Frequently Asked Questions (FAQs)

Framing on Your Feet: Using the Core Story of STEM Learning to Answer Frequently-Asked Questions

The vast majority of questions and comments that communicators hear from the public and policymakers can be predicted by the research-based "swamp" of cultural models on that issue.

If you can predict, you can prepare.

A strategic framer prepares by anticipating the questions that will emerge from the swamp; considering the 'traps' that are lurking in a possible response; and then, choosing a well-framed response with the potential to build a more productive way of thinking about the issue.

The sample question-and-answer sequences here show this tactical thought process in action. The exemplars come from questions and issues raised by stakeholder groups, but the models aren't intended to simply script "the right answers" to questions you might be asked. Rather, this is a teaching tool, offering illustrations of how to more effectively talk about STEM and informal learning by applying the research-based insights of the Core Story of Education. While communicators are welcome to use the recommended responses, we encourage you to use the analysis of 'false start' and 'well-framed' answers to build your capacity to apply these principles fluidly throughout your communications practice.

QUESTION

Is it really reasonable to expect that all students should learn deeply in the STEM fields? While some students are really talented in those fields, other students' strengths are in other subjects. Aren't we just setting up barriers for some kids if we insist on emphasizing STEM throughout K12 and into college?

ANSWER

THE FALSE START ANSWER

While some children do show a preference for STEM subjects early on in their schooling, we still need to provide interesting, engaging STEM learning opportunities for all students throughout their education. These are the fields that power our industries. Other countries recognize this and they are ramping up their efforts to prepare students in these fields. If we keep letting kids decide that "math is too hard for me," then America will never regain her footing in the international economy. Young people deserve to know that jobs in STEM fields generally pay well, which is a great incentive for encouraging students to continue to pursue these fields.

THE REFRAMED ANSWER

Our country's future will depend on preparing today's students to meet a wide array of challenges. When students have a strong grounding in problem solving through experimentation it sets them up to have a strong sense of curiosity and to become adults who are critical and creative thinkers. And we can think of the skills provided through learning in science, technology, engineering and math (STEM) as the many strands of a rope. For a rope to be strong, it must have many strands woven together. But all kids need to have opportunities to test out the strength and flexibility of their thinking in hands-on and engaging, STEM learning settings that enable them to see connections to the "real world." Such opportunities can engage a lifelong love of STEM, but you never know until you try. Ultimately, whatever careers students pursue, skills developed through STEM learning contribute to a problem-solving rope that will be useful in any field, and all students must be given the opportunity to truly develop their full potential in this way.

ANALYSIS

FALSE START ANALYSIS

- By conceding to the "Every Child is Different" pattern of thinking, this response runs the risk of undermining broad support for greater emphasis on STEM learning.
- This response cues a *Global Competition* frame, which has unproductive frame effects when it comes to education policy more broadly.
- By limiting the answer to math, this response misses an opportunity to help the public see the common threads among STEM fields.
- By repeating the "math is hard" mantra, it reinforces stereotypical thinking about math, even as it tries to correct that thinking.
- By closing on high-paying careers as a student incentive, this response individualizes the benefits of STEM learning – missing an opportunity to policy support by emphasizing the common good.

REFRAMED ANSWER ANALYSIS

- By starting with a Value rather than restating the unproductive frames embedded in the question, this response redirects to the Core Story's reliable, tested messages.
- Use of the Values *Future Preparation* and *Collective Prosperity* establish the shared benefits of STEM, and prime the public to think in broader, more systemic terms.
- By pointing out commonalities across the STEM fields (evidence-based problem solving, curiosity and experimentation), this response helps the public create connections among these disciplines.
- Use of the Explanatory Metaphor *Weaving Skills Ropes* establishes the skills of inquiry as essential and integrated with content or other skills.
- By closing on the idea that strong ropes are useful in many contexts, combined with the value of *Human Potential,* this answer provides insight into the relevance of STEM learning for all students.

