

# Rigor

Wendy Rohm

wrohm@wilmingtonchristian.com

[rohmscience.weebly.com](http://rohmscience.weebly.com)

**RIGOR. YOU KEEP USING  
THAT WORD**



**I DO NOT THINK IT MEANS  
WHAT YOU THINK IT MEANS**

[makeamememe.org](http://makeamememe.org)

## What RIGOR is NOT-

1. More homework
2. Doing more worksheets, more problems, more essays
3. Only for the best students
4. Removing support
5. Found in the resources
6. One more thing for an already-busy teacher

## RIGOR IS:

1. High quality assignments
2. Performing at higher level
3. Any student can reach higher
4. Built on a culture of success
5. Found in the way you use the resources
6. Increasing the level of expectation for what you are already doing

# Defining Rigor-

## An environment

Where each student is **expected** to learn at high levels.

Where each student is **supported** so he or she can learn at high levels.

Where each student **demonstrates** learning at high levels.

Barbara Blackburn. Rigor Made Easy, p. 9.

## **Environment:**

1. Control the classroom environment, not the students.

Fluent procedures.

Make the students who do the right thing feel comfortable.

Focus on expectations, not rules.

## **MAY I SAY SOMETHING?**

**Yes!** Please say it if ...

- you have **permission**
- it is **polite**
- it is **productive**
- you are **patient**

**WE VALUE YOUR INPUT.  
YOU CAN HELP US LEARN.**

**SO PLEASE, SPEAK UP!**

# Environment:

2. Give your students your BEST-  
Belief, Encouragement, Support, Time.

Blackburn

# Environment: It starts with YOU



Eye contact  
Smile  
Wait time  
Interaction  
Opportunities  
Encouragement  
Time

Do you treat \_\_\_\_\_  
like a caterpillar or a worm?



## Environment:

3. Create a college going culture.
  - Teacher/students use appropriate vocabulary
  - Answer in complete sentences
  - Talk about college like it's a given, not an option
4. Stop teaching to the middle.
5. Create a culture of error. Reframe failure as a step towards success. Failure is an expected part of learning.



• IN OUR CLASS •

**MISTAKES**

ARE

**EXPECTED**

**RESPECTED**

**INSPECTED**

**CORRECTED**

**EMBRACE THE MISTAKES**

Poster made for free on [www.canva.com](https://www.canva.com)

# Environment:

1. Control the classroom environment, not the students.
2. Belief, Encouragement, Support, Time
3. College going culture
4. Stop teaching to the middle
5. Culture of error

# Defining Rigor-

An environment

Where each student is **expected** to learn at high levels.

Where each student is **supported** so he or she can learn at high levels.

Where each student **demonstrates** learning at high levels.

Rigor Made Easy, p. 9

# Expectations: teacher AND student

1. Students need to adjust their expectations.  
“The teacher expects more of me. I will expect more of myself.”
2. Communicate expectations of rigor
3. Post/use learning objectives.
4. Format matters.



① **I AM EXCITED TO LEARN SOMETHING NEW**  
Through activities that make learning fun

② **I AM NOT AFRAID TO FAIL**  
Because I can learn from my mistakes

③ **I THINK CREATIVELY**  
By coming up with many solutions to a problem

④ **I UNDERSTAND WHY**  
And how a formula or procedure works through exploration

⑤ **I SEE THE BIG PICTURE**  
By using what I've learned in different situations

©2016 MRS. GIBBS

**MIND Research Institute**

Creators of ST Math  
mindresearch.org | stmath.com

## The teacher's thinking when asking questions -

- What does the student appear to know and understand about \_\_\_\_\_ ?
- What questions could you ask in order to -
  - Assess, advance, support the student's thinking?
- Are you calling on a variety? Do you only ask challenging questions to certain students?
- What is everyone else doing? Involved?

The teacher's thinking when...

