

It is so odd that when we say "*we do not yet understand the brain*", what we really mean is that our brain is so complex it cannot even understand itself.

The process of learning is so complex, it should not surprise you to learn that much of what you have always done to study likely has little to no effect at all.

Test Revision

A Question

Think about what you've been up to this period.

Compared with a typical math class in your life have you:

- Spent more time talking about math?
- Spent more energy listening?
- Spent more time reflecting on your learning?
- Spent more time trying to understand math instead of just doing it?
- Been more focused and on task?
- Been more motivated to learn?
- Been more engaged?

Learning How to Learn

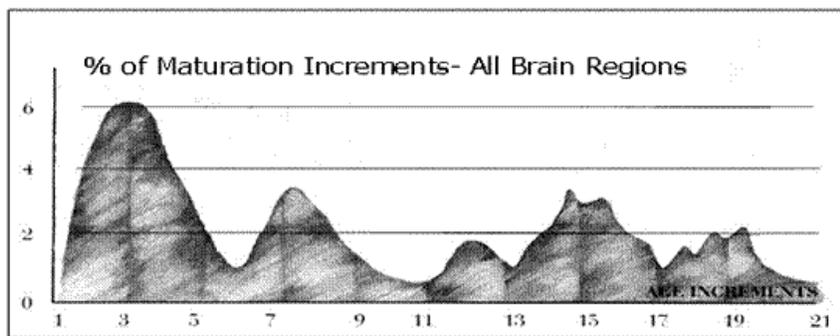
Because you have no idea how to do it (effectively).
- and neither do most teachers