QUESTION

There is a lot of attention these days to hands-on learning and new ideas about teaching, but we also hear from parents, employers and university professors that students can't do basic math without a calculator. If we are trying to prepare today's students for the challenges of tomorrow, shouldn't we focus on creating a firm foundation of basic skills in math before we spend time and money on these other approaches?

ANSWER

THE FALSE START ANSWER

There is no doubt that math skills are essential, and they are, in fact, embedded across the STEM disciplines. You can't be an engineer without a strong grasp of math. But the more important thing to think about when it comes to math is that we are aiming far too low. If we think of math as just getting kids ready to balance their checkbook, we're missing the point. Let's face it – these days, with online banking, checkbooks balance themselves. Instead, there must be a greater emphasis on higher math. We need to insist on algebra for each and every high school student. That's right: each and every student, regardless of whether they think math is their "thing" or not. We can accomplish this by shifting curriculum in some simple ways – for instance, spending a lot more time on fractions, even in kindergarten.

THE REFRAMED ANSWER

Our most important goal should be to create agile, adaptable problem-solvers capable of taking on the challenges and opportunities of the future. Preparing for the surprises ahead will require adding new content to the traditional curriculum, and updating the ways we teach science, technology, engineering and mathematics — what curriculum experts call STEM for short. The interwoven knowledge and skills of STEM subjects are all vitally needed in the 21st century. As just one example, we need to begin thinking about hands-on application and practice for STEM skills in the ways that we have been very used to thinking about language learning. We know that students need to be immersed in real-world situations to truly become fluent in a new language, so too do they need to apply straightforward math procedures to complex or open-ended problems. Exploring STEM in their lives outside of school makes a subject like mathematics appealing, and it creates the ability to think through challenging problems, both within and outside the classroom. As a nation, we simply can't afford to let any schools remain stuck in outdated ways of teaching these critically important skills. Engineers and scientists don't merely have jobs – they create jobs. We can make a big difference in developing more engineers and scientists by updating the ways we teach.

ANALYSIS

FALSE START ANALYSIS

- By restating the idea that mathematics acts as a gatekeeper to the "other" STEM disciplines, this response reinforces the unproductive public perception that *Engineering Is Specialized* and therefore suited only for students with particular talents or gifts.
- By trying to dislodge *Back to Basics* thinking through colorful argumentation, this response strays into Rhetorical Tone and thus runs the risk of sending the meta-message that this is a politicized or partisan issue – and as a result, is likely to fail to shift thinking of 'bystander publics.'
- The response pivots to a concrete Solution, but the "simple" suggested step feels oddly mismatched with the scale of the problem that has been established.

REFRAMED ANSWER ANALYSIS

- A strong dose of *Future Preparation* (at both the beginning and the end of the passage), with a focus on the innovation needed for tomorrow, acts as a reframing antidote to the *Back to Basics* thinking evident in the original question.
- The use of the Explanatory Metaphor *Fluency explains how learning happens in informal environments, establishing* the need for "the new basics" without using that term, which is likely to call up *Back to Basics* thinking through association. Instead, the metaphor helps to establish the need for students to see real-world applicability of what they are learning to develop mastery.
- A subtle execution of *Weaving Skills Ropes* by use of the adjective "interwoven" reinforces the idea that opportunities to practice are not "extra" but an integral component of full content mastery.

QUESTION

It seems that in some American sub-cultures, it is a "given" that kids will go into a STEM field, and they are proud of it; whereas for others, it's considered much too nerdy to love math or science. It seems to me that there isn't much to be done until we tackle the "culture" piece, and figure out how to change the subjects that parents value and encourage. What do you think?