- What is the goal of this activity?
- Why is this activity important?
- How can I make this activity more engaging?
- What are the key concepts?
- How can I assess student learning?
- What are some common misconceptions?
- How can I differentiate instruction?
- What are some effective strategies?
- How can I encourage student collaboration?
- What are some effective questions?
- How can I manage classroom behavior?
- What are some effective feedback techniques?
- How can I create a positive learning environment?
- What are some effective assessment methods?
- How can I use technology in the classroom?
- What are some effective communication strategies?
- How can I build student self-efficacy?
- What are some effective classroom management techniques?
- How can I use data to inform instruction?
- What are some effective professional development strategies?
- How can I collaborate with colleagues?
- What are some effective leadership strategies?
- How can I promote a growth mindset?
- What are some effective strategies for promoting student agency?
- How can I use formative assessment to guide instruction?
- What are some effective strategies for promoting student ownership?
- How can I use peer feedback to improve learning?
- What are some effective strategies for promoting student leadership?
- How can I use reflection to improve learning?
- What are some effective strategies for promoting student collaboration?
- How can I use project-based learning to engage students?
- What are some effective strategies for promoting student inquiry?
- How can I use authentic assessment to measure learning?
- What are some effective strategies for promoting student resilience?
- How can I use social-emotional learning to support student well-being?
- What are some effective strategies for promoting student growth?
- How can I use differentiated instruction to meet student needs?
- What are some effective strategies for promoting student success?
- How can I use formative assessment to guide instruction?
- What are some effective strategies for promoting student ownership?
- How can I use peer feedback to improve learning?
- What are some effective strategies for promoting student leadership?
- How can I use reflection to improve learning?
- What are some effective strategies for promoting student collaboration?
- How can I use project-based learning to engage students?
- What are some effective strategies for promoting student inquiry?
- How can I use authentic assessment to measure learning?
- What are some effective strategies for promoting student resilience?
- How can I use social-emotional learning to support student well-being?
- What are some effective strategies for promoting student growth?
- How can I use differentiated instruction to meet student needs?
- What are some effective strategies for promoting student success?

WHY ASK  
QUESTIONS?



# Questioning Techniques

1. Probe for higher level
  - a. That's a good start. What else can you tell me?
  - b. John got us moving in the right direction. Sally, what can you add to his answer?
  - c. That's a good answer. What can you do to make it a great answer?
  - d. Why do you think that your answer is correct?

# Questioning Techniques

2. No opt out.
3. Think time.
4. Call on a variety. Expect answers from all.
5. Questions should give students the opportunity to express their own thinking and reasoning, not just repeat the teacher's thinking.

# Questioning Techniques

6. Increase think ratio
  - Increase time spent \_\_\_\_\_
  - Reduce time spent \_\_\_\_\_

Ask yourself- what should my students be doing during this part of class?

## Questioning Techniques

7. Reject student self-reporting of learning.  
Demand student demonstration of learning.
8. Ask it backwards. Give students a well-written answer and have them write the question.

# Try these questions:

- What do others think about what \_\_\_\_\_ said (or wrote)?
- Do you agree or disagree? Tell us why.
- Does anyone have the same answer but a different way to explain it?
- Can you convince the rest of us why that makes sense?
- Why is that true?
- Does that always work? Does it work in all cases?
- Can you think of a counterexample?
- What assumptions are you making?
- What would happen if . . . ?
- What decision do you think he should make?
- What is alike and what is different about these two answers?
- How does this relate to . . . ?
- Have we ever solved a problem like this before?

# Analytical Thinking

- Break down complex into fundamental parts or principles
- Use the facts to support conclusion
- Look for patterns and trends
- Look for cause and effect
- Organize information
- Identify key issues

# Critical Thinking

- Evaluate information to make a judgement
- Form opinion by evaluating sources of info
- Include your opinion and knowledge
- Weigh opinions
- Use abstract ideas to interpret info.
- Assess bias or unsubstantiated assumptions

**Expectations: teacher AND student**

*Something old  
and something new.*

# Defining Rigor-

An environment

Where each student is **expected** to learn at high levels.