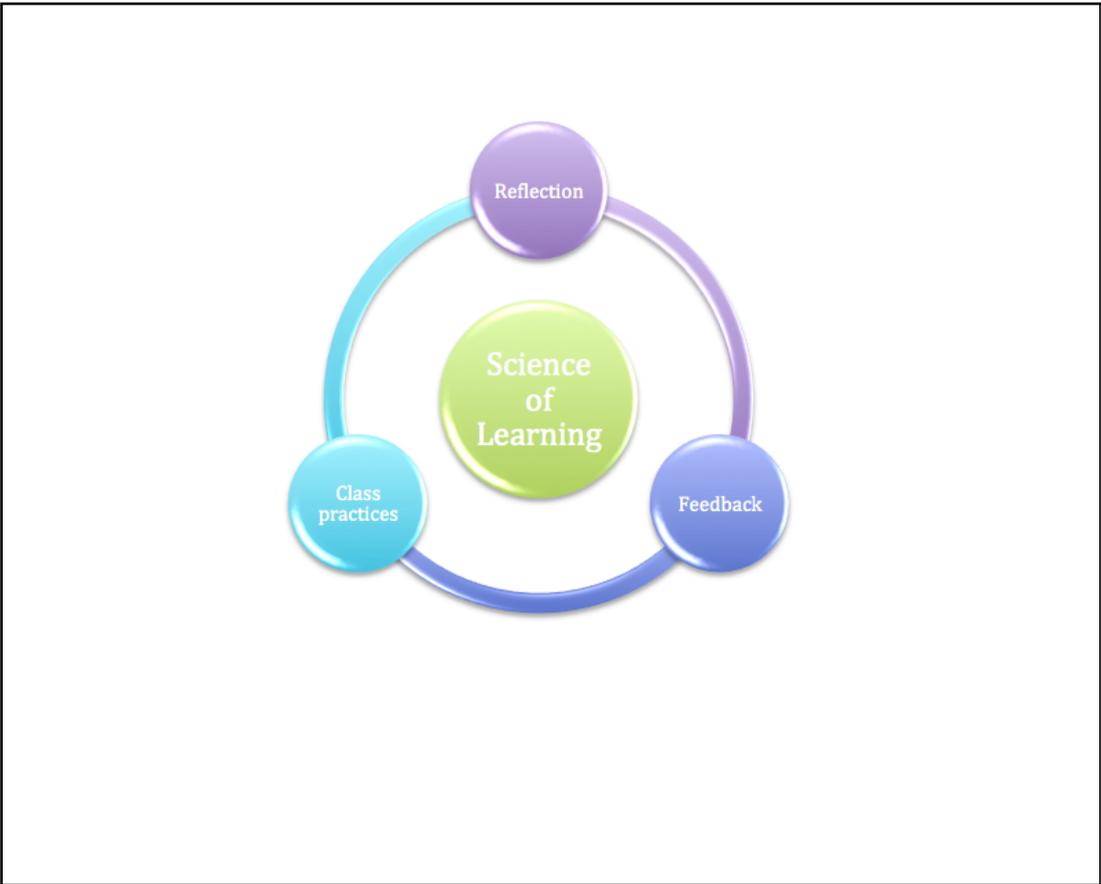
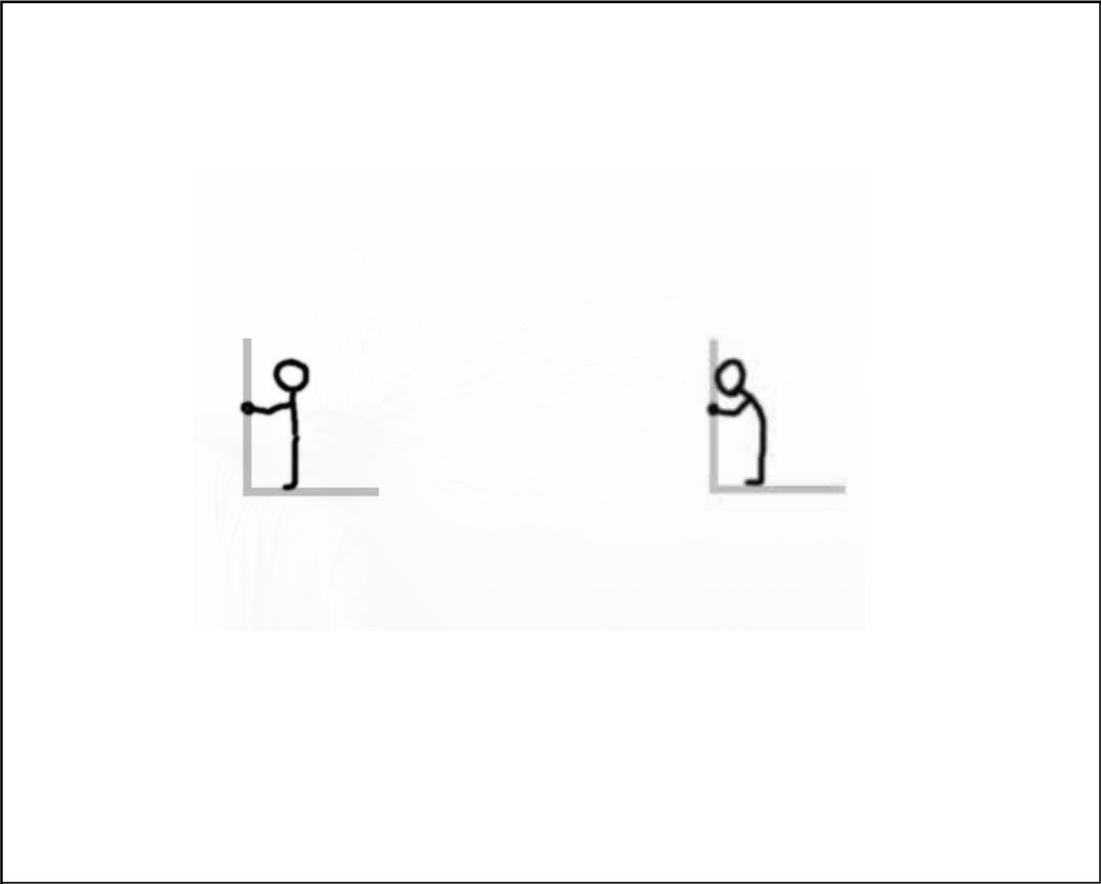
How can you honestly believe the same learning methods you have used your entire life will still continue to work, when what or how you learn looks nothing like it did even five years ago... and neither does your brain?

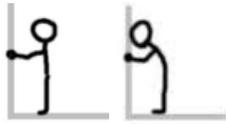
You may think you are the same person you entered high school as.

You are not.



Savage, Ronald C. The Child's Brain – injury and development. Wake Forest NC: Lash Publishing. 1999.





What effective, research-based learning strategies have already been modelled through the teaching style?



