.

See Professor Baraniuk speak about Connexions at the TED conference.

Can American High School Programmers Compete with China's?

It is quite amazing, how time pressure focuses the mind in terms of optimization. Now is crunch time, when all the neurons are firing and fingers are starting to go at light speed. - Troy Vasiga, Contest Chair of the International Olympiad in Informatics

In August 2010, 315 students from around the world competed in the International Olympiad in Informatics. Their challenge was to solve eight programming problems over two days. They had just five hours each day to write the code from scratch. The pressure was intense, yet these were not hardened veterans from Google and Microsoft. All the competitors were still in high school, or even younger.

Gennady Korotkevich of Belarus, the reigning champion, is only fifteen years old. But despite his age, he takes the challenge very seriously. He is proud of the fact that he practices only three to four hours per day, rather than the six to seven that many of his competitors do.

The Chinese also take this competition very seriously, winnowing down their elite competitors from an initial pool of over 80,000.

The process lasts an entire year, and it seems to work. Between the years 1999 and 2009, China has won 31 gold medals. Their nearest rivals are the Russians, with 25, and then the Poles with 20 and the Americans with 18. It has been a bit of a drought for the Americans, as they haven't won the collegiate version of this event since 1997 (though they had won 17 of the first 23 events up to that point).

The United States takes the programming competition seriously as well, holding a weeklong camp to whittle an elite group of fifteen down to the top four competitors, who will be invited to the international competition. In the 2010 event, the Americans put together a very strong team and were able to upset the Chinese and the Russians to take first place in the team competition. The top performer overall, however, was still the reigning champ, Korotkevich.

Although the competition is intense, these bright young minds from around the world embrace challenge as a very important part of the competition programming culture. They view challenging each other as the best way to get better. Doing so with their peers from around the world in the same room with them makes it all the more interesting.

As the creators of JogNog, one of our core beliefs is that "Competition is Fun." We believe that to adequately prepare children for the real world, they must understand and embrace competition. In our games, every player has a real chance of winning at any time.

Read the full article "Teen Mathletes Do Battle at Algorithm Olympics" in Wired Magazine.

Should You Cold Call Your Students?

Doug Lemov is a Harvard Business School graduate, an avid soccer player, a teacher, a principal, and the founder of a charter school. He has also recently written the book "Teach Like a Champion – 49 Techniques That Put Students on the Path to College." What is so interesting about that? Well, let me start with the analogy that Lemov uses in his book. It goes something like this:

"If you are playing soccer and you want your teammate to score more goals, you don't yell at them to score more goals or tell them that they need to raise the bar and now score 4 goals per game. Instead, you need to teach them the techniques of passing, dribbling, and kicking that lead to more goals."

With this soccer analogy in mind, Doug teamed up with a friend of his who is a videographer, and they began to videotape the best teachers, in action, in their classrooms. They sought to answer the question: "What teaching techniques do the best teachers have in common, and how can we teach these techniques to other teachers?" By analyzing this real-world data, Lemov distilled the many hours of video into 49 fairly simple but extremely powerful techniques.

Of those critical techniques, Lemov designates one as the most important. He calls it the "Cold Call." Like all the techniques

Lemov describes, it is something that any teacher could learn to use quickly. It is simply: "In order to make engaged participation the expectation, call on students regardless of whether they have raised their hands." You may already be doing this in your classroom, but I'd still encourage you to look at what Lemov says about how and why this technique works.

Lemov points out this simple change of using the "Cold Call" can have the following profound benefits:

1. It allows you to check systematically for students' understanding.

2. It increases the pace and excitement of the classroom.

3. It shows all students that you care about what they have to say.

4. It establishes your authority and that the room belongs to you.

What does this have to do with JogNog and educational games? I'm not yet sure, but I thought this book was so powerful, and the ideas so useful, that I would begin to share them with you. If you have any creative ideas about how these teaching techniques could be incorporated into JogNog, e-mail me at Steve@jognog.com.

Read about Doug Lemov in this New York Times article.

The Better Incentive for Learning: Porsche or Pizza?

"Kids should learn for the love of learning … but they're not. So what shall we do?" – Professor Roland Fryer, Jr.

One of the biggest questions facing researchers and educators who are investigating using rewards for school performance is: "Should we provide a really big reward when the student successfully graduates? Or should we provide very small immediate rewards for improved behaviors?" Or more specifically: "Which would make students learn better? Buying them a Porsche if they get into Harvard, or buying them pizza on Friday when they complete their homework?"

Professor Roland Fryer, Jr., of Harvard University's Education Innovation Laboratory (EdLabs), paid 18,000 kids a total of $6.3 million to find the answer. He continues to invest some $6 million each year to truly understand what does and doesn't work. What he has found so far is the following:

1. Paying $1.5 million to 8,320 students in New York City for good test scores did not work.

2. In Chicago, cash rewards for good grades resulted in better attendance, better grades (but not better test scores).

3. In Washington, students did better on standardized reading tests when paid for improved attendance and in-class behavior.

4. In Dallas, second-graders were paid to read books, and it dramatically increased their reading comprehension scores… AND those improvements carried over to the next year.