Where each student is **supported** so he or she can learn at high levels.

Where each student **demonstrates** learning at high levels.

Rigor Made Easy, p. 9



# Support Learning


1. Teach note-taking. (Try Cornell method)
2. Teach how to “pay attention” .
  - Sit up
  - Lean Forward
  - Act attentive using varied facial expressions
  - Nod when the person pauses
  - Track the speaker, maintain eye contact

*Rigor in Your Classroom p 103.*



How to be a great learner

# STAR

- S** Sit up
- T** Track the speaker
- A** Ask and answer questions like a scholar
- R** Respect those around you 

And whatsoever ye do in word or deed, do all in the name of the Lord Jesus, giving thanks to God and the Father by him. Colossians 3:17

# Support Learning

3. Productive struggle
4. Model assignments
  - Discuss assignment
  - Consider their past experiences
  - Show examples
  - Model the evaluation method of assignment
  - How to write a great sentence

# Support Learning

5. Provide reading guide

## *Guide-O-Rama*

Europe: War and Change—Chapter 12 (Sections 12.1–12.2)

### Page # Reading Tip

326 Look at the map. This gives you an idea of where Europe is in relation to where it would take to travel there? What would be the quickest way? What would be the most difficult way?

327 Read the introduction in the yellow box. Can you believe that most Europeans speak at least three languages? Can you speak any language other than English? Do you speak another language? Why or why not?

329-332 Read section 12.1. Pay close attention to the terms nationalism, colonialism, and imperialism. They are related, and can be confusing!!! I've found that when I am learning new terms, it's important to write an example along with the definition to help me understand.

---

## Chapter 4 Reading Assignment

Being able to read technical writing is an important skill in many different occupations. This activity will give you the chance to improve those skills. Carefully READ each section indicated. Read with the intention of UNDERSTANDING the material being presented. If necessary, READ IT AGAIN. The question on the page are to help you understand and to guide your thinking. The goal of this assignment is NOT to skim to find answers. THE GOAL IS UNDERSTANDING.

Read the Chapter 4 introduction, p. 77

1. In what way is a stroke similar to a heart attack?
2. There is a question at the bottom of the page. Read the question. Since that question is asked in Chapter 4, you can hypothesize that the answer to the question about diagnosing and treating strokes will have something to do with . . . what?

5. The operation of an MRI can be summed up this way: a strong magnetic field lines up the spinning \_\_\_\_\_ in the body's water molecules. Radio frequencies makes those water molecules \_\_\_\_\_. When the radio frequency is turned off, the spinning, wobbling molecules \_\_\_\_\_ and release energy in the form of \_\_\_\_\_. These signals are interpreted by a computer and are used to form and \_\_\_\_\_ of the tissues in the body.
6. How is MRI technology useful to doctors?
7. Look at the picture of the MRI machine on p 98. Here are some of the disadvantages of the machine: they are very heavy (not portable), extremely expensive, very noisy, and can cause claustrophobia. Toward what goals should research in MRI development be directed? (Which of these problems should be solved first? Why?)

#### **Read 4.2 Early Thoughts on the Structure of Matter, p 78-79**

11. What is the difference between philosophical atomism and scientific atomism? Which kind of atomism did the ancient Greeks practice?
12. Explain the Law of Definite Proportions by using water as an example.

#### **Read 4.3 The First Experimental Model: Dalton's Atomic Model, p. 79**

13. What are the two premises of Dalton's theory of matter? Do chemists agree with each of these today?



19. Study the diagram 4-15 at the bottom of page 85. The circle at the bottom left shows a diagram with a blue dot at the center and rings around it. What does the blue dot represent? What do the rings represent?

20. According to this diagram and what you have read, when an element is heated the electrons \_\_\_\_\_ energy and \_\_\_\_\_ to a higher level. Electrons release energy when they \_\_\_\_\_.

