Activating Students' Intrinsic Motivation to Master Mathematics

What observation(s) can you make regarding the teaching practices advocated in NCTM's **Principles to Actions** and the science of human motivation? In other words, how would the implementation of the teaching practices advocated in **Principles to Actions** produce stronger student motivation for learning mathematics?

Mathematics Teaching Practices

- Establish mathematical goals to focus learning
- Implement tasks that promote reasoning and problem solving
- Use and connect mathematical representations
- Facilitate meaningful mathematical discourse
- Pose purposeful questions
- Build procedural fluency from conceptual understanding
- Support productive struggle in learning mathematics
- Elicit and use evidence of student thinking

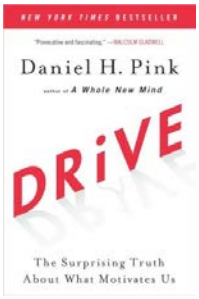
Factors Influencing Intrinsic Motivation

★ **Autonomy** (Task, Time, Technique, Team)
★ **Mastery** (Flow, Clear Goal, Mindset, Sense of Making Progress)
★ **Purpose** (Why, Connections, Larger than one's self)
★ **Belonging** (Culture Interests, Membership)

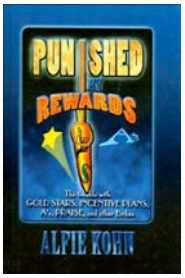
Make some notes on the connections you see below:

BUCKEYE COMMUNITY HOPE FOUNDATION
Education Division

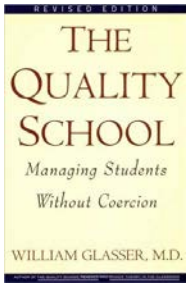
For Further Information on Inspiring Student Learning and Motivation in the 21st Century, Here Are Some Recommendations:



Drive: The Surprising Truth About What Motivates Us, *Daniel H. Pink*
Forget everything you thought you knew about how to motivate people—at work, at school, at home. It's wrong. As Daniel H. Pink (author of To Sell Is Human: The Surprising Truth About Motivating Others) explains in his paradigm-shattering book Drive, the secret to high performance and satisfaction in today's world is the deeply human need to direct our own lives, to learn and create new things, and to do better by ourselves and our world.
Drawing on four decades of scientific research on human motivation, Pink exposes the mismatch between what science knows and what business does—and how that affects every aspect of our lives. He demonstrates that while the old-fashioned carrot-and-stick approach worked successfully in the 20th century, it's precisely the wrong way to motivate people for today's challenges.

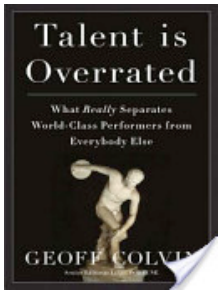


Punished by Rewards, *Alfie Kohn*
The basic strategy we use for raising children, teaching students, and managing workers can be summarized in six words: Do this and you'll get that. We dangle goodies (from candy bars to sales commissions) in front of people in much the same way we train the family pet. Drawing on a wealth of psychological research, Alfie Kohn points the way to a more successful strategy based on working with people instead of doing things to them. "Do rewards motivate people?" asks Kohn. "Yes. They motivate people to get rewards." Seasoned with humor and familiar examples, Punished By Rewards presents an argument unsettling to hear but impossible to dismiss.

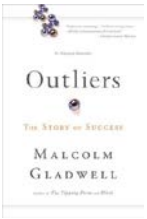


The Quality School: Managing Students without Coercion, *William Glaser*
"This should be required reading by every school administrator, every teacher, every board member and all university faculty involved in the training of teachers. There is no doubt that we need to squeeze all blame, all coercion and all criticism out of any people-related business. Not until we realize that schools are in a people business will we ever be able to make meaningful changes."
—Dr. Albert Mamary, former superintendent of schools, Johnson City, New York

Argues that traditional coercive management in schools is the root of today's educational problems.

