If you add any thoughts, please use color and put your name. (@jreulbach)
@mathymeg07 @numerzgal @rachelrosales @mel @algebrasfriend @romathio @algebrainiac1 @paomaths @shwwork

Blogs about this activity:
First Day with Make It Stick, Jo Boaler, and Plickers *Julie Reulbach*
Make It Stick: The Student Brochure *Meg Craig*

I loved Make It Stick and I think it would be so helpful for students. I would love for them to understand WHY I am doing what I am doing and how it will help them. So, I copied some of the things I wanted them to know into a document. I plan to assign this as a reading homework. Ideally, I want them to discuss it together and as a class the next day. I hate to burn a day of class, but think it will pay it forward! Here is my plan, I would love feedback and help with the discussion questions. Do you think this is a good idea? This was totally my idea for the first night's homework, too.

Here is my sequence:

1) Three questions whe hello
2) hey come in, quickly discuss
3) Plickers Survey
4) Jo Boaler Video
5) Write - What do you think? What surprised you?

Here's why I had thought of doing...

1A) Begin handout with "what methods do you use to learn something new?" "how do you study?" "what do you think the best way to remember something is?" (for generalization practice.)

I LOVE this idea as I would rather them generate ideas before they read the book excerpts. I also want to show them Jo Boalers video clip on Conceptual understanding and am trying to put it all together. I want to be outside of the door greeting students. As students come in the room, they will find their seats (names on the desk with plickers). I will have questions on the board that I want them to answer at their desks. This will get them working right away on the first day, before I am even in the room. (They need to get into this habit quickly). Maybe.... (suggestions for improvement please)

Ok, I love the idea of having them read about the "why". This will not only help students in your class, but in all classes. I have even taken class time to show students a video on the importance of sleep! My private school students are into multiple sports and activities, take the max number of AP classes and are overall stressed and tired. They NEED to know what will

help them learn more effectively. My one rhetorical question - will students be able to acknowledge that what they think is the best way for learning, maybe isn't? That is a HARD thing to overcome, even with evidence. Doesn't mean we shouldn't go through this exercise, but to recognize that it will take more than one time for it to sink in.
I would love the links to your videos - especially on sleep. My students NEVER get enough sleep!

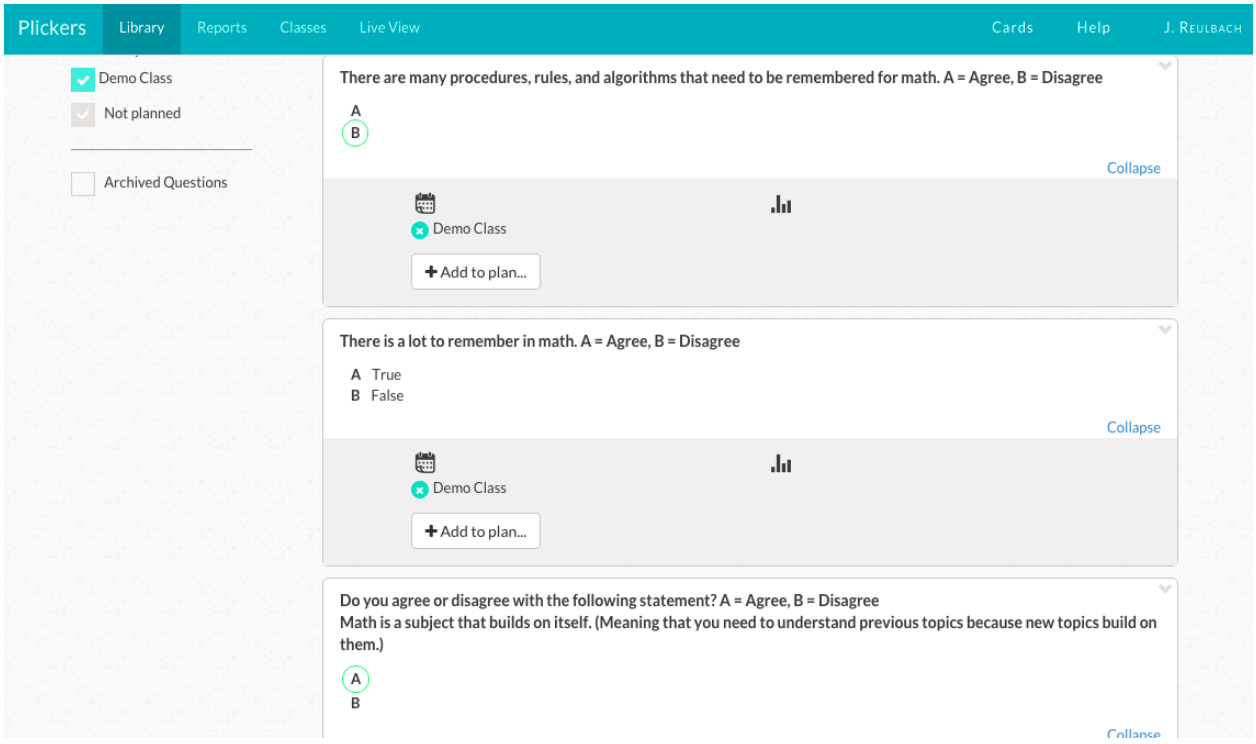
@shwwork Last year, first week, I showed students Jo Boaler clips every day for five days. Students bought into it more when a beautiful women with an English accent was talking.

