

The STEM Movement

COMPANION GUIDE MODULE (RE)DEFINING STEM

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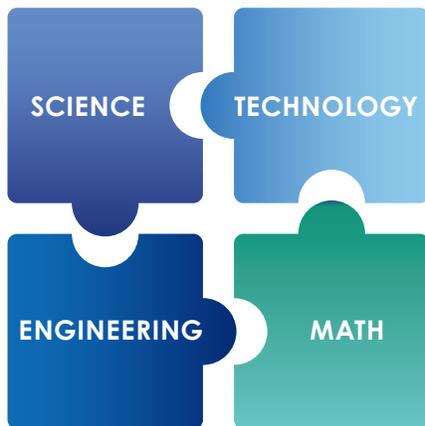
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1. HOW CAN I USE THIS GUIDE?

(Re)Defining STEM is the first of six e-learning modules that will encompass TGR EDU: Explore’s platform delivering teaching strategies that focus on student-centered approaches to learning, with the goal of connecting all students—especially those from underrepresented populations—to success in school and beyond.

(Re)Defining STEM will establish the need for an updated examination and definition of STEM education, provide clarity of the intended goals and outcomes of high-quality STEM education and establish a clear lens through which

all educators, no matter grade level or discipline, can see themselves as STEM educators or advocates.

This is the first module and is a great starting point, but all other modules can be enjoyed in any order. Be sure to work through each module at your own pace, reflecting on what resonates most with you and your teaching practice. This guide and the e-learning modules will help you inspire and motivate your students to reach new heights.

2. WHY DOES THIS TOPIC MATTER FOR EDUCATORS AND STUDENTS?

CURRENT TRENDS

Although the STEM movement was supposed to prepare more students for career-ready jobs in STEM fields, the needle has not moved enough, especially for students from underrepresented communities. More students than ever are graduating with STEM degrees but lack critical skills—not simply content knowledge—that companies desire. Educators, using proven strategies and intentional practice, can build these critical skills that will help students thrive in STEM fields.

CAREERS

The demands for STEM-related jobs grew at three times the rate of non-STEM-related jobs between 2000–2010 according to research done by the Smithsonian Education Center. There are currently millions of unfilled STEM jobs in the United States. As educators, we need to empower all students to enter the global workforce prepared to excel.

3. WHAT YOU CAN EXPECT IN THE (RE)DEFINING STEM MODULE

MODULE OBJECTIVES

At the end of the module, the participant should be able to:

- Examine an updated definition of STEM
- Summarize key components of effective STEM education
 - Interdisciplinary learning
 - Design principles
 - Real-world connections
 - Skill-building
- Describe how your practice can elevate STEM teaching and learning

MODULE LAYOUT

Lesson Highlight	Content	Key Points
Introduction	<ul style="list-style-type: none"> How can the STEM movement prepare all students for future success? 	<ul style="list-style-type: none"> New (or Updated) definition of STEM Past misconceptions about how to teach using STEM
The State of STEM	<ul style="list-style-type: none"> History of STEM Purpose of the STEM Movement Your Role as a STEM Educator 	<ul style="list-style-type: none"> Even though more students than ever are graduating with STEM degrees, STEM jobs are still unfilled. STEM is an approach to learning which empowers all students to enter the global workforce.
Four Components of STEM Education	<ul style="list-style-type: none"> Interdisciplinary Learning Design Principles Real-World Connections Skill-Building 	<ul style="list-style-type: none"> The four components to STEM should be incorporated into lessons. Investigate a lesson plan that utilizes the four principles well.
Interdisciplinary Learning	<ul style="list-style-type: none"> Using Traditional Methods Using an Interdisciplinary Approach Sensitive Delivery Lesson 	<ul style="list-style-type: none"> STEM is often siloed. Learning should embed multiple concepts from different disciplines in a single lesson.
Design Principles	<ul style="list-style-type: none"> The Engineering Design Process 	<ul style="list-style-type: none"> Professionals follow a design process. Students should solve problems using a process.
Real-World Connections	<ul style="list-style-type: none"> How to Make Connections Sensitive Delivery Lesson 	<ul style="list-style-type: none"> Students need to be motivated and engaged to be successful in the workforce. Relevance, student voice and student choice are ways to make connections with students.
Skill-Building	<ul style="list-style-type: none"> Skills students need to succeed 	<ul style="list-style-type: none"> Students need critical thinking, communication, collaboration and creativity. Candidates with skills such as writing, communication, and organization are hard to find and are needed in almost every industry.
How are YOU a STEM educator?	<ul style="list-style-type: none"> Recap 	<ul style="list-style-type: none"> Review all material covered. Reflection Activity Takeaway activity
Summary & Resources	<ul style="list-style-type: none"> Review of Learning Objectives 	<ul style="list-style-type: none"> How can you take STEM to a new level for ALL students?

