

- **Give your students science notebooks.** A blank notebook presents a world of opportunity to students - and, by encouraging your students to fill the pages of a personal notebook with observations about the world that naturally interest them, you're sharpening their observational and writing skills in addition to their scientific literacy. Ask your students to use them as half-journals, half-reporting assignments: They should write down questions that they have, ideas for projects that they want to complete, and more! Even any drawings that your students would like to include of natural phenomena they see around them would be great. It's crucial that you make it clear to your students that these notebooks belong to them, and they can do what they want - as long as they fill the pages! Then, perhaps in one-on-one mentoring sessions with them as the year progresses, use some of the observations and questions they have put in their science notebooks to guide a specific-to-them project delving into a concept they thought of themselves (Teachersbrain, 2018).
- **Consider creating investigation stations.** During your science class, refer to your students as 'scientists' and invite them to study concepts in an official capacity in investigation stations around your classroom! At each of several different locations, set up small activities involving easy-to-complete objectives, such as measuring a few objects, reading a brief paragraph, or taking a short quiz. Making sure that the stations, when all taken together, all have different types of actions in them will make this type of lesson more effective and engaging for all of your students! If you can find a few old button-up lab coats or goggles, so much the better to help your students feel as scientific as possible. After the students have each attended all of the investigation stations, you could use the end of the class or even the next class period to allow the students to reflect or present on what they have learned (Teachersbrain, 2018).
- **Make sure that you encourage your students in their pursuit of an independent investigation.** If you're teaching elementary school students, you're teaching students that have a natural inclination toward investigating the world around them. Take advantage of that! Harness your students' natural curiosity by providing them with common (yet "fun") scientific tools, such as magnifying glasses, magnets, and beakers. These, combined with safe household items that your students can mix and observe (such as vinegar, baking soda, and Alka-seltzer), can help your students become more aware of the inherent excitement of exploration. Allowing your students to take the reins and follow their own instincts can also help nourish their confidence in their own observational skills. Offer your students guidance when

appropriate, and assistance when requested, but otherwise allow them to make their own discoveries (HomeScience, 2017).

- **Give your students visual examples of the concepts you're explaining whenever it's possible for you to do so.** For example, instead of telling your students that the earth moves around the sun, have one student sit in the center of the room - and have another student spin around that individual. This will get the entire classroom involved in the teaching concept, and it will be much easier for your students to understand and remember the lesson when it was acted out in such a physical way. Whenever possible, get your students up and moving: Use oranges and beach balls to talk about atoms, protons, and electrons, or have your students care for a tadpole, watching as it turns into a frog (HomeScience, 2017).
- **Ask your students questions as often as you can - and encourage them to ask questions as well.** Instead of providing a very discrete exam, for example, you could simply walk around and ask them assessment questions while they're engaged in their independent investigations. Whether you use the assessment for official purposes or not, simply asking your students to tell you what's happening before them can help you gauge how well they know their concepts - which, in turn, can help you design future lesson plans to meet your students where they actually are. Some good questions to include might be: What did you see happening? Is there anything you don't see happening? Why do you think this is happening? Have you seen this happen before? Does what's happening here remind you of anything else you've seen recently? Just helping your students make these kinds of connections on their own will be much more powerful than simply telling them what the connecting concept is (HomeScience, 2017).

Integrating Science into Other Types of Instruction

Scientific concepts are a very real part of our lives that touch every facet of our everyday. Furthermore, science is definitely not a subject that should stay neatly in one hour of your students' days; instead, it can easily be incorporated into other types of instruction. There are a couple of benefits to proactively doing this: To the extent that science can sometimes be considered more exciting and immersive, it can help make other subjects more interesting - and, of course, if you're able to help normalize scientific literacy and vocabulary, that will help immensely when it's time to delve back into scientific instruction.

Integrating subjects is a very timely focus for educators today. Here, we'll focus on a few different ways to integrate science into other types of instruction.

- **Start by recalling STEM guidelines.** STEM, as the general grouping of Science, Technology, Engineering, and Math, has several goal-and-outcome-oriented guidelines that can help you craft your lessons - even if the content isn't specifically science-related. According to Stem By Design, the STEM criteria include:
 - Addressing a problem that your students are likely to understand or at least recognize from their real-life (this will help them feel the lesson is applicable and engaging!);
 - Trying to drive the lesson with an engineering, scientific, or mathematical process in mind, if at all possible;
 - Getting your students to work together, to increase your students' communication and collaboration skills (skills which are vitally important to every workplace today!);
 - Celebrating the fact that a single problem may have multiple different approaches to get to the same answer - or, indeed, several different answers that might be considered correct;
 - Using primarily inquiry-based learning and teaching models for your classroom, in which you allow your students to ask questions, ask questions of your students and use those questions as jumping-off points for respectful dialogue
 - Prioritizing creativity and ownership as much as you can while in class, and even guiding your students to entrepreneurship by giving them open-ended projects and materials with which they are expected to create solutions
 - Helping your students physically build something as often as you can (STEM by Design, 2016)!