1. What is math?

2. Finish these sentences:
   The people that are the best math students....

3. How do you study for a math test?

Then I want to plicker these questions. I use plickers day 1 bc some students may not have their computers yet or have phones (freshmen). Yikes - changing these questions....



I want them to discuss what they wrote down with their table partner - but I can't' decide if I should do that before or after the plickers.

I'm leaning towards your plicker questions before the other 3 that they are writing down. But, I can't give you any kind of good reason as to why!
I thought that too, but I really want them to have something to do when they come in, and I want them to think about these things for a few minutes before the survey. ??

I then am going to show them this Jo Boaler video, and have them write down their thoughts (need help here for a prompt).

I am going to do something similar, but in a "chalk talk" routine. Here is a link if you have never heard of it. http://www.nsrfharmony.org/system/files/protocols/chalk_talk_0.pdf

I am going to pose 4-8 questions for students to ponder and think about. Some will be geared towards Make It Stick ideas, some towards Growth Mindset ideas, and some for establishing class norms. I'll share my questions as soon as I have them finalized. We don't start still until Aug 12, so don't expect them too soon. :)

I LOVE this and haven't heard of it before so thank you! I don't think I can do this the first day, I will have freshmen in my classes and learned the hard way last year that no one wants to stand up to participate until a few weeks in (it's so mortifying!). However, I could see this on giant white boards with 4 people at a board. Then, they could share their boards…

I gave chart paper to each table and had them do the chalk talk protocol right at the table on chart paper. This way you don't have to worry about students getting up in front of others and you can post chart papers around the room.

I would love to see a chalk talk in action. Can search YouTube, does anyone have a good one they like?

I love the chalk talk idea! I start school Sept 2. @rachelrosales, would you mind sharing the 4-8 questions that you used and any recommendations?

> I don't love showing the video even though I love Jo Boaler's teaching. I'm not sure the students will get much from the video, but I could be wrong!
>
> @shwwork There are other videos she has were the grad students are sharing along with Jo, students really enjoyed them. They wanted more videos at the end of the five days I showed short clips

1B)Assign reading (doc attached) for hw. I didn't want it too long, but wanted Practice and Study Tips

> I love this. Was planning to do the same thing.

1C) Go to the person who is busy signing all of your first day handouts.? What do you hand out day 1? Our

Teachers have parents guardians sign syllabus. I wanted to put "an adult that cares about your grades" so it could be another teacher, coach, parent, what have you, but then I felt sad for the kids that don't have an adult that cares. Explain to him/her the differences between the way you study and the new ways suggested in this handout (for elaboration practice).

Day 2 - After the reading HW

2. Write 3 key things

(without looking at the reading) have them write down key things that stuck out to them for 5 minutes. (need better wording here). Maybe give them less time here for more time for discussion? I am going to have them do this as they walk in the door. Again, trying to train them to start working as soon as they enter the classroom. Give a few minutes after everyone is in.

> Could do a "give one-get one" activity. Have students write down 4-5 **(3)** things they found important from the reading, then circulate around the room exchanging ideas with each other. (circulate people or papers)? I am concerned this will be tough first week. Kids are shy first weeks of school - maybe just in my school??

