K–12

THINKING AND ACTING LIKE A SCIENTIST

17 EFFECTIVE STRATEGIES

TO PROMOTE A RICH LEARNING ENVIRONMENT

STUDENT ENGAGEMENT

RISK-TAKING

COLLABORATION

SHARED CONTROL

STUDENT CHOICE

ORAL AND WRITTEN DISCOURSE

RICH LANGUAGE

CONSTRUCTION OF MEANING

Learning Environment

The instructional environment influences how students view themselves as science learners. When teachers establish an environment that supports collaboration and academic discourse, students freely take risks in pursuit of learning, value the sharing of ideas, and construct meaning through collaborative discussions.

We value a rich learning environment that promotes...

- **Student Engagement**
- **Risk-taking**
- **Student Choice**
- **Rich Language**
- **Collaboration**
- **Shared Control**
- **Oral and Written Discourse**
- **Construction of Meaning**

In the Classroom

In a rich learning environment...

- ☑ Students are engaged and take ownership in the learning process.
- ☑ Students feel safe taking risks, making mistakes, and learning from them.
- ☑ Teachers promote student choice whenever possible.
- ☑ Students use descriptive, academic language as they collaborate to construct meaning.
- ☑ Students have fun doing science!

Here are 17 strategies to get you started!

1 Sticky Note Surprise

When students feel like they matter, they're more likely to be engaged and curious.

To make sure each student knows you value them, use your calendar. Each month, place students' names on a day in your calendar. For elementary, you may have one student per day. For secondary, you may have 3-4 per day. On that day, write a quick sticky note with a positive message for that day's students and leave it on their desks. Each student gets a note from you each month, building the **rapport and connection** that is required for a culture of **risk-taking**.

2 Game-ify Your Lessons

Increase student engagement by taking a note from the gaming industry.

Consider what makes a game compelling. There is a goal, obstacles in the way of that goal, and some way to chart your progress toward that goal. Recreate these elements in your lesson. Position the learning objective as a goal. Then, set up the various components of the investigation as obstacles. Chart each team's progress through the "obstacles" in a visible way so each team sees themselves nearing the final "destination" to add instant **engagement**.

3 Jigsaw

Want to promote collaboration in your classroom? Conduct a Jigsaw!

Place students in a “home” group and have each student choose a different article to read. After reading, the groups divide into new “expert” groups consisting of students who read the same article. The article is discussed and then students re-form into their home groups and share in the **construction of meaning**. Working independently to accomplish shared goals is at the heart of **collaboration**!

4 Repeat and Add On

Develop students' listening skills by guiding their collaborative discussions.

Encourage them to share their ideas, but connect them to their classmate's ideas with this format: You said X. I also think X, and I also think Y. For example, "You said your marble went farther because more force was applied to it." I also think the marble went faster because more force was applied to it, and I also think there was more force because it was applied more directly." Students learn to **listen attentively** and **develop ideas**.

5 Four Corners

Give students an opportunity to take a stand and defend their thinking.

For questions that have multiple possible answers and/or perspectives, put four different answers to the question in the four corners of the room. Ask students to go to a corner, discuss the topic with the other students in the corner, and then support and defend their **choice** to the rest of the class.

6 Be Precise

As students are discussing their observations, encourage them to use precise language.

For example, if a group recorded that sand is moved from one place to another, you might introduce the term transport to encourage the use of **rich languag**e in the classroom. For example, say, “I notice that Kaya’s group mentioned that the sand moved from the dune into the water. Another way to say this is that the sand was transported. Did anyone else notice materials being transported from one place to another?”

7 Source Swap

Help students collaborate in order to efficiently construct meaning.

Have each student find a website or a video in support of the topic(s) under study. For example, if studying Earth's features, students may choose a feature (trenches, ridges, mountain ranges, etc.) and find a source with information about their chosen feature. Once they have reviewed their source they trade with another student and review the new source. The pairs then discuss the two sources and decide how to use the information as **reasoning** to support their **claim**.

8 Gallery Walk

Encourage collaborative sharing of ideas.

Have students position boards showing their work on easels, stands, a chalkboard ledge, or propped up against a wall or table. Have groups walk around the room to view all the boards. One person from each group can stay back to answer questions from the other groups. The small-group setting builds trust and supports **risk-taking**.

9 Present and Defend

Have students conduct a Present and Defend to develop presentation skills as well as audience participation skills.

Research teams present a summary of their investigation to the class. The class analyzes the information presented and asks clarifying questions, challenges and/or supports the arguments made, and even presents alternative explanations as appropriate. Research teams use oral discourse to defend their explanation with **evidence** and **reasoning**.

10 Room for Reflection

Resist the urge to move from one chunk of learning to the next without pausing for reflection.

When transitioning to new content, give students 2-3 minutes to discuss a reflection question. Most **construction of meaning** happens during reflection, so this helps students process what they've learned and may reveal any partial understandings.

11 Environmental Learning

Does your physical environment celebrate learning?

Display multiplication facts on stair risers, draw angles on the floor of a door opening, show a historic fact about clocks next to the clock, show a scientific model of a full circuit next to the light switch. Surround students with the **wonder of learning** to increase **student engagemen**t.

12 Circle Up

Want to keep students from always talking with the same partners?

Make sure they know how to **collaborate** with a variety of people. Have students form an outer circle and inner circle that face each other. Give each group a question/topic to discuss for one minute. Students in the outer circle then move until you say “stop” to talk with a new partner. Talking with various people about a topic builds **discourse** skills and **adaptability**.

13 Messing About

Messing About is curiosity's best friend!

Before moving directly into an investigation, allow time for students to "mess about" with materials and supplies to begin exploring and building interest in phenomena. During this experience, students can brainstorm questions they are interested in exploring later, while also building the prerequisite knowledge and experience they need to be successful in the investigation. Messing about builds **curiosity** and **engagement**.

14 Greeting Every Kid, Every Day

Make an effort to greet every student every day

If you want students to be **curious**, they first have to feel that their ideas and their wonderings matter. Make an effort to greet every student every day. Look each student in the eye and welcome them to your classroom. It's a small gesture that makes a big impact in **classroom culture**.

15 Know Your Role

Assigning specific roles allows students to share control of their learning.

Encourage effective collaboration by having students work in teams of 3-5 and take on specific roles. Each of the roles must be critical to the investigation, and each student must rely on the others to be successful. This can be an opportunity for **student choice** if the students show an affinity for a particular role.

16 Give One, Get One

Build collaboration skills and social-emotional skills at the same time.

Have students number their papers 1-5. Give them the topic you are about to study and have them write down 3 things they know about the topic. After they've written down 3 things, they move around the classroom and ask another student for a 4th piece of information and they share one of their ideas. They find a different student and repeat the process for a 5th piece of information. They learn you get more ideas when you **collaborate** and they learn you that sometimes you need to **give in order to receive**.

17 Grade-Free Zone

Students are often afraid to take risks because they think their grade will be affected.

Errors and mistakes should be embraced as a positive part of the learning process. Build in several activities each day that are grade-free to provide a learning environment that promotes **risk-taking**.

Creating classrooms where curiosity, creativity, and creating thinking thrive!

Student Programs

- Summer Camps
- Field Experiences
- High School Journal Club
- Afterschool Cohort
- Science on Saturday

Professional Development

- Teacher Workshops
- Sustained Training
- Customized Consulting
- Science on the Grand Conference

Instructional Tools

- Downloadable Lessons
- Interactive Student Journal
- Classroom Resources

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052018