Note-taking, review, and studying



Collection of feedback data



Repetition

What have you noticed that's different?

Reflect

What have you learned by fixing your tests?

Feedback many of you received:



Cognitive Engagement

A, C, and TIPS are not enhanced by just reading over notes. You have to be actively using and engaging the parts of your brain involved in these processes, if you are to become better at them.



Process of learning

1. Do all activities
2. Check & correct
3. Understand why



Communicate

Don't be afraid to ask for help

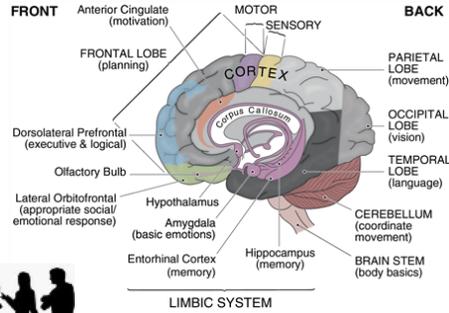
How has our "Testignment" evaluation engaged effective learning processes?



Why does it work?



Cognitive Engagement



Process of learning

Not repetition
Not action
But repetition of action with reflection



Communicate

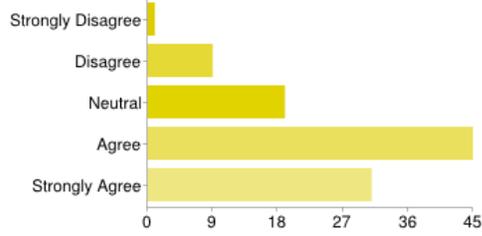
Give and receive feedback - and not just with the teacher!
Dialog as learning



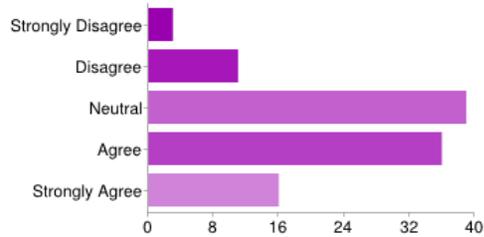
Read what your peers say...

Teaching and Evaluating

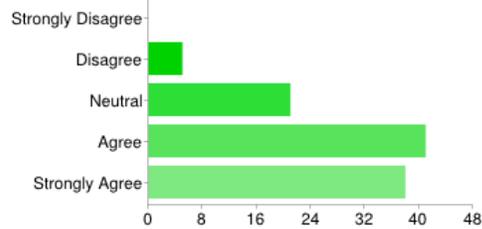
Having to make my own notes is probably better for me in the long run



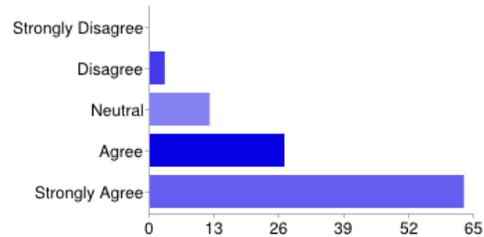
When my teacher talks less and I do more I feel I am more engaged and learn better



Learning from solving a realistic problem is better than just listening to my teacher lecture

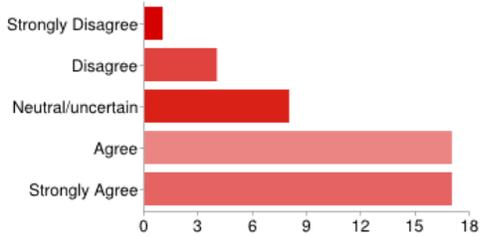


I feel that being able to hand in material multiple times encourages me to perfect my understanding

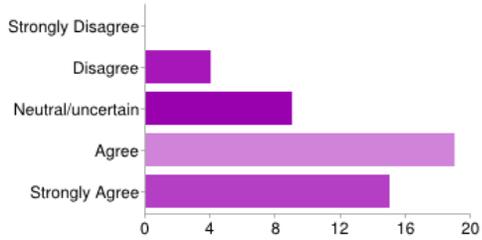


Cheat Sheets

Having a cheat sheet reduced my stress level a lot, even if I didn't use it much.