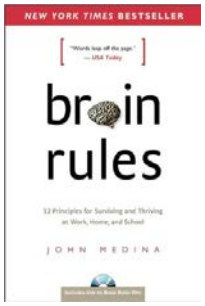


Talent Is Overrated: What Really Separates World-Class Performers from Everybody Else, *Greg Colvin*
Asked to explain why a few people truly excel, most people offer one of two answers. The first is hard work. Yet we all know plenty of hard workers who have been doing the same job for years or decades without becoming great. The other possibility is that the elite possess an innate talent for excelling in their field. We assume that Mozart was born with an astounding gift for music, and Warren Buffett carries a gene for brilliant investing. The trouble is, scientific evidence doesn't support the notion that specific natural talents make great performers. According to distinguished journalist Geoff Colvin, both the hard work and natural talent camps are wrong. What really makes the difference is a highly specific kind of effort-"deliberate practice"-that few of us pursue when we're practicing golf or piano or stockpicking. Based on scientific research, Talent is Overrated shares the secrets of extraordinary performance and shows how to apply these principles.



Outliers: The Story of Success, *Malcolm Gladwell*

There is a story that is usually told about extremely successful people, a story that focuses on intelligence and ambition. Gladwell argues that the true story of success is very different, and that if we want to understand how some people thrive, we should spend more time looking around them-at such things as their family, their birthplace, or even their birth date. And in revealing that hidden logic, Gladwell presents a fascinating and provocative blueprint for making the most of human potential.

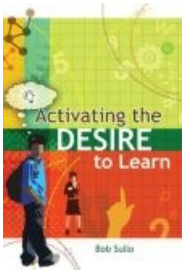


Brain Rules, *John Medina*

Most of us have no idea what's really going on inside our heads. Yet brain scientists have uncovered details every business leader, parent, and teacher should know-such as the brain's need for physical activity to work at its best. How do we learn? What exactly do sleep and stress do to our brains? Why is multi-tasking a myth? Why is it so easy to forget-and so important to repeat new knowledge? In Brain Rules, molecular biologist Dr. John Medina shares his lifelong interest in how the brain sciences might influence the way we teach our children and the way we work. In each chapter, he describes a Brain Rule-what scientists know for sure about how our brains work-and then offers transformative ideas for our daily lives. Medina's fascinating stories and sense of humor breathe life into brain science. You'll learn why Michael Jordan was no good at baseball. You'll meet a boy who has an amazing memory for music but can't tie his own shoes. In the end, you'll understand how your brain really works-and how to get the most out of it.

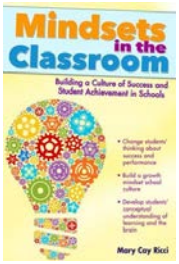
At Risk Students: Reaching and Teaching Them, *Jonas Cox and Richard Sagor*

The revised edition of this book was just released last month, The authors describe their work in applying the lessons on motivation they learned from at risk kids to the acquisition of academic content and skills for life-long learning. From a theory basis, the information parallels what you will find in the other books listed here on motivation with the added benefit of drawing on the authors' successful experiences in schools with at-risk kids. It also suggests activities to do with staff to help implement the motivational techniques and concepts.



Activating the Desire to Learn, *Bob Sullo*

The research is indisputable: Students are less disruptive and do better academically in schools that cultivate the internal motivation of students. In Activating the Desire to Learn, veteran educator Bob Sullo shows how to apply lessons from the research on motivation in the classroom. According to the author, we are all driven to fulfill five essential needs: to connect, to be competent, to make choices, to have fun, and to be safe. Studies show that when these needs are met in schools, good behavior and high achievement tend naturally to ensue. Written as a series of candid dialogues between the author and K–12 students, teachers, counselors, and administrators, Activating the Desire to Learn covers everything you need to know to change the dynamics of learning in your classroom or school



Mindsets in the Classroom, *Mary Cay Ricci*

In working with at-risk students, "mindset" is usually the first issue to overcome. Ms. Ricci provides information on mindsets as well as specific techniques to help students understand that intelligence is not a fixed quantity, but something that can be developed with work and effort.