21. Consider the bottom right diagram on p 85. Which fall represents a greater amount of energy being released: a fall from level 6 to 3, or a fall from level 5 to 2? \_\_\_\_\_ How do you know?

## 5A The Periodic Table Notes

Carefully read section 5A (p112-114). Complete the table showing how each scientist contributes to our understanding of elements and the periodic table.

Name	Description of organization	Positives	Negatives
Antoine Lavoisier			
John Dalton			

1. In your own words, from what you have read, what were all of these men trying to do?
2. In your own words, from what you have read, what is the periodic table?
3. Consider the contributions of Mendeleev. If you had to describe him as a scientist in just 3 words, what words would you use and why? (Do not refer to his appearance.)  
Word #1  
Word #2  
Word #3
4. Henry Moseley was killed during WWI at the age of 27. Another famous physicist said of him "Had the European War no other result than the snuffing out of this young life, that alone would make it one of the most hideous and most irreparable crimes in history." Why do you think he said that about Moseley?

Proof for:	Statement	Proof against:
	1. Lincoln believes the soldiers have died in vain.  Agree                      Disagree	
	2 Lincoln's intent is to make Americans feel guilty about the war.  Agree                      Disagree	

Silver, Strong, Perini. The Strategic Teacher

5. Provide a reading guide.
6. Teach great sentence writing.

Say what you mean. Read it to yourself. If you need to explain what you meant then it is not a good sentence.

Model sentence starters:

In spite of \_\_\_\_\_, George Washington \_\_\_\_\_.

Because of \_\_\_\_\_, they concluded \_\_\_\_\_.

Had it not been for \_\_\_\_\_, \_\_\_\_\_.

Not only \_\_\_\_\_ but also \_\_\_\_\_ . . .

## Example

Write a sentence using the names of 2 of these men:

Aristotle, Democritus, Alexander the Great, Copernicus.

*Why should we require answers in  
COMPLETE SENTENCES?*

## Or DON'T write a sentence

Describe \_\_\_\_\_ in 3 words.

Write a newspaper headline for this event in 5 words or less.

Give a 3 word clue to get someone to guess the vocabulary word.

Play Taboo (you will have to think of words they can't use ahead of time)



# Taboo type game

Describe the word

**PRESSURE**

Without using any of  
these words:

force  
area  
gas

Describe the word

**GOVERNMENT**

Without using any of  
these words:

authority  
president  
nation

Describe the word

**SLOPE**

Without using any of  
these words:

line  
rise  
run

Or **DON'T** write a sentence

Flesh out the skeleton.

heart=

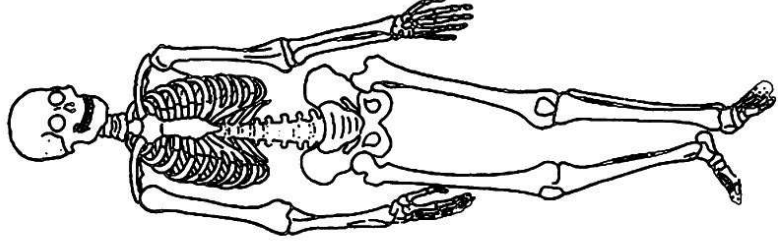
feet=

arms=

spine=

hand=

mouth=



**Review ≠ Repeat**

## Review ≠ Repeat Think differently

Make a metaphor.

- How is a colony like a child?
- Compare capitalism to a baseball game. Or a beehive.
- What else can we compare to capitalism?
- If you were a type of rock (igneous, sedimentary, metamorphic), which particular one would match your personality? Why?
- How is this process like digestion?
- How is the Declaration of Independence like a break-up letter?

Silver, Strong, Perini. The Strategic Teacher

# Defining Rigor-

An environment

Where each student is **expected** to learn at high levels.

Where each student is **supported** so he or she can learn at high levels.

Where each student **demonstrates** learning at high levels.