3. Discuss in groups of four. (NOT looking at article) for 5 minutes

> I think my students would need a more defined prompt. If I just said to discuss it, I'm not sure how productive they would be. Mine as well - that's what I need you all for!! :)
>
> Maybe - Pick one idea that you all had in common. If you did not have any things in common, decide which idea you all feel is the most important from your papers.

(If you happen to be in a 1:1 school, looking at the text using Prism might be interesting. http://prism.scholarslab.org/?locale=en You upload text. Students read - highlight based on teacher's guiding questions. The website collates all the highlights; you can discuss commonalities.) Students have to create an account to use Prism. They can do it through Google, but I may skip this option for now.
Wow, that sounds like a totally cool option! Wish we were 1:1. or 2:1. :(
I haven't seen this either! We are 1:1. But I dont know if students will have tech on the first day.
Holy crap. My English teachers are going to go Apes over this!!

Hi, Deloris Mercer HHS Macon Ga: School starts on 08/02.
I am using www.education planner.org 20 minute learning style quiz. (During class)Having students write down 3 things that would help them learn out of their learning style for AP Cal. Think Pair Write Share. For homework after they read- I am going to use flipgrid for their response (when they are home) and highlight and play 3 short 1 minute video during class.(For 5 days) students are being the experts about their individual learning style. I am sharing a short video too but it is from the www.Gadoe.org on how AP classes are different than any other math class. So, we r looking at 15 videos in 5 days😆. I am starting 1.1 from the CED on the second day of school. Flip grid will count as 7 bonus points on Fridays homework mini- Quiz. I don't grade homework nightly but on Friday give a 5 question open note quiz from weekly homework. So, those who create their Flip grid homework first night get all 7 points, 2 nd night(5 points) 3rd night 3 points 4th night 1 point. Showing them my growth mindset. They have been assigned a collaborative partner. So, on day 2 they must make a flip grid 1 minute video in response praising partner and then providing feedback to their learning style. Focus for day 2 is a paragraph reflection on information learned about their learning style with a source or in response to the Calculus TEDTalk. I am sharing with your friends at all homework on day 1. Maybe too much!?I loop with my kids. This is our third math class together so it makes the first day easier. Day 2 "Leader in Me- goal setting for course ":

4) Look back at article to prove points w a partner (maybe debate style via Chris Luz - as in, "I think that this is the BEST piece of advice or the most important thing I learned). I feel this is now covered with #3.
Some possible discussion prompts:

-Describe in your own words what "Generation" means.
-Think of a time when you were assigned a problem in math that you had never seen before - what did you do? How should we approach unfamiliar problems in this class? How do these unfamiliar problems help us learn?
-What is the role of making mistakes in our learning process? (tied more to growth mindset?)
- How do you expect to see "spaced practice" in this class?

5) Class summary:

Make a goal. Maybe each student can decide what one piece of advice was most important to him/her and (write a goal pertaining to it) +100 on a cute piece of paper. e.g. "I will practice retrieval for 15 minutes a day." "I will try an old homework problem 3 times a week." then have the rest of their group sign it as "accountability buddies."? Love the goal! What type of paper? Let's develop this...

Would be nice to have space to leave these goals posted in the classroom for the rest of the year.

I think I'm going to have mine keep it in the front of their binder and have an "accountability" minute (or two) every week or so.

This might be a good place to use "hexagonal thinking." Students put their goal in just a word or short phrase on a hexagon (you prepare paper hexagons ahead of time.). After writing goals, students put them all on a table, and try to make connections. How are their goals similar to one another. http://tracyannclark.com/tag/hexagonal-thinking/

Love the goal! I feel like I need more examples in case the students have a problem getting started.

Do I have enough time for all of this in 55 minutes?? I would have to set a timer or we would definitely not get it all done in that amount of time. I need to buy a timer. Do you have one you like? I use the timer on my iphone.

Hand out for the students: BTW, love Kindle for Mac as when you copy/paste it does the citation for you!! I'm hoping some students will want the book. I may buy a physical copy and "lend" it out to students. I'm hoping to get the school to buy a class set for my advisory/homeroom class. (I'm also hoping for a unicorn) haa haa made me chuckle YIKES! Only hardcover for $20?? 6x8.5 Also, holy cow, even the kindle is $18. Why are teacher books always so expensive? Because, you know, we make the big bucks!