BUCKEYE COMMUNITY HOPE FOUNDATION
Education Division

Inspiring Student Learning

Increasing Intrinsic Motivation for an Education

Take Grades Out of the Spotlight

- Schools may not be ready to give up on grades, but that doesn't mean you must emphasize the reason for doing an assignment is the number of points they can "earn" or the percentage the work counts toward their grade.
- Do you reward them with "points" when a thank-you or helpful feedback would suffice?

Use *Incentives* Only When Appropriate

- Identify tasks that your students do that are routine, almost mechanized. Can you use incentives to get them to do it any faster or better? Think about what kind of "if/then" awards would be appropriate (and then use them)! Do not use incentives for work that involves creativity or thinking as incentives have a negative impact on this kind of work.
- Collaborate with your students to find the most appealing "if/then" scenarios – "if we get this done by Friday, I will wear a pink vest all day on Monday" may be more appealing than "if we file this by Friday, we'll have pizza." (Or the opposite may be true. It's your job to find out.)

Work and Play

- Like Tom Sawyer, sell the benefits of the work your students are doing. Can you convince them that the work is actually enjoyable?
- Help your students identify the tasks they do that directly help others, or tie the work they do to a direct impact on the school or class. This will help them feel more like the Swedish women who donated blood because it was the right thing to do instead of donating for money.
- Best Part of Class Meeting. Ask your students to come to the next class meeting with one sentence about the work they like doing best. Sharing this insight will spark others to feel more connected to the work they do (feeling more like play than work). (*Not collaborating with your students? This is a good place to start. Ask students!*)

Self-Examination

- Best-selling author Daniel Pink summarized our intrinsic drivers as a desire for Autonomy in our work, a desire to build Mastery in an area of interest to us, and a higher Purpose than just earning an income or being compliant. Examine yourself – are you internally motivated to teach by Autonomy, Mastery and Purpose? Or would more cash make you work harder than you do?

Autonomy

Factors that influence the feeling of Autonomy that one possesses fall into four categories: The control one has over the task assigned, the time to complete the task, one's choice of those who work together on the task, and the techniques that one can choose to complete the task. While some of these may need to be fixed in a given situation, the more choice in these areas that you can build into the task, the greater the degree of autonomy one feels. While such choice sometimes has no more than a minor impact on the actual learning, it has a very positive impact on students motivation to learn.

Task

- Have regular one-on-one meetings with your students and ask them what kind of tasks they prefer doing. Try to offer more of those tasks.
- Are there times when you can offer choices regarding the task, i.e., different task choices that would result in the same learning outcomes?

Time

- Encourage your students to look at their "To Don't" List and identify what they can take off their plates or what wastes time that they could stop doing to increase time for productive learning.
- Look for opportunities for your students to set their own schedule regarding tasks. Do they need to all finish at the same time, or is there some leeway?

Team

- Instead of assigning two students to work together, ask one person if there is someone he/she would benefit from working with.
- Share the research that in peer tutoring, the person doing the tutoring gains just as much growth in understanding as the person being tutored--students learn much when they teach others. (effect size = .54, John Hattie, **Visible Learning for Teachers**, 2012). Note that students should be *taught* how to tutor effectively--simply telling a student to tutor another is <u>not</u> always effective.
- Grow a class climate focused on successful and high quality completion of tasks so that group formation is less about being with friends and more about have an optimum team with a variety of strengths represented. (even a student who "needs help" is a strength because it forces the *bright* students to clarify and explain their thinking, sometimes uncovering weaknesses or errors).