What seems to work is the pizza, not the Porsche. The rewards should be small enough so that they don't corrupt and distort behavior (the most egregious distortion, for example, would be to encourage cheating), and the rewards need to be nearly immediate – like the same day the good behavior happens, or at least weekly. It also turns out that it is better to pay for the behavior than it is to pay for the outcome. Often, the kids don't even know what they need to do to raise their grades no matter how powerful the incentive is. According to Fryer: "If you pay a kid to read books, their grades go up higher than if you actually pay a kid for grades, like we did in Chicago."

With an online learning game like JogNog, rewards can be small (even free – like "gold star") but through game mechanics, they can be delivered immediately with the desired behaviors. In the long run, this will have much more impact than buying a Porsche upon graduation. It should be much less expensive as well.

Are the Tiger Moms Right?

In her Wall Street Journal article "Why Chinese Mothers Are Superior," author and Yale law professor Amy Chua (Battle Hymn of the Tiger Mother) argues that American parents could learn a thing or two from their Chinese peers in terms of raising well-educated children. The article has produced a storm of controversy and 7,845 comments on the Wall Street Journal website.

What's Chua's point? Well, consider this from her article: What beliefs would 70% of Western mothers agree with but 0% of Chinese mothers would? They could be stated as "stressing academic success is not good for children" and that "parents need to foster the idea that learning is fun." About 0% of Chinese mothers agreed with this statement.

What, then, is the belief system of Chinese parents, according to Chua? The parenting and education philosophy that they espouse is as follows: "…nothing is fun until you're good at it. To get good at anything, you have to work, and children on their own never want to work, which is why it is crucial to override their preferences… the Chinese strategy produces a virtuous cycle. Tenacious practice, practice, practice is crucial for excellence; rote repetition is underrated in America."

I don't have anything to say in particular about Chinese parenting, but the philosophy that hard work begets mastery, begets praise, begets self-confidence, and begets wanting to do more hard work is a virtuous cycle we strongly believe in and have implemented in JogNog. What's more, the research, American research, is starting to back this up. JogNog provides the base foundation of knowledge from which students build mastery. In our next release, look for the "Praise Me" button in the interface, which makes it easy for students to solicit praise and be rewarded for their hard work and mastery of their subject.

Why Aren't U.S. Students Motivated?

We're number 26! That is the current world standing of the United States in a ranking of countries for education. Why are U.S. students falling behind? Economics columnist Robert J. Samuelson has an idea: "The larger cause of failure is almost

unmentionable: shrunken student motivation." How can we motivate students to care more about school?

Here is the Newsweek article and the report's interactive rankings list. Thomas L. Friedman discusses the Newsweek report in his New York Times op-ed here.

Pay for the 'A'. Really?

Paying students for getting good grades isn't a new idea, but it is a controversial one. In this poll of educators, the plurality believed that paying students was a bad idea because it doesn't encourage learning for learning's sake. However, recent research is beginning to show that it just might be a good idea…

Some ingenious methods have been proposed recently to motivate students to learn. One of these that has been gaining traction is to provide small, immediate incentives tied to positive learning behavior. These rewards can range from an ice cream to cold hard cash. In his research paper "A Little Now for a Lot Later: A Look at a Texas Advanced Placement Incentive Program", Professor C. Kirabo Jackson analyzes a Texas program that pays both teachers and students for passing grades on AP exams.

- The findings were remarkably positive

- AP course and test taking increased

- SAT and ACT scores increased

- The percentage of students going to college increased

- The rewards didn't distort behaviors in undesirable ways.

At JogNog, our philosophy is to provide small, incremental, immediate rewards to students. Unlike the reward program discussed in the Texas study, we focus on rewarding the learning behavior, not "just" the result (see my previous blog post "Should You Praise the 'A'?" – 9/27/10). This has been shown to reduce unnecessary pressure and foster a continued desire for learning in the student.

In the next release of JogNog in February, look for the debut of the "Praise Me" button, which students can use to solicit rewards for their mastery and hard work.

Further Evidence: Less Studying, More Testing

The most popular article on the New York Times website last week was Pam Belluck's "To Really Learn, Quit Studying and Take a Test." She reports on the recent extraordinary results that show that testing is superior to studying for the purpose of learning new concepts and building higher-order thinking skills.

So if you are a college student, the research recommends that to learn well, you should read the book chapter, study it, but then close the book and quiz yourself on it rather than keep reading it multiple times. How much better will you do? Well, in this study students retained 50% more information a week later than by just reviewing the material multiple times.

What about new techniques, like drawing a concept map to illustrate connections between ideas rather than just re-reading the chapter or memorizing facts? Testing was far superior. It provided 50% better recall a week later.

But testing is only good for fact retrieval, right? Certainly, concept mapping taught higher-level concepts that couldn't be achieved through just retrieval practice, right? No. Testing provided better results for higher-order thinking than the techniques that were designed for it.

How could this make sense? Well, it is hypothesized that testing, or "retrieval practice," doesn't just store facts in the brain the way you would in a computer. In fact, it challenges the brain to organize the information, make sense of it, and form higher-level concepts so that they can be found later when the student needs them.

At JogNog, we are experimenting with asking students to play JogNog "smart towers" of questions even before they have begun to study the material, and then play them again after they have studied it. We are anticipating that even when you don't know the answer, you challenge your brain to think about it and begin to organize the information. Then, when you are actually exposed to the information, it makes sense and allows you to build higher-order thinking skills. Initial results are promising… stay tuned…

Click here to read about this breakthrough research: "To Really Learn, Quit Studying and Take a Test."