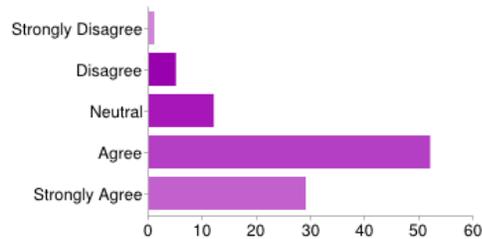


I found that because I had a cheat sheet, the way in which I studied changed to focus more on understanding how to do things and why, rather than on memorization.

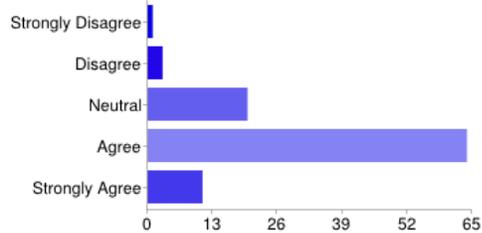


Feedback

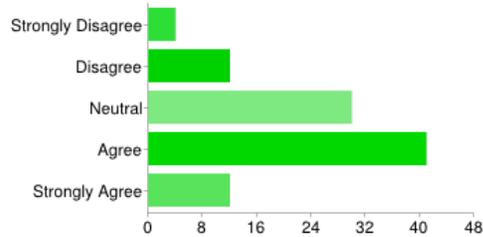
I believe teachers could use this device to adjust instruction or meet individual student needs



I believe I could use the compiled results of these reflections to learn something about how I learn or improve my achievement



For me, writing out reflections highlighted things about myself I did not expect or normally don't spend time thinking about



My Purpose



To Lure

To engage in practices that develop deeper and longer-lasting understanding

To improve learning and learning habits

My Lure:

I offered to adjust your mark to reflect an adjusted level of learning

That simulated and stimulated:

- Confidence
- Engagement
- Positive attitude
- Risk free environment
- Numerous attempts
- i.e. the video game analogy



Specific Actions on your part:

- Attempting
- Receiving feedback
- Reflecting
- Re-attempting
- Seeing
- Hearing
- Discussing
- Sharing
- Articulating
- Re-stating
- Organizing
- Correcting with understanding

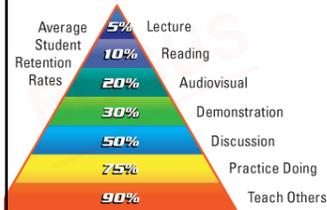
You learned more not because of the carrot, but because of what the carrot made you do.

Teaching and Studying Facts

CISCO. (2008). *Multimodal Learning Through Media: What the Research Says*. Retrieved November 22, 2010, from CISCO: <http://www.cisco.com>



LEARNING PYRAMID



1. *Multimedia Principle:* Retention is improved through words and pictures rather than through words alone.
2. *Spatial Contiguity Principle:* Students learn better when corresponding words and pictures are presented near each other rather than far from each other on the page or screen.
3. *Temporal Contiguity Principle:* Students learn better when corresponding words and pictures are presented simultaneously rather than successively.
4. *Coherence Principle:* Students learn better when extraneous words, pictures, and sounds are excluded rather than included.
5. *Modality Principle:* Students learn better from animation and narration than from animation and on-screen text.
6. *Redundancy Principle:* Students learn better when information is not represented in more than one modality – redundancy interferes with learning.
7. *Individual Differences Principle:* Design effects are higher for low-knowledge learners than for high-knowledge learners.
8. *Individual Differences Principle:* Design effects are higher for high-spatial learners rather than for low spatial learners.
9. *Direct Manipulation Principle:* As the complexity of the materials increase, the impact of direct manipulation of the learning materials (animation, pacing) on transfer also increases.

Teaching and Studying Facts (cont.)



Watt

...Teachers explain procedures without targeting deep conceptual learning, and **students replicate procedures** using sets of small problems

...Performance-based assessment have strong potential to impact mathematics teaching (Rothman, 1995), through emphasising **challenging material for all learners**

...**Tests are not well-written**, and the traditional mathematics test typically focuses on repetition of learned procedures using small sets of problems

...Student performance on the traditional mathematics **test cannot be used** to infer more general mathematical ability

...The difficulty of designing appropriate assessment tasks should not be used as a justification for maintaining the current emphases in conventional assessment practices.

