# INTEGRATIVE STEM EDUCATION AT SCHOOLS

## INTRODUCTION

Scientific subjects are of great importance. The demand for a qualified workforce in technology and research intensive sectors is and will remain at a high level, with an impact on the demand for science, technology, engineering and mathematics (STEM) related skills. Greater efforts must now be made to highlight STEM as a priority area of education, and increase engagement at all levels. Although broad challenges are well known, such as the need to make it more attractive to females, it is also now important to increase understanding of the career pathways followed by STEM graduates.

As a philosophy, STEM is meant to create a program that integrates all four disciplines in a way that forces the student to use cross-disciplinary knowledge to solve problems. Which essentially means that the traditional learning style incoming freshman are used to—typically some form of memorization and recitation of information—is pretty much out the window.

You'll rarely be given the explicit solution to a problem. Instead, you'll often be required to use what you already know to figure out the right answer for yourself. This requires a significant amount of creativity and flexible thinking, as well as technical knowledge and mastery of each individual discipline.

This approach to education is often why those of us who are extremely analytical, but not especially creative, tend to struggle with STEM. Successful students quickly learn how to think for themselves and abandon their expectations of being told what to think. Of course, STEM teachers won't assume that incoming freshmen in a basic technology class already have mastery of advanced, graduate-level mathematics. Students in STEM are guided in their learning to build up mastery of the four disciplines over time, just like non-STEM students. However, when the time comes for them to apply what they've learned, whether a student does well or not depends heavily on how well they're able to solve the problem, not how much they've memorized.

# CONTENT

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| **Day 1** | • What is STEM<br>• Common use of STEM at Schools<br>• Philosophy of Interdisciplinary Lesson Plans<br>• Backward Design. |
| **Day 2** | • Subject-Based and Problem-Based Learning,<br>• Collaborative-Based Learning,<br>• Entrepreneurially-Minded Learning |
| **Day 3** | • Classroom preparation recommendations,<br>• STEM based Maths Lessons<br>• STEM based Science Lessons<br>• Integrated math and science using physical constraints. |
| **Day 4** | • STEM and technology integrated lessons<br>• STEM methodology and assesment of STEM based activities<br>• Using mobil devices with STEM<br>• Assessment answer keys, project solutions. |
| **Day 5** | • Tools that can be used to plan and manage STEM projects<br>• Units of measurement, coordinate system, minimum, maximum, mean and linear relationship. |

# OUTCOMES

- Fosters ingenuity and creativity: Ingenuity and creativity can pair with STEM and lead to new ideas and innovations
- Builds resilience
- Encourages experimentation
- Encourages teamwork
- Encourages knowledge application
- Encourages tech use
- Teaches problem-solving
- Encourages adaption
- Encourages tech use:
- STEM learning teaches kids about the power of technology and innovation. So, when students encounter new technologies, they will be prepared to embrace them, instead of being hesitant or fearful. This will give them the upper hand in the global landscape, as the world is becoming increasingly tech-centered.
- Teaches problem-solving:
- STEM education teaches students how to solve problems by using their critical thinking skills. By engaging in STEM learn experiences, students learn how to examine problems and then create a plan to solve them.
- Encourages adaption:
- To succeed in life, students have to be able to apply what they have learned to a variety of scenarios. STEM education teaches them to adapt the concepts that they learn to various iterations of a problem or issue.