Gaming to Re-Engage Boys in Learning

In her TED talk, Penn State University researcher Ali Carr-Chellman makes the case that boys continue to have difficulty adapting to the culture of elementary and middle school. She starts by pointing out the obvious: the average boy is more likely than the average girl to want to play in the dirt and write stories about massive tornadoes that wipe out entire neighborhoods. She also presents some startling differences that indicate that school is not as welcoming a place for boys as it is for girls:

- For every 100 girls who are suspended from school, there are 250 boys.

- For every 100 girls who are expelled from school, there are 335 boys.

- For every 100 girls diagnosed with ADHD, there are 400 boys.

Why are there such vast differences between boys and girls? Carr-Chellman proposes that schools are designed more for girls than for boys; that there are few male role models for boys to emulate in schools, and even those that did exist are vanishing (the percentage of male teachers in elementary school has dropped from 14% to 7% in the last decade); that the things that boys care about and want to learn and write about are often banned by zero tolerance policies; and that No Child Left Behind directives leave the teachers with little flexibility in reaching boys in a way that is compelling to them.

Is there a solution? Carr-Chellman suggests that game technology holds promise. She points out that boys not being engaged with school long predates the ascent of video games in the home. She views boys' interest in video games as a symptom rather than a cause, and proposes that video games, if used correctly, could be a novel way to re-engage boys in the classroom.

I have already seen JogNog reach boys and girls who like games with challenging educational content when more standard interventions in school are not successful. So I agree with much of what Carr-Chellman is saying, and certainly the statistics are startling. See Ali Carr-Chellman's talk: Gaming to Re-Engage Boys in Learning

The Irreplaceable Teacher

""If you want to know what will happen in the future, ask a kindergarten teacher." –Clifford Stoll

Clifford Stoll is both the astronomer who helped the National Security Agency track down a notorious KGB hacker who was breaking into their computers and a "high-tech heretic" who believes that gratuitous computer use in the classroom is detrimental to learning and takes away from the real learning and inspiration that comes from great teachers and mentors.

In this short and highly entertaining video, Stoll shows how he let his eighth-grade science class discover how to measure the speed of sound by using simple classroom instruments. Stoll is one of the brightest high-tech minds in the world today, but he still makes time to be a teacher to honor the teachers who helped and guided him.

What if We Challenged Finland!?

The Wall Street Journal recently reported that the United States is making some modest progress compared to its peers on the international educational exam called the Program for International Student Assessment (PISA). The test measures how prepared 15 year olds are in math, science and reading. It is given every three years to sixty different countries. The U.S. Department of Education released the most recent results last month.

The results should produce some mild celebration. The U.S. jumped from a score of 489 to 501 in Science, which puts it right in the middle of the pack of other industrialized nations or 13th in the world. In reading literacy we nudged up from 493 to 500 but still placed behind South Korea, Finland, Canada, New Zealand, Japan and Australia. In math the U.S. also saw an increase from a score of 474 to 487 but that is still below average and lags seventeen other countries.

But overall, I think this is really good news. These are significant improvements and we should be excited that our nation and our educational system is rising to this international challenge. Could we accelerate this process a little? There is nothing like some friendly competition to challenge oneself to do better. What if, rather than putting all the burden for improvement on our teachers, our educational system and our government, we had our students more directly engaged? What if we could get our children

in the United States to directly challenge the best country? What if our fifteen year old students challenged Finland to a friendly academic competition?

In the past this would have been logistically impossible, but today this would be easy to do using JogNog. Set up a JogNog city with a version of the test questions from the PISA test. Or let the students challenge each other by designing their own questions and cities. Then let them see who can build the biggest cities! Think of how motivated our students would be if they could see their fifteen year old peers in Finland and interact with them directly? What if the losing team had to buy the winning team ice cream?

Maybe you think this sounds farfetched. Well I've recently traded email with a high school teacher in Poland who is very interested in using JogNog to have his classrooms challenge and work with a similar classroom in the United States. If you are a teacher and are up for a fun challenge please let us know.

Read the Wall Street Journal article: American Teens Trail Global Peers in Math Scores.

Could You Teach with Only Games?

Quest to Learn is a new school of some 145 sixth and seventh graders located in New York City. It is entering its second year of operation but is most interesting for the following reasons: 1. It has a grant from the MacArthur Foundation"s $50 million digital media initiative. 2. Its students don"t receive grades; they instead achieve levels of expertise (like apprentice vs. master). 3. A class lesson is now a "quest". 4. Everything in the school is taught through game technology.

That"s right, the students who spend their afternoons and weekends playing video games at home are now able to use those same skills to learn in school. Will it work? We"re about to find out. I think that game technology will be unbelievably successful in getting and keeping these students" attention. The challenges for Quest to Learn will be in making sure they have enough content and that it covers the core curriculum. It is a grand experiment; I just hope that they go about it in a smooth transition from currently working teaching techniques. There is a lot that can be done with game technology for education, but it also has its inherent limits – there is nothing that can replace a great teacher.

New York Times: Learning by Playing: Video Games in the Classroom

Making Everyone Smarter – The Next Trillion Dollar Industry

In his recent editorial, Rich Karlgaard, the publisher of Forbes magazine, makes the case that the "Scary Smart" have inherited the world and that the surest way to become a billionaire today is to become one of them. Who are the "scary smart"? They are folks with 150-plus IQs and 800s on their SATs. They are folks like Bill Gates, Google"s founders and even Warren Buffet, who read every book on stock investing in the Omaha library by the time he was twelve.