ANSWER

THE FALSE START ANSWER

We do see a smaller proportion of African American and Latino students pursuing STEM majors and careers, and the same can be said for women and girls. Obviously, the reasons for those disparities are extremely complicated, but let's start with your insight about perceptions and identity. I think that makes it all the more important to highlight the so-called exceptions, because there are in fact many, many women and people of color excelling in these fields. Encouraging those exceptions to become more public faces is one thing we can do, because a role model can be unbelievably motivating for young people, giving students a clearer understanding of how they themselves can break the mold and become that hot-shot, high-paid chemist, bio-engineer, or software developer. In terms of policy, there's a lot we can do to create that "culture shift" you mentioned. There's a really exciting range of programs designed to encourage students from under-represented groups to get interested in STEM fields, to be able to see those fields as a possibility for themselves and others like them.

THE REFRAMED ANSWER

To allow all children to reach their full potential so they can contribute to our communities, we need to ensure that all children, no matter where they live, have opportunities for quality learning. That's not happening right now. Too often, what we see is a patchy and uneven system of learning opportunities for powering up students' knowledge and skills in STEM. Think of those opportunities as charging stations – for some youth, there are lots of charging stations all over their communities, easily and regularly accessible—great curriculum and materials in their schools, and lots of museums, summer opportunities, and clubs to join. But other young people live in charging dead zones, where they just can't plug in to high quality learning opportunities. It's especially important that communities have lots of places to plug in when it comes to STEM learning, because effective learning in these fields requires multiple opportunities and ways to interact with concepts in order to truly power up learning. We need to even out the inequitable system we have now, taking steps to ensure that all communities have lots of high-powered charging stations.

ANALYSIS

FALSE START ANALYSIS

- This response reinforces unproductive patterns of thinking about racial, ethnic, and gender disparities by missing a chance to explain the systemic issues that contribute to these inequities, and by framing the solution as one of increasing motivation and self-identification of individual students.
- In highlighting benefits for "under-represented" groups and failing to establish a frame that includes the common good, this response limits the potential to build broad public policy support for STEM reforms.
- By drawing attention to individual benefits in the form of high salaries, this response misses the opportunity to foreground the common good.
- The Solutions frame element is underdeveloped – "exciting" programs are mentioned, but deserve a "solutions story" that explains how they work.

REFRAMED ANSWER ANALYSIS

- This response tackles the equity question by framing it as a matter of *Fairness Across Places.* Including cues such as "no matter where they live" taps into this tested Value, which is among the more reliable and broadly appealing "flavors" of fairness that a strategic framer can use.
- It also includes *Human Potential,* which FrameWorks research shows to be an effective Value for framing policies related to race equity in K12.
- By framing the issue of access with the Explanatory Metaphor *Charging Stations,* this response points to systemic problems and sets up a the need for a systemic, public policy solution.

QUESTION

What are the primary benefits of afterschool STEM?

ANSWER

THE FALSE START ANSWER

Well, frankly, one major benefit is adequate childcare, so kids can stay safe and parents can work. The juvenile crime rate triples between the hours of 3 p.m. and 8 p.m., with violent crimes by juveniles peaking between 3 p.m. and 4 p.m.—the hour at the end of the school day. Why? In part because an increasing number of our children are unsupervised during these late afternoon hours, while parents are at work. In fact, 11.3 million "latchkey children" go home after school each day to a house with no adult supervision. We can do better. These hours can be put to better use than watching TV or getting into mischief – we can use them to push student achievement.

We also know that more time spent on STEM learning means more STEM learning. Right now, just around a third of U.S. students are meeting proficiency standards for math and science, so we need to focus on these critical areas as much as possible. By extending the learning day, we can boost achievement and get more kids into the STEM pipeline.

THE REFRAMED ANSWER

Afterschool STEM opportunities – programs that engage kids in the afternoons, on weekends, or over the summer - spark learning by letting children and youth experiment with ideas in real-world situations. Because these programs can be flexible, they give students freedom to explore in a low-pressure environment, which is a good way to discover new interests. Because these programs can be responsive to children's interests and cultures, they are especially good at engaging kids who might not think of themselves as "math and science types." Studies suggest that afterschool STEM may even activate a lifelong interest in science, technology, engineering or math, as students who participate in these programs are more likely to pursue STEM majors or careers. So, for all these reasons, informal STEM is a vital complement to classroom learning. Given the important role that STEM knowledge and skills will play in solving 21st century challenges, these kinds of initiatives need to be high on our list of our collective priorities.