The parts you have excerpted are perfect for the students. Seriously, this will help them understand why your class is different & hopefully make life easier for all of you. :)

The Handout *(well, I'm not handing it out, I'm sending it electronically - with a Prism option)*

Make it Stick.
The Science of Successful Learning.

Peter C. Brown

PEOPLE GENERALLY ARE going about learning in the wrong ways. Empirical research into how we learn and remember shows that much of what we take for gospel

about how to learn turns out to be largely wasted effort. Even college and medical students—whose main job is learning—rely on study techniques that are far from optimal. At the same time, this field of research, which goes back 125 years but has been particularly fruitful in recent years, has yielded a body of insights that constitute a growing science of learning: *highly effective, evidence-based strategies to replace less effective but widely accepted practices that are rooted in theory, lore, and intuition*. But there's a catch: the most effective learning strategies are not intuitive.

People commonly believe that if you expose yourself to something enough times you can burn it into memory. Not so. many teachers believe that if they can make learning easier and faster, the learning will be much better. Much research turns this belief on its head: **when learning is harder, it's stronger and lasts longer.** (from Preface)

Practice, Practice, Practice

Spaced Practice versus Massed Practice

Why is spaced practice more effective than massed practice? It appears that embedding new learning in long-term memory requires a process of consolidation, in which memory traces (the brain's representations of the new learning) are strengthened, given meaning, and connected to prior knowledge—a process that unfolds over hours and may take several days. Rapid-fire practice leans on short-term memory. Durable learning, however, requires time for mental rehearsal and the other processes of consolidation. Hence, spaced practice works better. The increased effort required to retrieve the learning after a little forgetting has the effect of retriggering consolidation, further strengthening memory. (p. 49)

What your intuition tells you to do:

Intuition persuades us to dedicate stretches of time to single-minded, repetitive practice of something we want to master, the massed "practice-practice-practice" regime we have been led to believe is essential for building mastery of a skill or learning new knowledge. These intuitions are compelling and hard to distrust for two reasons. First, as we practice a thing over and over we often see our performance improving, which serves as a powerful reinforcement of this strategy. Second, we fail to see that the gains made during single-minded repetitive practice come from short-term memory and quickly fade. Our failure to perceive how quickly the gains fade leaves us with the impression that massed practice is productive. Moreover, most students, given their misplaced faith in massed practice, put off review until exam time nears, and then they bury themselves in the material, going over and over it, trying to burn it into memory.

Why spaced practice is better:

It's a common but mistaken belief that you can burn something into memory through sheer repetition. Lots of practice works, but only if it's spaced. If you use self-quizzing as your primary study strategy and space out your study sessions so that a little forgetting has happened since your last practice, you will have to work harder to reconstruct what you already studied. In effect, you're "reloading" it from long-term memory. This effort to reconstruct the learning makes the

important ideas more salient and memorable and connects them more securely to other knowledge and to more recent learning. It's a powerful learning strategy.

How it feels:
Massed practice feels more productive than spaced practice, but it is not. Spaced practice feels more difficult, because you have gotten a little rusty and the material is harder to recall. It feels like you're not really getting on top of it, whereas in fact, quite the opposite is happening: As you reconstruct learning from long-term memory, as awkward as it feels, you are strengthening your mastery as well as the memory.

Interleaved [Mixed Up] Practice
If you're trying to learn mathematical formulas, study more than one type at a time, so that you are alternating between different problems that call for different solutions.

What your intuition tells you to do:
Most learners focus on many examples of one problem or specimen type at a time, wanting to master the type and "get it down cold" before moving on to study another type.

Why interleaved practice is better:
Mixing up problem types and specimens improves your ability to discriminate between types, identify the unifying characteristics within a type, and improves your success in a later test or in real-world settings where you must discern the kind of problem you're trying to solve in order to apply the correct solution.

How it feels:
Blocked practice—that is, mastering all of one type of problem before progressing to practice another type—feels (and looks) like you're getting better mastery as you go, whereas interrupting the study of one type to practice a different type feels disruptive and counterproductive. ***Even when learners achieve superior mastery from interleaved practice, they persist in feeling that blocked practice serves them better.*** You may also experience this feeling, but you now have the advantage of knowing that studies show that this feeling is illusory. (pp. 204-207).