But Bill Gates goes even further than Karlgaard and argues that not only do our rocket scientists need to be smarter but even the person designing our toilets needs to be smarter: "Toilets are one of the greatest underinvestments" and we "… end up with the low-IQ guy [making] toilets…" which may result in a sub-optimal design that has a huge negative impact on the environment. Toilets aren't rocket science but they do have far more impact on the standard of living of most of the world than the next mission to Mars. In essence Gates is arguing that everyone needs to be smarter. The average person needs to get smarter and the smart need to get scary smart. Our message at JogNog is "Everyone. Smarter." (we"re very pleased … it is not every day you find Bill Gates agreeing with you!)

One consequence of the demands of our society requiring smarter people is that there will be plenty of employment and business opportunities to provide the services that make people smarter. As Forbes" publisher Rich Karlgaard says: "I"m convinced the next trillion-dollar industry will be built around all the stuff that makes us smarter." If this is so (and we strongly believe it is) then all of us in the fields of education are in good position to participate in creating the most exciting new industry and opportunities in the decades to come.

Read the Forbes article: "Scary Smart – The Next Trillion-Dollar Industry"

Fantasy is Not Reality: How Realistic Should a Video Game Be?

In a recent article in the Economist they talk about the effect known as the "uncanny valley" that occurs when humans interact with robots, cartoons and video games. The "uncanny valley" refers to the paradoxical dip in comfort and feelings of realism as a robot, cartoon or video game becomes more and more lifelike. For example consider the highly publicized movie "The Polar Express" which had an animated version of Tom Hanks as a train conductor. It was "almost" lifelike but not quite and the movie images felt a bit creepy and left the audience feeling uncomfortable. The movie had gotten trapped at the bottom of the "uncanny valley". If the movie images had been a little bit more lifelike they would have been accepted by the audience (as they were in "Avatar") or if they had been more of a cartoon (as in "Tangled") the audience would have given it a free pass recognizing it as an animation.

JogNog is not exempt from the challenges of avoiding the "uncanny valley". Some of the most frequent suggestions we get from kids are about the physics of our game world: "that rock doesn"t look real", or "the clouds are moving too fast", or "it doesn"t make sense that the tower would fall over like that". Our strategy with JogNog is to keep it squarely in the virtual world of cartoons and animations and not try to recreate a perfect image of the real world. This affords us the opportunity to provide a game that is clearly "a game" that is meant to be played for fun.

Drill to Make Concepts Automatic

"Drilling" is a term used to describe the learning process of rote memorization by presenting items over and over repetitively until they are learned. It is sometimes referred to disdainfully as "Drill and Kill", implying that you drill to memorize the facts but kill the enthusiasm to learn. Though much maligned in education circles "drilling" is making a comeback. The reason for its renaissance is simply that it works. If you want to memorize a sonnet – drill. If you want to learn your multiplication tables – drill. If you want to learn the state capitals – drill. Drilling has the advantage of focusing on what you don"t know until you learn it. It also has the advantage of testing – which has recently been shown to be an active not a passive part of learning.

But what about learning higher order concepts? Drilling is just memorizing facts… right? That certainly is true but recent research has shown that in order to learn and think about much higher level concepts you need to make certain facts or simpler concepts automatic. Consider, for instance, that if Einstein had to take time to think through the "concept" of simple multiplication rather than just knowing the answer he might not have had the time left to think about higher order concepts in his mathematical proofs. Or, if you can"t remember the lines of Shakespeare"s sonnet how are you going to analyze his thesis and contrast it to another writer? If you don"t know the Battle of Hastings was in 1066 and the defeat of the Spanish Armada was in 1588 how will you be able to contrast the two empires?

In the New York Times article "Drill Baby Drill" the noted educational reformer E. D. Hirsch embraces drilling or "distributed practice" noting that it is "helpful in making the procedures second nature, which allows you to focus on the structural elements of the problem." Hirsch further argues that certain knowledge needs to be "automatic", "meaning that you don"t have to think about it, you just know what to do with it." Making the facts automatic frees up the brain to focus on what it doesn"t know. With JogNog we try to make drilling fun – and for the most part we see that students often forget that they are drilling, they are just caught up in the game.

Why Can't Educational Games Reach Everyone?

One problem that many educational games suffer from is the inability to scale. They sometimes work for a narrow topic but not for anything else. The board game Monopoly, for instance, was originally conceived in 1903 to teach people how real estate tycoons created monopolies. But the game is limited in its ability to teach other subjects. Likewise many online educational games require millions of dollars to create but teach only one or two concepts. To date this has really been an unsolved problem for educational games. In her article "Bringing Game-Based Learning to Scale", Merrilea Mayo from the Kauffman Foundation details the challenges of producing educational games that cover broad areas of knowledge and are available to a wide spectrum of players.

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both testing and learning we believe that JogNog is an educational game that can scale in a way that has breadth and depth and reach that has not been achieved by any other educational game to date.

Read the paper: "Bringing Game-Based Learning to Scale."

Can Time Pressure Increase Learning Performance?