4. CONTINUING THE CONVERSATION IN SCHOOLS

This section of the companion guide provides overviews, pre- and post- activities, discussion questions and supporting resources that accompany the (Re)Defining STEM module. This flexible model allows educators to apply the module objectives with school or district goals, such as literacy, culturally responsive instruction, career and college readiness or cooperative and collaborative classroom structures across disciplines.

PRE-ACTIVITY:

What is your current definition of STEM education? What does it look like in the classroom? What is the role of the educator? What is the role of the students?

POST-ACTIVITY

AEIOU is a strategy that gives students an opportunity to practice their communication skills and demonstrate learning. Use this strategy to summarize your learning from the (Re)Defining STEM module.

For each letter, share your corresponding reflection:

- **A**djective – a word or two that describes something you saw or learned
- **E**motion – how a part of the module made you feel
- **I**nteresting – something you found interesting about the content or the topic
- **O**h! – something that caused you to say oh!
- **U**mm? – something that prompted a question or something you want to learn more about

DISCUSSION QUESTIONS

- How has your definition of STEM changed after navigating through the (Re)Defining STEM Module?
- Four components of STEM Education were explained and explored through a lesson plan exemplar. Which of the four components do you use in your lesson plan development? How frequently do you frame instruction with each component?
- Which of the four components were you not as familiar with or not using as consistently in lesson planning? Which component is an area for professional growth to incorporate more into your instructional practices?



TAKEAWAY ACTIVITY

Now that you have ideas of how you can use STEM learning in your classroom, you can inspire your colleagues by sharing these resources with them to encourage STEM teaching. Facilitate the lesson “How are you a STEM Educator?”

Learning Objective

Participants will illustrate and share how they see themselves as STEM Educators and reflect on how certain qualities, used for teaching STEM, transcend disciplines and improve student outcomes.

Activity Procedure

1. Introduce the activity by explaining that participants will illustrate how they see themselves as STEM educators.
2. Break into small groups of 3–4. Provide each group with a large (6–7 ft.) piece of butcher paper and a set of markers.
3. Have each group select one person to lay down on the paper and another person use the marker to trace their outline. This outline is the group’s “STEM Educator”.
4. Ask group members to consider and discuss how they see themselves as STEM Educators and attempt to illustrate specific qualities useful for teaching STEM in the classroom.
 - Ex.: Sunglasses can demonstrate how one is reflective, or a thought bubble can demonstrate how one is thoughtful
5. After 15–20 minutes have each group share what they have illustrated and why.
6. Ask participants to reflect on what they saw and heard and to connect the activity to their own practice.

Activity adapted with permission from Orange County Department of Education



SUPPORTING RESOURCES FEATURED IN THE (RE)DEFINING STEM MODULE

HOW YOU CAN CONTINUE THE CONVERSATION:

Please consider joining the TGR Foundation Educator Community Forum. This is a great network where educators receive support and learn together to continuously improve and hone their teaching practice.

TGR FOUNDATION EDUCATOR COMMUNITY

Are you an educator looking for inspiration and support? Join our network of passionate professionals committed to building a brighter future for students around the globe.

TGRfoundation.org/educator-community

SENSITIVE DELIVERY LESSON

TGREDUexplore.org/curriculum

ADDITIONAL RESOURCES

TGR EDU: EXPLORE CURRICULUM

Use these interactive resources, designed for grades 6–12, to develop problem-solving and decision-making skills with real-world applications in college access and STEM learning.

TGREDUexplore.org/curriculum

REFERENCES

2020. *The STEM Imperative*. Smithsonian Science Education Center. Retrieved from: <https://ssec.si.edu/stem-imperative>.