Technique

- Get feedback from your class about HOW work gets done. Do they have any suggestions for improvements to processes or procedures that haven't been implemented?
- As a teacher, focus on whether work is getting done, not how. Unless there is a big inefficiency in your students' work (or what they're doing is wrong), let them do it their way.

Mastery

Mastery is the desire to be good at something that we have selected whether it be playing an instrument, excelling at a sport, being an expert in a field, or becoming a better teacher.

Mindset

- Try to identify whether your students have a fixed or growth mindset. Those with a fixed mindset believe that intelligence is a fixed quantity--they are either smart or not. With growth mindset, students understand that achievement is a product of hard word, not innate ability. Listen for black-and-white thinking, which sometimes includes the words "success," "failure," "never," "always," or "hard."
- Coach those students with fixed mindsets to develop more of a growth perspective. Expose them to books such as **Talent Is Overrated** (Greg Colvin), **Outliers** (Malcolm Gladwell) or **Brain Rules** (John Medina).
- Read Carol Dweck's book, **Mindset**.

Tasks with just the right amount of challenge

- Providing just the right amount of challenge is crucial to building intrinsic motivation. It is a key reason why differentiating instruction can yield substantial improvement in the achievement of all students.
- Work with your class to identify small steps each student could take to improve in a given area.
- Partner two students together who have opposite or differing skills and encourage them to teach one another.
- Differentiate your instruction to insure the right amount of challenge.

Feedback

- Make sure you're providing regular, clear feedback to help keep your students on track. Remember the difference between feedback (positive impact) and praise (negative impact).
- Ask your students if they are clear about their goals, and then have them repeat their goals back to you (since nothing says "I get it" like being able to clarify it yourself).
- Ask your students to identify how they will know they are making progress.
- Acknowledging a personal best by a student is a way to indicate that you are monitoring their progress and may also have a positive impact on relationship.

Flow

- Observe your class – when are they most productive? What situations yield the most flow for them? Start a conversation about Flow and see if they have any suggestions to increase their own or the class's.
- Monitor the tasks you assign for the building blocks of flow: the right amount of challenge (Goldilocks task), an absolutely clear goal, and rich, specific feedback on progress.

Purpose

Purpose is the reason for doing something. The intrinsic desire to do something beyond ourselves requires a purpose that resonates with our very being or reaches out beyond our immediate self-interest to something bigger.

Purpose Motive

- **When giving instructions for a task, make sure to share the WHY as well as the HOW. Why is the information they will learn important? How will the task help them understand the content?**
- Ask your students what they think the purpose of your course is. To take this a step further, ask your students for their six-word sentence of the course's purpose, and then compare and contrast the different purposes in a meeting. Collaborate as a team to define your class's purpose.
- Make sure every student has a purpose sentence (six words or more). Then work with your students to make sure their personal purposes are tied back to the class's purpose.
- Focus learning on the class as the unit instead of only the individual student. In other words, build a classroom community where everyone shares the responsibility for the class's learning. This moves purpose beyond the self and students become part of something larger. Such collective efficacy has been shown to be a powerful characteristic of school success.

Visuals

- Wherever possible, use visuals of your class's purpose. (*Perhaps this becomes a logo that elicits your purpose that appears on all class materials.*) One teacher printed small posters which he asked students to post inside their locker or in their room at home.
- As a team-building exercise, have small groups in your class draw a poster of the class's purpose and then share them with the rest of the class. Post them somewhere in your classroom.

Stories

- Use purpose-related stories in your classes, meetings, and your one-on-ones.
- Recognize your students for things they have done that contribute to the class's purpose. Make sure to include the story of what you observed when giving the feedback.

Experience

- How can you help your students experience the class's purpose directly? Can you take them on a field trip where they see the content (skills and knowledge) being used? (i.e. make use of community resources.)
- Brainstorm with your class different ways they can have a hands-on experience of the class's purpose.