Sezer

...In many secondary schools and college mathematics courses, **lecturing remains the most common form of instruction**

...This pedagogy assumes that a transfer of knowledge from an expert to a passive learner is possible; however, research indicates that this kind of instruction causes students to learn facts in isolation, often forgetting the reasoning behind the explanations (Roth, 1994). Research indicates that this approach neither encourages nor enhances learning that fosters conceptual understanding

...That majority of mathematics instruction is based on giving an algorithm and later asking student to practice it, making **mathematics education similar to following a recipe**, where the reasoning behind a procedure is often lost



Boulton's 5-Step CPR

(Cut out **P**rofuse **R**eadings)

For University and Beyond



What is the difference between literacy, and
functional literacy?

What is the average number of pages a university
student is assigned to read each day?

There's a strategy to performing well in school.
Do you know how to play the game yet?

Instructors will focus mostly on "**need to know**",
not "**nice to know**".
Can you tell the difference?

You can't re-read your textbooks to study,
you won't have the time.

You need to have notes or learn how to skim though it!

How?

Well, how does an informative paragraph work?

Read this...

Over the long term the effects of smoking are more serious than they are over the short term. For example, blood vessels in the heart and brain narrow and darken. The smoker experiences shortness of breath and usually a cough. Also, smokers often suffer lung infections and diseases such as pneumonia, bronchitis, or emphysema. However, lung problems are not the only health problems which smokers experience. Cancer of the lungs, mouth, larynx, oesophagus, bladder and kidneys are common. Moreover, women who smoke while pregnant are likely to have babies who are lower in birth weight. Therefore, it is important to continue educating the population about the dangers of smoking.

Let's try another (with brackets)

Read this...

By examining the relationships among the various forms of demand and income, Keynes was able to explain the Great Depression in a way that classical economists could not.

If government policy
could affect the sizes of the leakages
and the injections

aggregate demand could be managed.

id·i·ot [id-ee-uht]

-noun

1. an utterly foolish or senseless person.
2. anyone who spends four years learning English skills in high school and then never uses any of them.

Synonyms:

1. fool, half-wit; imbecile; dolt, dunce, numskull, moron.

Over the long term the effects of smoking are more serious than they are over the short term. For example, blood vessels in the heart and brain narrow and darken. The smoker experiences shortness of breath and usually a cough. Also, smokers often suffer lung infections and diseases such as pneumonia, bronchitis, or emphysema. However, lung problems are not the only health problems which smokers experience. Cancer of the lungs, mouth, larynx, oesophagus, bladder and kidneys are common. Moreover, women who smoke while pregnant are likely to have babies who are lower in birth weight. Therefore, it is important to continue educating the population about the dangers of smoking.

Intro

Introduces the main idea of the paragraph (this is why this note-taking technique works)

Body

Contains details that support the main idea (they prove it, further it, explain it, substantiate it, or justify it)

Conclusion

Reinforces the main idea.

Boulton's CPR

Get the Big Picture

ONE

Read the chapter title, then read the unit that the chapter's in

This tells you how this topic fits into the big picture.

TWO

Skim through the chapter to get an idea of what it's about. **Don't read**, just look at titles and subtitles.

THREE

Now you know the layout, *read the chapter's intro paragraph(s)*.

At this point, you should have an idea of what the structure and layout of the chapter is.

FOUR

In a few sentences in your head, describe the focus of the chapter. If you had to explain to a friend what the chapter's about in 2-4 sentences, what would you say? What, as a student, is the most significant concept you should remember from this chapter 5 months from now? Once you've got it, write it.

FIVE

Read. Do it this way:

- a. *Read the first (and last) paragraph under each subtitle.* If you still don't have the gist of it,
- b. *Read the first (and last) sentence of each paragraph*

How to take notes in a lecture: The "Cornel Method"

Get the Big Picture

ONE

Read the chapter BEFORE you go to the lecture

Skim it like I've taught you here. You'll absorb far more. You'll also know what's vital and not.