Research has shown that attention and learning rate increase with time pressure on the current learning task. Interestingly, Professor Sophie Leroy has also shown that attention and learning rate on the next task is also improved with time pressure on the previous task. It is hypothesized that by providing time pressure, the learner is more able to achieve completion and cognitive closure of the previous task which frees up their attention to focus on the next learning task. This is one of the reasons you see the timer in the JogNog game – to provide time pressure so that the student feels cognitive closure as they complete each level of their knowledge tower.

Read the paper: "Why Is It so Hard to Do My Work? The Challenge of Attention Residue when Switching Between Work Tasks" .

Has Harvard Banished the Final Exam?

Harvard held final exams in only one out of every four undergraduate courses last year. This is remarkable for the school that invented the grueling three hour, blue book, "final exam" in the 1830s and allocates a week of each semester to study for them. Why would they do this? One reason is that smaller more frequent exams are better. In one study, college students studying algebra were tested weekly with cumulative quizzes. By weekly quizzing, they increased their performance by 16%. At JogNog, we believe in this continuous testing regimen as embodied in our 6th Core Belief: "Small Steps. Great Results."

Read about continuous cumulative testing here: Boston Globe [Editor's Note October 2011: Boston Globe now restricts free access to its archived articles]

Should You Praise the 'A'?

If your student works very hard and gets an A on a project, should you praise them? Recent research suggest that the answer is: "Yes" – praise them for their hard work. And "No" - don't praise them for being smart. It turns out that students who believe that they are "smart" tend to worry about how smart they appear to others and tend not to try challenging tasks that they might fail at or make mistakes. Students who were praised for their effort, on the other hand, stayed in a growth mindset of looking for new challenges. At JogNog, we believe in praising effort and accomplishment, and the A's will inevitably follow the hard work. To see this research from Stanford University click here.

Why Aren't U.S. Students Motivated?

Were number 26! That is the current world standing of the United States in a ranking of countries for education. Why are U.S. students falling behind? Economics columnist Robert Samuelson has an idea: "The larger cause of failure is almost unmentionable: shrunken student motivation." How can we motivate students to care more about school? New York Times, Newsweek

Should You Make Your Classroom Less Safe?

There is a paradox in life. Seeking safety is sometimes the least safe thing you can do. It happens on the football field when players try to play it safe and end up getting injured. It happens when climbing mountains and climbers worry more about not falling than about getting to the top. It happens when you choose to safely lie on the couch rather than getting exercise and risking that bike ride on the dangerous roads of suburbia. It happens in the classroom when we keep our students so safe that there is nothing interesting going on and they are safe, sitting and falling asleep.

In 1978, a toddler named Frank Nelson fell through the gap in the handrail at the top of a twelve foot slide and landed on his head on the asphalt below. Tragically, he fractured his skull and suffered permanent brain damage. The fall resulted in a lawsuit and a $9.5 million settlement. It also resulted in 1981 in the Handbook for Public Safety from the U.S. Consumer Product Safety Commission which resulted in playgrounds from then on being required to be made 'safer'. Paradoxically in 1980 (before the new safety requirements), there were only slightly fewer emergency room visits per 1,000 children than in 2012 and no reduction in the number of deaths or head injuries. What could explain this given the massive effort to make playgrounds safer?

Professor Ellen Sandseter has an explanation. She interviewed children on playgrounds and found that, despite all the safety precautions, children have an innate drive to confront and overcome things that scare them. She found that there were six kinds of risky play that the children used to confront their fears: 1. Exploring heights 2. Handling dangerous tools like knives 3. Being near dangerous elements like fire 4. Rough-and-tumble play with the risk of injury 5. Speed – such as cycling downhill and 6. Exploring unknown areas.

Risk and unsafe situations may well be an important part of learning. It may be encoded deep in our DNA to pursue our curiosity which leads to behaviors that, in the short run, may seem to be unsafe. But, in the long run, they produce learnings that allow us, later in life, to safely navigate an unsafe world.

How could you make your classroom less "safe" today? Might it wake up some students?

See more details in the Reader's Digest article: http://www.rd.com/advice/parenting/revolution-not-supervised/

JogNog Supports Massachusetts' Move Forward with PARCC

Fifty-four percent of Massachusetts school districts will administer the PARCC test next year for English and Math in grades 3-8 rather than the MCAS.

JogNog has aligned its 1,300+ quizzes for formative and summative assessment to the Common Core for English and Math

so we are expecting even greater usage of our Math and English assets this coming year. Teachers and school systems will be looking for time-saving ways to effectively review and assess competence on the new standards. JogNog's ready-to-use quizzes and automated grading are great ways for teachers to cover this material and save time in class.

See the article here:

http://www.bostonherald.com/news_opinion/local_coverage/2014/10/many_school_districts_choose_parcc_over_mcas_test

Connecting Concepts – Khan Academy Gets It

Yesterday I was re-reading Salman Khan's book (founder of Khan Academy) "The One World Schoolhouse". He writes about how we, as teachers, often segment and balkanize the learning of concepts that are connected. Often we just don't have the time or the structure to connect them together.

He gives the example in mathematics that the formulas for the quadratic equation, the vertex of the parabola and completing the square all express the same general mathematical concept (I didn't know that…). But they are often all taught separately. Or consider in history that Napoleon's financing of his armies is covered in the section on European history and the Louisiana Purchase is covered in American history. Yet the sweet deal that Thomas Jefferson got was deeply dependent on Napoleon's immediate need for cold hard cash (didn't realize that either – just never connected the dots).

