# Growth Mindset Conference

I recently attended a math teacher’s conference in San Diego, and in preparation for running some Professional Development about what I learned, I thought I would try to summarize here.

[](https://chucklarrieu.files.wordpress.com/2014/07/synapse_brain_connections.jpg)

**Growth Mindset Research**

The research, in a nutshell, says that the brain grows with concerted effort and collaborative communication.  The brain is a plastic structure that adapts, makes connections, and grows with concerted effort.  An example of this lies in London cab drivers, who study for years for a test called “The Knowledge.”  These cab drivers have larger than normal hippocampi (hippocampus being the long-term memory center of the brain).  What’s more, their hippocampi shrink back to normal after they have retired.

Not only is it true that the brain grows and makes new connections with concerted effort, it is also a useful belief.  Students who believe that they can grow their brain and get better, do.  They have more perseverance, have deeper understandings, and can transfer their habits of thinking to many areas of their lives.  This belief is called a “Growth Mindset.”

Messages are very important for students.  If they receive the message that they can help each other grow their brains, then that will contribute to a better classroom environment.  To compound the effect, send the message that you want to grow their brains so that they can contribute as much as they can to their family and community.

[](https://chucklarrieu.files.wordpress.com/2014/07/shutterstock_145599601.png)

**Low Floor High Ceiling Tasks**

These are math tasks that have a low point of entry that can escalate to sophisticated mathematical concepts and relationships.  Low Floor means it is easy and fun for anyone to start thinking about the problem.  High Ceiling means students who are further ahead than others can push themselves to discover higher levels of problem solving.  I posted an example of such a task in my last post.

The pedagogical reason for such tasks is to foster an inquiry relationship with mathematics–that is, interacting with mathematics as a process of experimentation and discovery rather than memorization.  As such, these tasks make students hungry for methods.  How can I count this easier?  How can I solve this kind of equation?  What is the relationship?  These questions motivate the teaching of methods and procedures.  Most current math teaching does just the opposite–trying to force feed formulas and methods without any intellectual need.

Some resources for such tasks can be found at [YouCubed](http://youcubed.org/teachers/), as well as Dan Meyer’s [101QS](http://www.101qs.com) and [Three-Act Tasks](https://docs.google.com/spreadsheet/pub?key=0AjIqyKM9d7ZYdEhtR3BJMmdBWnM2YWxWYVM1UWowTEE&gid=0).

[](https://chucklarrieu.files.wordpress.com/2014/07/group_1.png)

**Complex Group Instruction**

Complex instruction is basically group work where each student plays a specific role in the group.

* **Facilitator:**  Make sure your group reads all the way through the card together before you begin. “Who wants to read? Does everyone get what to do?” Keep your group together. Make sure everyone’s ideas are heard. “Did anyone see it a different way? Are we ready to move on?” Be sure everyone can explain. Make sure no one is talking outside your group!  **Basically, keep your group together and focused.**
* **Recorder/Reporter:**  Your group needs to organize a record with all your results. Your record needs to show everyone’s ideas, be well-organized, and use color, arrows, and other math tools to communicate your mathematics, reasons, and connections. “How do we want to show that idea?”  **Basically, direct how the group will present its findings.**
* **Resource Manager:**  Get materials for your team.  Make sure all questions are team questions. When your team is done, call the teacher over to debrief the mathematics. You are the only one who can ask the teacher a question – make sure it is a group question. **Basically, procure materials and teacher help for the group.  “Three before me!”**
* **Team Captain:**  Remind your team to find reasons for each mathematical statement, and search for connections among the different statements. “How do you know that for sure? How does that relate to…?” Be ready to join the teacher for a huddle.  **Basically, ask others to explain their thinking and huddle with the teacher to convey instructions to your group.**

[](https://chucklarrieu.files.wordpress.com/2014/07/numbers.jpg)

**Number Talks**

The first building block of abstract mathematics is numeracy–the ability to manipulate numbers.  Here are the steps to do a Number Talk

1. Pose an arithmetic question that requires some figuring, like 1000-676 or 18\*5.  Instruct students to do the problem in their head with no pencils or paper.
2. When most students are done (indicated by a quiet fist to the chest), ask for answers.  Record any answers and validate none of them.
3. Ask for students to defend one of the given answers.
4. Ask for the student’s name and label it on the board.  Listen to the student’s strategy, and then record the steps, modeling proper mathematical notation.  Refrain from using more formal notation like 5\*18=5(10+8).  This will come later as they learn algebra.
5. After seeing a few strategies, find a way to visually represent their thinking, most notably with area models.

[](https://chucklarrieu.files.wordpress.com/2014/07/personal_growth.jpg)

**Growth Mindset Strategies**

* My Favorite “No.”  Show an anonymous mistake and have students guess what the mistake was and why it’s an illuminating mistake.
* Synapse!  Whenever there’s a mistake on the board, instead of crossing it off or erasing it, just draw a lightning bolt and say “Synapse!”, underscoring that the brain forms new synaptic pathways through processing mistakes.
* Offer Pass/Fail skills tests where students have a few weeks to come in and fix their mistakes to get full credit.
* Two Stars and a Wish–what are two things this group/student did well, and what is one thing you wish they had done to make it better?
* Give students an opportunity to grade themselves based on a rubric
* Asks students to design test questions.
* Go with students through the [How To Learn Math](https://class.stanford.edu/courses/Education/EDUC115-S/Spring2014/about) course to promote a growth mindset from the very beginning of school.  Give them paragraphs to write for homework.  Be warned, some of the videos are pretty corny, but their message is true.
* Convince yourself, convince a friend, and convince a skeptic

[](https://chucklarrieu.files.wordpress.com/2014/07/apps.jpg)

**Math Apps for Parents**

There are [some great apps](http://youcubed.org/parents/2014/math-apps-and-games-we-like/) to promote numeracy with your children.  Check them out.

I think that’s pretty much all I have to say about that at the moment.  I think this has helped me organize my thoughts and I’ll be able to share a lot with other teachers.  Let me know if this helps you!