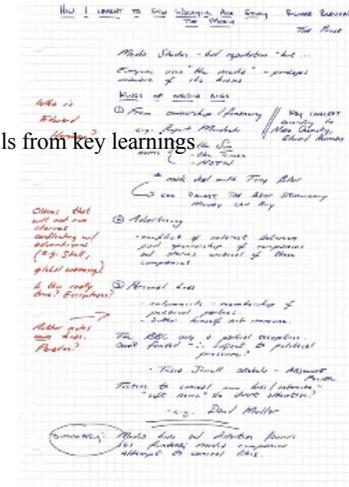
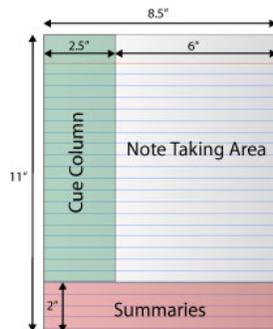
TWO

Don't hear, listen. Get it?

THREE

Use the Cornell University Note-taking method

This will help you narrow down the key ideas, and separate details from key learnings



Test Revision

Instructions

1. Type up your answers on a new sheet of paper. Erase nothing on the original.
2. Write the correct answer.
3. Explain using proper terminology & course concepts:
 - (i) Why your answer does not work. **Do NOT tell me what you did wrong!** Instead, tell me WHY what you did was not the correct procedure, and HOW it would lead to a false answer.
 - (ii) Why the correct answer does work. Again, tell me WHY the correct procedure would lead to the right answer.
4. Everything **MUST** be in your own words.
5. Explanations need to be in the same order as the test questions. For questions that were correct, include the question number with the word "correct" so I know to skip over it. In other words, if you didn't lose any marks for question six, then write:

6. Correct.

You must do all of these steps or no mark revision will be awarded.

Assignment Revision

Instructions

1. Delete nothing, not even my comments.
2. If you wish to show me that you're removing something, then use the "strikethrough" font. In google, this is found under **FORMAT - STRIKETHROUGH**.
3. Insert any new work into the appropriate place, and ensure that it is coloured in **BLUE** font colour (not background colour).
4. Using my comments, explain the following for each blue correction:
 - a) Why what you originally had written down was illogical, incorrect, or incomplete (Don't tell me why you forgot or why you didn't do it!!!! Tell me why what you actually had written down was not sufficient)
 - b) What you think your correction adds to your work and/or how it fixes the problems in #4(a) in terms of insight, clarity, or anything else.
 - c) If you are adding something upon which I did not directly comment, then insert your own comment (INSERT - COMMENT).

You must do all of these steps or no mark revision will be awarded.

Reflection

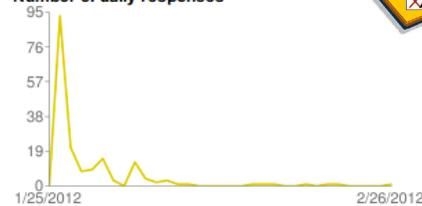
A Question

If you had a chance to ask every IRHS grad a question, what would it be?

Grads were asked the following:

Please comment on what change you would benefit from the most, if you had to go back to high school and do it all again. As well, you can make any additional comments you feel help explain your answers above. Please do not hesitate to add any suggestions or constructive feedback so that my courses can be improved for those who follow you.

Number of daily responses



Some Facts

319 emails were sent encompassing the school years ending June 2008 to June 2011 (only 20 were sent to earlier periods). This represents approximately 27% of all grads during this time frame .

Response rates for these years are over 15% of *all* graduates, and 60-65% of Jeff Boulton's students.

181 responses were received as of February 27, 2012 (twice the response rate of most professional voluntary-response surveys, and more than voter turnout in most elections in Canada).

Of the 181 responses, 59% (106 students) offered a verbal comment; only 3 were negative

Personal Self-Reflection

www.JeffBoulton.ca

Consider the following:

Did you do all the exercises?
Did you do all the review?

Did you try what was suggested (i.e. make a matrix of understanding)?
Did you review notes?
Did you make good notes from the problems/lessons?

Did you pay attention in class?
Did you make sure you knew how to do each question, and WHY the correct solution was in fact correct?

Did you use the online quiz to practice?

Think of these for all of the above: FREQUENCY, INTENSITY, DURATION

Think of what you need to improve: What you need to do, AND what you need from others (like your teacher)

Reflection

Read the responses and list the following three things:

Something that surprised you



Something that was frequently or highly recommended that you hadn't thought of doing



Something you will resolve to do, now that you have read these comments