There are great (but complex) fixes to this problem but also simple ones. How 'bout just asking the kids next time they learn something: "What else is this connected to?". Maybe we'll all learn something and remember it longer.

Ever seen a stuck student?

I was in a middle school in Massachusetts earlier this year, working with a teacher who taught children with reading disabilities. We were doing research on how JogNog could be used to provide review of lots of examples of words that were tricky to pronounce because of the soft 'C' or 'G' sounds. Like circus, concept, and reconcile.

All the students quickly engaged with JogNog and were comparing their movement on the leaderboard but one boy was having trouble. For about ten minutes he kept trying but then, when I looked over, he had given up and was just staring off into space, or tapping on the table with his iPad stylus. He'd gotten stuck on questions that were too hard and he'd just given up.

I'd never seen this before so clearly and it reminded me of one of the overarching goals of any good video game: "the careful balance between too little challenge (which results in boredom) and too much challenge (which results in getting stuck and eventually giving up)."

No student should ever get stuck. They need to keep moving. They need to feel empowered and successful. Their time is as precious as ours and if they are stuck they are missing out on valuable minutes, hours and days that could be used productively learning.

Have you seen this problem in your classes? With your students? What have you found successful in 'unsticking' your students?

What is the Great Unmentionable Problem with Online Learning?

I took a few minutes yesterday starting to take the online certification course for Google Analytics. It seemed like a good idea. But what I quickly found was that I was being taught things that I already knew or were common sense. There was no easy way to skip to or find the places where I could really benefit from new knowledge.

In that way, a lot of online courses are inferior to physical books. Both contain knowledge that you'd like to acquire but if you are reading a physical book it is easy to start to skim over material you are already familiar with and focus in on material that is new or challenging.

Online learning systems need to make it easy to find the nuggets of knowledge that are most beneficial to you and allow you to skim over or 'place out of' content that you have already mastered.

What is 'Coopertition'?

I espouse friendly competition to motivate learning. Two things are critical to make it work and be a positive and not a negative learning experience for the student:

1. Each participant needs to know that they have a decent chance to succeed.

2. There should be a team based mentality within the competition.

The first criterion means that even a student who is weak in a given subject area has a chance to win if they put in the effort. Successful competitions should be competitions about how much you can learn not how much you know.

The other key ingredient of using friendly 'competition' for motivating learning is the paradoxical effect that it often breeds friendly 'cooperation' in education as well. Students, while trying to help their school correctly answer a large number of science questions on JogNog will form strong bonds with other students as they cooperate together to achieve a common goal.

Strangely the 'competition' breeds and strengthens this 'cooperation'.

Do kids really read the explanations on quiz review problems?

Interesting point about kids not wanting to challenge themselves or read the explanations – too often folks forget about what really is motivating the kids in school. We had the same problem with our quiz / review game JogNog – we incented the kids in a competition to just answer questions and they 'beat' the system by just answering the same questions over and over again. We changed the algorithm so they only got a point for a new /

challenging question and that fixed the problem. Still lots of questions answered – now they were just more helpful educationally. Here's the current leaderboard with the new algorithm: www.jognog.com/jsc2015

Check out the article from the Stanford University newspaper: http://www.stanforddaily.com/2015/02/01/why-i-worry-about-ed-tech/

How Computer Games Reward and Motivate Students

In the classroom it is difficult for the teacher to see and reward every effort of each student. Yet recent research has shown that recognizing and rewarding small efforts with small rewards is far more valuable in motivating students than very large rewards that are delivered infrequently or based on success rather than efforts.

In the real world it is hard to measure and reward small efforts. In a computer game it is far easier. In his fifteen minute talk at the TED conference, Tom Chatfield talks about how online games can detect effort and deliver small rewards in automated ways that are just not possible in the classroom.

Chatfield provides seven key ways that computer games motivate and engage players and could be used to motivate and engage students on learning tasks. One of the main things that computer games do well is to motivate based on rewarding effort and encouraging the player to not be afraid to try and fail at new ideas. He points out how "rapid, frequent, clear feedback" is possible in a computer game while it is so hard to do in real life. And how uncertainty and chance create excitement and 'windows of enhanced attention' where learning is greatly enhanced.

Fail better.

Just saw this quote in Forbes – I think it points up one of the strengths of games: "Ever tried. Ever failed. No matter. Try again. Fail again. Fail better." – Samuel Beckett

When You Decide, You Learn

When does the actual learning take place in school or in an educational game? Is it on exposure to content? Is it when you are tested on the content? or, Is it when you must make a decision based on the content?

In game theory, it is proposed that interest in a game can be measured by the number of decisions that a player gets to make per minute. If stuff just happens in the game but the player does not interact, then they lose interest. If the player interacts with the game but they don't have to use knowledge to make decisions, they lose interest. If they have to make decisions that impact on the game, and these decisions are based on knowledge they have acquired, they stay the most engaged and keep playing the game.

The game makers have figured this out as a way to keep their players playing. Fortuitously, it also looks like the higher the "decisions per minute" are, the higher the learning rate will be.

I was recently reading a research blog on the use of games for education and came across the following comments:

"I've been playing a number of educational games lately and I've observed that many of them have a low rate of decisions to make per minute."