ANALYSIS

FALSE START ANALYSIS

- By leading with the 'custodial' benefits of afterschool, this answer is likely to focus attention on out-of-school time as mere 'babysitting' – which begs the question as to why other parents' child care troubles should be a matter of public concern.
- This response reinforces unproductive thinking about adolescents – they're dangerous, they're lazy – and would therefore undermine broader support for public investments in positive youth development.
- This response positions out-of-school time as just "more time." In so doing, it misses an opportunity to talk about the unique contributions of informal learning, and increases the chance of pushback in the form of, "Kids need free time to recharge."

REFRAMED ANSWER ANALYSIS

- This response uses the *Activation* metaphor to generate understanding of one of the essential characteristics of informal learning settings: its ability to spark and fuel interest in these critical fields.
- Closing with *Future Preparation*, this response harnesses the power of Values frames to build policy support.

QUESTION

What can we do to encourage more dedicated, inspiring teachers in science and math so that more kids develop an interest in those subjects?

ANSWER

THE FALSE START ANSWER

A passionate, exciting teacher who makes physics or calculus relevant for a struggling or bored student can make the difference between a child who becomes an engineer and one who decides that science is too hard or too boring. So, we need to do everything we can to get and keep good teachers in math and science. Recruitment incentives are key; science majors can make a lot more money doing other things besides being a teacher. So that's something we have to figure out. But there's also a lot we can do beyond the regular school day. Afterschool programs can provide a great space for letting children explore their interests, and can provide for hands-on experiments and other fun ways of learning science. A good example of this is right here in our local district, where testing pressure has led to science classes being cut in order to allow for more time on reading and math. Nonprofit partners are filling the gap in the afterschool hours, with the award-winning Science Alive and Exploration/Imagination programs. Kids just love these!

THE REFRAMED ANSWER

Ensuring access to great STEM teaching is essential to making sure that every child, no matter where they live, can fulfill their potential to contribute to our communities. We can achieve that goal by supporting innovative teaching and learning in a range of contexts that activate students' interests. Not only schools, but also libraries, science centers, afterschool programs can all be seen as vital sites for sparking up STEM learning. Each becomes more effective as ideas travel from one site to another, making what's gathered at each site more powerful. For in-school and out-of-school learning to fuel each other as best they can, it can't be left to chance. So to answer your question directly – one thing we can do to support classroom teachers and informal educators is to create opportunities for bringing people, ideas and resources together. Sometimes this takes the form of rethinking traditional school schedules and staffing; sometimes it involves expanding training opportunities for the wide range of adults who work with young people; and sometimes, frankly, it requires more funding. It also means devoting more resources to areas that are underserved by having fewer or lower-quality learning opportunities. But given the important role that STEM knowledge and skills will play in solving 21st century challenges, these kinds of initiatives need to be high on our list of collective priorities.

ANALYSIS

FALSE START ANALYSIS

- By focusing on the interpersonal qualities of teachers and students, the opening is likely to activate *Caring Teacher* thinking, which makes it difficult for the public to see the need for high-quality teacher education. The individualized way of framing financial incentives could call up another unproductive aspect of *Caring Teacher* – that only self-interested, and therefore "bad," teachers are concerned with money.
- The response mentions other STEM disciplines but doesn't explain the connections, and returns repeatedly to science. This risks reinforcing the public perception that *STEM = Science*, while missing the opportunity to build on the productive associations with science to make a case for STEM more broadly.
- This communication falls into the *Dysfunctional Comparison Trap.* By contrasting challenges in the traditional K12 system with innovative informal learning opportunities, this response may heighten the public's pessimism about education reform.