Studying

Optimal Study Habits
- Always does the reading prior to a lecture
- Anticipates test questions and their answers as he reads
- Answers rhetorical questions in his head during lectures to test his retention of the reading
- Reviews study guides, finds terms he can't recall or doesn't know, and relearns those terms
- Copies bolded terms and their definitions into a reading notebook, making sure that he understands them

• Takes the practice test that is provided online by his professor; from this he discovers which concepts he doesn't know and makes a point to learn them
• Reorganizes the course information into a study guide of his design
• Writes out concepts that are detailed or important, posts them above his bed, and tests himself on them from time to time
• Spaces out his review and practice over the duration of the course

Fellows's study habits are a good example of doing what works and keeping at it, so that practice is spaced and the learning is solidly embedded come exam time.

(pp. 216-217).

Explain to Students How Learning Works
Students labor under many myths and illusions about learning that cause them to make some unfortunate choices about intellectual risk taking and about when and how to study. It's the proper role of the teacher to explain what empirical studies have discovered about how people learn, so the student can better manage his or her own education. In particular, students must be helped to understand such fundamental ideas as these:

• Some kinds of difficulties during learning help to make the learning stronger and better remembered.
• When learning is easy, it is often superficial and soon forgotten.
• Not all of our intellectual abilities are hardwired. In fact, when learning is effortful, it changes the brain, making new connections and increasing intellectual ability. • You learn better when you wrestle with new problems before being shown the solution, rather than the other way around.
• To achieve excellence in any sphere, you must strive to surpass your current level of ability.
• Striving, by its nature, often results in setbacks, and setbacks are often what provide the essential information needed to adjust strategies to achieve mastery.

Frequent Quizzing to Enhance Learning
Where practical, use frequent quizzing to help students consolidate learning and interrupt the process of forgetting. (p. 226).

"The whole idea of the testing effect is that you learn more by testing yourself than by rereading. Well, it's very hard to get students to do that because they've been trained for so long to keep reading and reading the book."6 I can't tell you how many times the students come to me and they show me their textbook and it's highlighted in four different colors. I say to them, "I can tell you have done a lot of work and that you really want to succeed in this class because you have blue and yellow and orange and green highlighter on your book." And then I have to try to tell them that any more time spent on this after the first time was a waste. They're, like, "How is that

possible?" I say, "What you have to do is, you read a little bit and then you have to test yourself," but they don't quite know how to do that. (p. 229).

Testing Groups instead of Study Groups

Testing groups. Wenderoth has transformed class "study groups" into "testing groups." In a study group, the person who knows the most talks and the others listen. The emphasis is on memorizing things. However, in a testing group, they all wrestle with a question together, without opening the textbook. "Everybody has bits of information, and you talk with your colleagues and figure it out." The emphasis is on exploration and understanding. Wenderoth will ask students in a testing group what ideas they don't feel really clear on. Then she'll send one student to the whiteboard to try to explain the concept. As the student struggles, perhaps putting up the pieces of the answer she knows, the rest of the group are instructed to test her by asking questions whose answers will lead her to the larger concept. Throughout, all textbooks remain closed. (pp. 230-231).

Brown, Peter C. (2014-04-14). Make It Stick. Harvard University Press. Kindle Edition.

Additional Resources for students and parents:

A couple of resources as alternatives to the text above:
concise summary of study tips written by one of the authors:
https://www.psychologytoday.com/blog/make-it-stick/201406/make-it-stick-six-tips-students

video summary of book highlighting study tips:
https://www.youtube.com/watch?v=88X4zqkRWFs

My Favorite Boaler video for students is on her site youcubed:
https://www.youcubed.org/boosting-messages-from-how-to-learn-math-for-students/

Above is the video set I show my students.

Here is another resource on interleaving over blocking
http://www.scientificamerican.com/article/the-interleaving-effect-mixing-it-up-boosts-learning/

Additional Resources - Thanks Beth!
Article about "Six Tips" about making it stick could be a good follow up for students. I am also going to lend out my hard copy to kids who are really interested and want to read it.

Also, an 8 minute video that summarizes the book as well with examples.

NY Times article on pre-testing and frequent quizzing:
http://mobile.nytimes.com/2014/09/07/magazine/why-flunking-exams-is-actually-a-good-thing.html?_r=1

Sleep Video: From Zzzz's to A's:
http://www.pbs.org/wgbh/pages/frontline/video/flv/generic.html?s=frol02p392&continuous=1

Another sleep video:
http://brainrules.net/brain-rules-video