"My concern is that we want educational games to be better ways to learn. But one aspect of 'better' is almost certainly to waste less time."

At JogNog, our third core belief is:

"As Fast as You Can" – Let the kids learn as fast as they can. If they can find a way to learn faster – let them. We promise to never slow down your progress with game mechanics.

If you watch a student play JogNog you see that they often build a tower in a single session. They build one level after another rarely stopping to even watch the graphics. Almost every second of their time is spent in reading a question, thinking about the question and deciding on an answer. The rate of decisions per second for a JogNog player is at the maximum possible for the given player.

I believe that challenging students with the highest levels of "decisions per minute" is the best way to keep them engaged in a game and the fastest way that they can learn new concepts. It seems like the research agrees.

Make it Harder to Read to Learn Better?

In recent research, volunteers were asked to read for 90 seconds about two mythical species (the Norgletti and the Pangerish). One group was given the text in a difficult to read font (Comic Sans) and the other group got an easy to read font (Bodoni). Fifteen minutes later the group with the difficult to read text answered questions correctly 86% of the time. The group with the easy to read font? Only 73% correct. Article from The Economist.

This is a paradoxical result as one would expect that making it easier for the students to read would allow them to spend more time and focus on the most important new information in the text. But this finding is consistent with other research that we recently mentioned in this newsletter that showed that making students struggle a bit to remember a new fact made the fact stick in their memories much more securely. In JogNog we believe in continuously challenging students. Our strength at JogNog is in providing the perfect balance between too much and too little challenge. The result keeps the students motivated and learning as fast as they can.

This matches some research that came out of Cincinnati Children's Hospital Medical Center by Dr. John S. Hutton that showed that there was greater activation in the parietal-temporal-occipital association cotex - or the region of the brain that is very active when older children read to themselves or when younger children hear stories read to them. The interesting thing about the research is that these are parts of the brain that are active for processing visual association – even though the child is not watching anything. It is believed that they are performing a very important function of creating visualizations in their own brains based on the words that they are hearing read to them.

It also implies that perhaps when children watch videos that we are making it too easy on their brains. They are no longer required to remember what a mountain or a bear looks like as they do when they read – perhaps their brains need this kind of exercise to grow in important ways. NYT Beditime Stories for Young Brains – Perri Klass – 8/1/7/15

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JogNog Digital Learning Day Stories

Last Friday, JogNog celebrated Digital Learning Day with a challenge: "Who can answer the most questions correctly between 4am ET and 9pm ET?"

Within the company we ran a pool and predicted that the winner might get anywhere from 1,636 to 3,003 correctly answered questions. We never thought anyone would reach those kinds of numbers though, but we were optimistic.

At the end of the day, the winner answered 7,306 questions correctly! It was a tremendous achievement.

Build a Scaffold for Higher Order Thinking with JogNog Flash Quizzes

Students are often posed questions on classroom tests requiring higher order thinking skills before they have built a foundational knowledge of relevant terms for a particular standard or concept. Essentially, they are being asked to compose and answer complex questions when they don't yet know how to even speak the language.

To help to solve this problem, JogNog has invented the "Flash" quiz. It is a quiz that focuses solely on the terms that are needed to get a basic understanding of the standard being learned. It is a multiple choice quiz with two distinctions. First, it contains only one distractor (wrong answer), and the distractor is usually chosen to capture a typical mistake in thinking about that particular term. Second, the quiz contains a highly simplified drawing for each answer that further helps the student disambiguate between the correct answer and a distractor.

With only one distractor, very short answers, and simplified images, the Flash quiz questions cannot fully test or define the terms. Instead, they provide a rapid and imaginative way for students to build a hook into a key aspect of each term. This then allows them to remember the terms later and gives them a place to build more complex characteristics about the terms. In essence students are given a scaffold onto which they can build more knowledge as it is acquired.

The JogNog Flash quizzes are fun and can be played rapidly as a warm up or later as a review of more sophisticated material. Flash quizzes can be played in a "flash" and provide the student with a motivated way to learn about specific terms that are critical to building higher order thinking skills around various standards.

JogNog currently has Flash quizzes for grades 6th, 7th, and 8th for Life Science and for Earth and Space Science.

Zap Some Excitement Into This Week's Lesson: Challenge Another Class!

JogNog has a new feature that allows teachers to create fun and simple contests between their classes. All they need to do is to go to the website home page on JogNog.com, select one of the JogNog classes they have previously set up, and then click on Contest on the leaderboard. This will allow them to challenge another class by entering the class code of the other class.

The contests run every other week from Thursday to Wednesday. A nightly count of all the questions that have been correctly answered by members of each class is posted on the Contest leaderboard.

Although the contest is simple, it is a powerful tool for using collaborative learning as the students in each class work together as a team. It is also well-suited for the differentiated classroom because any child, regardless of ability, can participate and help the team by learning the answers to questions and then answering them correctly.

Miss a Question? Get a Second Chance!

There is a new feature on JogNog that helps students learn even faster. Now if you get a question wrong you get a second chance to answer that question on a higher level. With this new feature just one incorrectly answered question is repeated on the higher levels.

This helps students review the more difficult questions without having to replay the entire level and gives them a sense of accomplishment as they see themselves correctly answering questions that had previously stumped them. It also makes it easier for them to focus on getting a perfect score (mastery) on the quiz!