Even if the lesson you're teaching isn't specifically a scientific one, if you're able to incorporate some of the above national STEM guidelines into your lesson plan, you'll be at least familiarizing your students with the way science works in real-time for professional scientists - and giving them some of the skills that they'll need to succeed in their future careers, no matter what they may be (Jolly, 2016).

One fantastic way to integrate STEM concepts and problem-solving training into lessons from other disciplines - for example, history, literature, and social studies - is to examine the way that various historical engineers have had to solve problems since the dawn of time. Throughout many historical events, engineers and their predecessors have invented creative technologies in order to solve the main problems of their day.

As one example, you could discuss, in history class, the practical difficulties that the ancient Egyptians faced when they were building their famous pyramids to celebrate their pharaohs and queens. They needed an efficient but noteworthy way to mark tombs - and they decided that a pyramid was the best shape.

Why was the pyramid the best solution to the problem the ancient Egyptians faced? History teachers could incorporate a STEM focus into this lesson by asking questions like:

- What types of engineering problems did the Egyptians have to solve when they were building their pyramids? (Any answer is a good one, but some relevant ones might include the weight of the stones, the distances from which the stones had to be transported, the logistics of getting the heavy stones from the base of the pyramid to the top, and making sure that the often-delicate burial chambers were protected while construction was going on).
- What would you have done if you were working on a pyramid if you'd been alive back then? This is where you can let your student's minds run wild - or you could even let your students work in teams to put together a solution for any of the identified problems.

If you're thinking about ways to incorporate technology and scientific angles into literature or art subjects, you can always lean into digital avenues for sharing and presenting. Consider allowing your students to blog or vlog during their participation in a project. If you help them learn how to edit their work, safely share it and present it well, that's more than just a soft skill: Being able to market digital products well is a skill that will serve them in their eventual career, no matter what they end up doing!

Ultimately, as you try to get your students involved in science, there are just a few key tips to keep in mind - whether you're teaching science in its own right or are trying to find ways to integrate it into other topics:

- **Start with small changes.** Instead of investing in all-new lesson plans or creating new curricula, simply take a lesson that you already know how to teach well and just incorporate one or two new questions, problems, or aims.

- **Go to the Internet for ideas.** Pinterest, Twitter, and other social media networks are full of ideas from teachers who are trying to do the same things you are!
- **Use materials that you already have around.** Don't spend too much! One of the ideas that STEM (and, particularly, science) thrives upon is thriftiness and creativity. You don't need to spend extra money to make your science classes (or integration) effective.

Finally, if your experiments with scientific integration don't work the first time, don't sweat it! Science is full of trial and error (in fact, that's basically what the scientific process is). Learning how to make the most of mistakes will be a lesson in and of itself; embrace it!

Conclusion

If you're interested in increasing the amount of time your students spend with scientific vocabulary or subjects, you will have to invest some time and effort into creative, engaging lesson plans. However, it doesn't have to be difficult or expensive to do so. By making sure that your lessons are practical, integrative, and engaging, your students will naturally be more interested in learning even the most difficult subjects.

There will be a great payoff for your students if you help them learn more about scientific subjects. Scientific literacy will help them be successful for the rest of their lives! It just means that right now, while your students are young, you have a window of opportunity to help them understand these esoteric topics.

References

Cafaralla, Mucculloch, and Bell. (January 2017). Why Do We Need to Teach Science in Elementary School? Stem Teaching Tools. <http://stemteachingtools.org/brief/43>

The University of Texas at Arlington. (September 8, 2017). Importance of Science Education in Schools. The University of Texas at Arlington Online. <https://academicpartnerships.uta.edu/articles/education/importance-of-science-education.aspx>

Teachersbrain. (November 28, 2018). Strategies for Teaching Science in Elementary School. Teacher's Brain Blog. <https://teachersbrain.com/strategies-for-teaching-science-in-elementary-school/>

HomeScience. (2017). Tips for Teaching Science to Elementary Students. HomeScience Tools. <https://learning-center.homesciencetools.com/article/tips-for-teaching-science-to-elementary/>

SHARE Team. (2020). Three Ideas for Teaching Science to Elementary Students. Resilient Educator. <https://resilienteducator.com/classroom-resources/3-ideas-for-teaching-science-to-elementary-students/>

Crawley, R. (March 22, 2018). 5 Easy Ways to Teach Science in the Elementary Classroom. iAchieve Learning. <https://iachievelearning.com/2018/03/5-easy-ways-to-teach-science-in-the-elementary-classroom/>

Zimny, J. (May 30, 2018). 12 STEM Tips for Elementary School Teachers. SEEN. <https://www.seenmagazine.us/Articles/Article-Detail/ArticleId/6974/12-STEM-Tips-for-Elementary-School-Teachers>

STEM by Design. (July 5, 2016). The 8 Criteria for Authentic STEM Programs. STEM by Design. <http://www.stem-by-design.com/the-8-criteria-for-authentic-stem-programs/>

Jolly, A. October 17, 2016. How Do We Integrate STEM Across Subjects? MiddleWeb. <https://www.middleweb.com/33039/how-do-we-integrate-stem-across-subjects/>



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