REFRAMED ANSWER ANALYSIS

- By beginning with the value *Fairness Across Places,* this answer shifts thinking away from a little-picture understanding of the problem (student interest) and opens a big-picture conversation about collective needs and benefits.
- The Activation Metaphor kernel (and reinforcing language like use of the verb "fuel" to describe activation of interest) describes what actually happens in informal settings for STEM learning and frames them along with formal setting as mutually reinforcing, rather than pitting them against one another. This frame builds support for both K12 and out-of-school investments and reforms.
- This response avoids the *Caring Teacher Trap* by focusing on professional skills and the training that develops them.
- By moving from the list of "asks" straight to a dose of *Future Preparation,* this response harnesses the orienting power of Values frames to build policy support.

QUESTION

Sure, afterschool programs and informal learning contexts for subjects like science are fun, but doesn't the real learning take place in the classroom? In a time of tough budget decisions, when we are facing a crisis of talent shouldn't we prioritize regular coursework in school?

ANSWER

THE FALSE START ANSWER

Tragically, in a world where knowledge and education are the fundamental currency needed to participate in a global marketplace almost a quarter of students are not graduating from high school on time and most young adults are entering college ill-prepared. This suggests that we need to expand our support for both formal and informal learning. Formal learning can occur in institutional settings, such as schools and colleges, where learning is a major goal, whereas informal learning contexts occur in settings such as the home or workplace where learning activities may take place but learning is not necessarily a primary activity. Informal learning should no longer be regarded as an inferior form of learning; it needs to be seen as fundamental and necessary. It can support outcomes in formal education, such as student achievement, but it is also valuable in its own right. Thus, we can no longer afford not to invest in afterschool programs. Afterschool programs save at least three tax dollars for every one spent by reducing the need for remedial education and grade repetition as well as keeping kids safe and out of trouble. Voters say they are willing to use taxpayer money—and even pay more in taxes—to support afterschool programs.

THE REFRAMED ANSWER

We need to ensure that our future leaders have the skills required to drive a prosperous economy in the information age. The measure of a quality education is changing in step with our rapidly changing world – a world that relies on knowledge of science, technology, engineering, and math to power its industries and tackle a range of pressing problems. Effective learning involves multiple opportunities for encountering ideas and having many different ways to apply and experience them. This is particularly true in STEM disciplines, which require hands-on practice and experimentation. Just as language learners need to be immersed in real-world situations to really acquire fluency, those learning STEM benefit from opportunities to explore everyday applications. Only through practice do they truly master the language. In fact, we all benefit when every child, regardless of whether their local economy is booming at the moment, is able to access and benefit from quality STEM learning opportunities. The attention to evidence, curiosity, problem-solving, and critical thinking that these fields foster are the qualities we need in our country's future voters and decision makers.

ANALYSIS

FALSE START ANALYSIS

- By starting with a crisis frame instead of an appeal to a high-level, shared ideal such as *Fairness Across Places* or *Future Preparation*, this communication falls into the *Missing Value Trap.* Without a framing strategy that consistently reminds the public of the collective benefits of a STEM education, the public is likely to fill in assumptions that view STEM through the lens of private concern and individual gain.
- This communication also falls into the *Missing Process Trap* by relying solely on defining formal and informal learning and asserting their equivalence - yet failing to explain how they work and how they might support each other.
- This communication also relies on unframed numbers and lists of data to make its point about the value of afterschool STEM.

REFRAMED ANSWER ANALYSIS

- Opening with the tested Values *Collective Prosperity* and *Future Preparation* fills in an essential point in an advocacy narrative: why this issue matters and what is at stake for society.
- Using the Explanatory Metaphor *Fluency* to explain how learning happens in an informal environment, this response establishes informal learning as an essential part of an effective approach, not merely a "nice extra." This helps to make a strong case against cutting support for informal learning.
- The processes by which learning happens are more clearly established here. The *Fluency* Explanatory Metaphor helps people make connections between skills and their applications.
- Closing with a forward-looking frame such as *Future Preparation* can help to shift attention away from immediate budget pressures to a longer view on the consequences and benefits of funding decisions.