Show Me the Standards!

Each quiz in JogNog is mapped to one particular standard. For instance, each math quiz is useful for review or assessment of just one Common Core standard. It has been that way for many years but now with our new release on the web teachers can see the standards as they are mapped to the quizzes. Teachers can now search for and select quizzes based on the standards they are teaching in class each week and they can also view the new Standards report which shows the teacher how their class has completed and improved on each standard.

Now it is easy for teachers to find JogNog quizzes that exactly match the standards they are focused on and to report to themselves and administrators the progress their class is making on each individual standard with pre- and post What is "Ed-Tech Burnout"?

Build a Scaffold for Higher Order Thinking with JogNog 'Flash' Quizzes

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When More is Better than Better

In February, James Samuelson, a teacher from Queens, New York, wrote an interesting article for the Wall Street Journal: "The Pleasures of Teaching to the Test". In that article, he advocated for testing - lots of simple testing. I'm also an advocate for more, simple testing, not necessarily fancy better testing but instead more repetition of basic skills, repetition until there is 'overlearning' rather than just enough understanding to pass the next test and then forget everything. I believe that our students need more experience with simpler problems before they have to tackle the big problems.

Is there a perfect school curriculum? Is some better textbook necessary? Is the latest teaching strategy going to move the needle? Or would some hard work and some blunt effort make a difference? Would just more of doing the right simple things be better than the latest and greatest (aka 'better') teaching fad?

When we, as teachers, look at the new investments in the latest craze in teaching, maybe we should be asking ourselves: "Would just more repetition, more immersion, create better students faster?"

Could it be that more is better than better when it comes to education? Could it be that quantity of reading, studying, recall, and testing is superior to any breakthrough technology or pedagogy or lesson plan? Consider my story.

When I was in high school, we had a great physics professor named Mr. Big (made up name but not made up story). Mr. Big was … well … BIG and though I later learned he was a really nice, funny guy, amazing teacher, and man of high integrity, he was very intimidating to a high school student. Mr. Big would assign us several homework problems each night (seemed like every night). Some were hard and some were easy. Then, the first thing in class the next morning, he would have each of us go up to the board and work the problem. You did not want to be unprepared in front of Mr. Big and the rest of the class. It was ok if you got the wrong answer or were confused, but you had to show that you had done the work and had at least tried. It was not uncommon for some of the students to shed a tear if they came in unprepared. In fairness, this was an advanced placement physics course so we were motivated than the average high school student.

Looking back on that high school physics class, I realize that Mr. Big was already practicing flipping the classroom. His lectures were shorter than most, and a lot of his class time went into working through the problems interactively with the students. Lots and lots of problems. And it seems to have worked. Many of us got the highest scores possible on the AP physics test. I got the highest score as well (I'm still convinced that there was some snafu in grading) and got into MIT (thank you, Mr. Big and my other teachers).

At MIT there was a different mentality. When I was an entering freshman and I was assigned my first homework assignment in physics, I was surprised that we had only received one problem set for the week rather than a homework assignment each night as we did in high school. It seemed like college really was going to be easy. It was even more surprising that there were only three to five problems on the homework. I took a quick look at the problems, and since it seemed pretty short compared to high school's homework, and being a typical freshman, I began working

diligently on it at about 9 pm the night before it was due – assuming it might take an hour or so to complete.

At three in the morning, I knew I was in trouble. Each problem was very complex and required a lot of background reading. It assumed that you already knew all the small steps and was asking you the big important question. I really felt overwhelmed. I didn't have any small successes before I hit this big challenge.

I never did get all of that problem set done before I had to turn it in that morning.

It stayed that way throughout most of my four years at MIT. I never felt satisfied that I'd completed the problem set correctly, and often, I didn't finish the assignment. We would move on to some new topic before I'd really digested the old one.

For graduate school, I moved up the river to Harvard and things went much better. I studied something I was interested in. I even took courses at MIT while enrolled in Harvard's graduate school. What was the difference? When I look back on it, I think it all grew out of just one thing. In between my undergraduate work at MIT and graduate school, I worked for six years at two high-powered and innovative companies - a startup making artificial intelligence computers and one making supercomputers. Every day for six years, I slogged through real world computer problems. I had to solve lots of intriguing problems but also learn tons of boring stuff. Lots of repetition and lots of practice. I think it was this practice in the real world – like the problems that Mr. Big forced me to do in high school - that gave me the base foundation that I needed to later tackle graduate school. It was a slow and painful climb but it was built on a solid base of lots of experience. A huge quantity of experiences and examples.

I think in some ways that modern education is more like what I experienced at MIT. Big, challenging, difficult problems with innovative teaching pedagogies. All good, but sometimes kids need to ramp up to the big challenges, and they need lots of routine simple repetitions to build a large experience base from which to then solve the big problems. Truly education may be a case where more is better than better.

About JogNog

JogNog is an easy way for teachers to review the standards and topics that their students need to know for their state tests in Science, Technology and Engineering, Math, ELA and Social Studies. When used regularly, JogNog has been shown to have significant positive impact on state test scores. JogNog is available on the web for Google Classroom and Microsoft Office 365 users and as an app for iPad, iPhone, Android, Chromebook, Kindle Fire, and Windows Phone. For more information about JogNog, visit www.JogNog.com.