Rigor Made Easy, p. 9

# Student performance & demonstration

1. Students use academic and domain specific vocabulary.
2. “Easy comes through hard work.”
3. Peer editing and revision .
4. Every student answers: use Pair & Share, individual whiteboards, interactive response technology.
5. Provide choice and relevant assignments. What does the assignment really measure?
6. Multiple ways to demonstrate learning- not same type of tests every time, allow creative demonstrations.
7. Create student interest- examples:

## Interesting projects / activities

### Creative writing assignments:

- ❑ Write from a certain point of view.
- ❑ Be a comma, write an Op Ed piece to young authors about the misuses of the comma.
- ❑ Write from the point of view of the word problem as he writes in his diary explaining all of his hidden tricks.
- ❑ A water drop explaining to new water drops what to expect in the water cycle.
- ❑ TV interview with reporter and an ancient Aztec.

## Interesting projects / activities

Creative writing assignments:

- ❑ Write a haiku
- ❑ 5 syllables, 7 syllables, 5 syllables

Atmosphere, it's here  
Around the Earth in layers  
N, O, H and more

Axis and Allies  
Allies were victorious  
It's all World War II

## Interesting projects / activities

Creative writing assignments:

- Write a riddle
- Vocabulary
- Historical figures
- Bones

Prices go up.  
Your wallet is thinner.  
You pay twice as much to  
provide for your dinner.  
What am I?

*Inflation*

My end is not like my beginning.  
I get bound up for change.  
I start low and end up high.  
What am I?

*A butterfly*



# Interesting projects / activities

## Creative assignments:

- ❑ Research and present an argument for or against \_\_\_\_\_
- ❑ Biome project. The town council needs land for a new building project. They will need to use land in one of these biomes. Make a presentation to use at the town council explaining why your biome is extremely important and should not be destroyed.

<p>Create a conversation between two articles of the Constitution, with each stating why one is more important than the other.</p>	<p>You are the Chief Justice of the Supreme Court. Show your duties and responsibilities in an agenda or schedule format.</p>	<p>How is the Constitution like a building blueprint? A baseball game? A city? Create an analogy for two of these questions and write an analogy of your own.</p>
<p>Create a powerpoint presentation for three of the seven articles of the Constitution. Present it to the class.</p>	<p>Create a collage representing at least 5 ways the Constitution affects us today. Write a paragraph explaining your collage.</p>	<p>Create a fictional story that shows what the US would look like if the Constitution did not exist. Read your story to the class.</p>
<p>Find and collect at least three newspaper articles which show how the Constitution affects us today. Highlight the main idea of each article.</p>	<p>The US has been taken over by a foreign country. How is this going to affect the Constitution? Report this effect in a news bulletin on network television.</p>	<p>Create a set of 12 flashcards of the articles of the Constitution to be used for people studying to become naturalized citizens. Include a visual representation, term, and a definition in your own words for each card.</p>

## SOURCES:

- Lemov, Doug. *Teach Like a Champion 2.0: 62 Techniques That Put Students on the Path to College*. Jossey-Bass, 2015
- Boston, Melissa, et al. *Implementing Effective Mathematics Teaching Practices*. From the “Taking Action Series”. National Council of Teachers of Mathematics, 2017
- Blackburn, Barbara R.  
*Rigor in Your Classroom: A Toolkit for Teachers*. Routledge, 2014.  
*Rigor Made Easy: Getting Started*. Eye On Education, Inc., 2012.  
*Rigor is not a Four Letter Word*. Eye on Education, 2008
- Johnson, LouAnne. *Teaching Outside the Box: How to Grab Your Students by Their Brains*. Jossey-Bass, 2015.
- Whitaker, Todd. *What Great Teachers Do Differently: 17 Things That Matter Most*. Eye On Education, 2011
- Silver, Harvey; Strong, Richard; Perini, Matthew. *The Strategic Teacher*. ASCD, 2007.