Belonging

Relationship Building

- The surest way to demonstrate that you care is to show concern about student learning success to the point where you listen and act upon student input regarding what would help them learn.
- The enthusiasm you show for the content and the quality of the lessons and materials you prepare for them are also perceived by students as evidence of caring.
- Know your students in terms of where they are in terms of meeting your learning goals, but also for their individual interests and unique characteristics. Simply wishing a student a happy birthday or acknowledging their performance on the athletic field or in a school performance communicates that you know something about them outside your classroom.
- When planning a lesson, think about it from your students' perspective. If you were in their seat, how would the lesson work for you?

Inclusiveness

- Are your lectures and material inclusive of students' culture?
- Can you connect the content to their interests?
- Are there ways you can utilize community resources, including adults from the community, in your class?

Student Voice

- Ask students what you can do to help them learn. You might start with a questionnaire if this is new for students, then gradually move to a class meeting format to hear their concerns and, to the extent possible, act on them.

Classroom Climate

- Work to build a climate where the learning of the class is everyone's responsibility, not just the teacher's.
- Make the classroom "our room", not just the teacher's room. Everyone shares in the responsibility for the functioning and care of the classroom.

Links to Success

- Kay Alderman (1990) raised four factors that she described as links to success for at-risk students. These factors, when adequately addressed by teachers, increased the likelihood of success and development of an internal locus of control.
  - Proximal goals (immediate and attainable)
  - Learning strategies (appropriate for the learner, not too hard or too easy)
  - Successful experience
  - Attribution for success (students credit themselves for success)

Other

Teacher as coach/manager; Students as athletes/workers

- Athletes who let their coaches do all the work would find it very hard to bring home a medal! Harry Wong stated: *Whoever is doing the work is the one who is learning. In too many American classrooms, the teacher is the one doing most of the work*. Glasser (1998) listed these four essential elements for an effective lead manager:
  - The leader engages the workers in a discussion of the quality of the work to be done and the time needed to do it, giving them a chance to add their input.
  - The leader shows or models the job so that workers can see exactly what is expected. Workers are asked for input if they see a better way.
  - The leader asks the workers to inspect or evaluate their own work for quality, with the understanding that the leader accepts that they know a great deal about how to produce high-quality work and will therefore listen to what they have to say.
  - The leader is a facilitator in that he shows the workers that he has done everything possible to provide them with the best tools and workplace as well as a non-coercive, non-adversarial atmosphere to do the job.

Resistant Students

- Michael Pantalon (Yale School of Medicine) suggests asking two "irrational questions" for the purpose of moving others to action. For example, say a student is procrastinating about studying for a test. Instead of saying "You must study," ask two questions instead. (1) On a scale of 1 to 10, with 1 meaning not the least bit ready, how ready are you to study? After she offers her answer, ask: (2) Why didn't you pick a lower number? Asking why the number isn't lower is the catalyst. Most people who resist doing don't have an "yes-no" position, so don't ask a binary question. The 1-10 scale can expose a "maybe." As the student explains her reason for being a 4 instead of a 3, she announces her own reasons for studying. She moves from defending her current behavior to articulating why, at some level, she wants to behave differently. As she clarifies her personal, positive, and intrinsic reasons for studying, she increases the chances that she actually will study.

If you have to talk, try to limit yourself to 10-minutes. Attention spans only last that long.

- If you must talk longer than 10 minutes, do the core idea first. The mind processes meaning before detail. More will be remembered by the brain if it has the general structure to tie the details to. More doing by students and less talking by you elevates the importance of students in the classroom and their sense that the class is about them as well as you.
- You'll need a hook every 10 minutes to keep attention. A hook must trigger emotion and must be relevant.
- The brain does not multitask. It only attends to one thing at a time. People who are doing several things at once or switching between them, make 50% more errors, and take longer than if they gave each their full attention in turn. (*This is also why it is not a good idea to use a cell phone while driving.*)