How to Give ALL Students Access to STEM and Why It Matters
<table>
<thead>
<tr>
<th></th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Introduction</td>
</tr>
<tr>
<td>4</td>
<td>Chapter 1: The Problem</td>
</tr>
<tr>
<td>6</td>
<td>Chapter 2: The Solution</td>
</tr>
<tr>
<td>8</td>
<td>Chapter 3: Why It Matters</td>
</tr>
<tr>
<td>9</td>
<td>Chapter 4: Who Has Been Successful</td>
</tr>
<tr>
<td>11</td>
<td>Conclusion</td>
</tr>
<tr>
<td>12</td>
<td>Appendix &amp; Resources</td>
</tr>
</tbody>
</table>
Introduction

The United States is on the cusp of a STEM crisis. The problem? Data¹ indicate that not enough of our nation's students are equipped for STEM opportunities now, much less in the future.

The performance of American teenagers in reading and math has stagnated since 2000². U.S. students’ academic achievement lags behind many of their peers in other countries³.

Our children are being taught 20th-century skills using 19th century pedagogy for a rapidly accelerating 21st-century global economy. It doesn't add up to a winning formula. When our teachers lack access to comprehensive STEM resources, they simply aren't equipped to prepare students for future success.

The good news is that there is a solution. By providing multiple STEM experiences to ALL learners starting at an early age in-school, after-school, and out-of-school, you are doing your part to solve the STEM crisis. We must deliberately include girls, students of poverty, students of color, rural students, and urban students. 21stCentEd works with school districts, charter schools, private/parochial schools, homeschooled parents, and community organizations to provide a comprehensive STEM education in this way.

Benefits of working with 21stCentEd:

1. A Virtual STEM Academy for ALL students with unlimited in and out-of-school access to self-paced, project-based, courses organized through career pathways. Early STEM engagement brings strong benefits to students at a crucial time when many young learners may have formed or are forming self-defeating ideas about their abilities.

2. Each enrollment provides access to over 900 hrs of STEM in 46 (and counting) courses, 20 hrs of instruction with 10 projects per course. Students are exposed to more than coding and robotics i.e., Design Thinking, Entrepreneurship, Financial Literacy, Digital Media and Art, Animation, Coding, Gaming, Robotics, Engineering, Virtual Reality, Artificial Intelligence, Machine Learning, Internet of Things (IOT), and more including various certifications.

3. A Built-in, self-paced curriculum, with lesson plans to address STEM-teacher shortages. Mentors and coaches (who can be anyone: teachers, community partners, and/or students, etc.) who guide students through courses, in school, after-school, and out of school.

4. Establish or enrich current CTE programs with courses in Architecture and Construction, Audio/Visual Technology, Health Science, Transportation, Engineering and Technology, and much more.

5. Collaborate with community partners such as libraries, Boys and Girls Club, YMCA, community centers etc. to provide access beyond the walls of the schools. There simply isn't enough time in the day for schools to do the work alone. It truly takes a village to raise a 21st-century graduate.
One of the greatest challenges facing the United States is motivating, educating and training a technical workforce capable of competing on a global scale. Nationwide, there are over 665,000 open computing jobs currently available.

By 2028, 2.5 million advanced manufacturing jobs will go unfilled, and 2.7 million data science and analytics jobs will be open. The success of our children and economy is at stake.

Research from STEM Connector reports five STEM talent gaps:

**Fundamental Skills Gap**
- The average STEM competency is insufficient for modern work.
- The new “STEM skills” (employability and 21st century skills, including communication, collaboration, critical thinking and creativity) are hard to build in traditional education models.
- Employers do not always clearly or appropriately define the skills they need.

**Belief Gap**
- Students hold incorrect beliefs about their own STEM ability.
- Students and others feel they do not “belong” in STEM.
- Students falsely believe only certain industries offer STEM jobs.
- Employers hold incorrect beliefs about how academic performance and credentials relate to job success.
The Problem Continued

Postsecondary Education Gap
- Not enough people hold credentials beyond high school, but most STEM jobs require postsecondary credentials.
- Credentials are misaligned with employer needs.
- Jobseekers and employees face challenges engaging in lifelong learning.

Geographic Gap
- In some regions, the number of jobs is declining, leaving people out of work and with outdated skillsets.
- In some regions, there is a booming STEM economy, but companies must import talent as locals are not equipped to compete for those jobs.

Demographic Gap
- Lack of access to resources drives achievement gaps in STEM education from early years.
- Bias and historic inequity remain embedded in education and employment systems.

The STEM pipeline, which is meant to guide students from elementary school into successful careers, has not been effective. The skills gap is real.
The Solution: Comprehensive STEM

While transforming our society to match the pace of technology is a heavy lift, it is a necessary one. We work with school districts, charter schools, private/parochial schools, homeschools, parents, and community organizations to close the STEM Talent gaps by focusing on the following areas:

• Access to high-quality STEM learning opportunities.
• Representation of girls, racial and ethnic minority groups, and persons with disabilities in STEM.
• Essential 21st-century knowledge and skills, including critical thinking, creativity, collaboration and communication.
• Stakeholder collaboration in education, workforce development and economic growth.

Increasing Access

By launching a virtual STEM Academy with 21stCentEd, schools of all shapes and sizes will be able to provide STEM access in-school, after-school, and out-of-school. Students will have access to the kind of learning that will help them achieve mastery-level education in STEM skills.

Courses are flexible by design, suited to your school’s individual needs and budget concerns. Part self-guided, part mentor-led, students get access to the expert-level knowledge that’s just not attainable in an 8-hour school day guided by standardized test results.

The first step in solving this problem is to create and enhance STEM experiences for ALL students from an early age. This means instilling a STEM culture throughout the community. We must deliberately include girls, students of color, and both rural and urban students in our STEM initiatives.

Data show that while representation in STEM has slowly risen, the proportion of racial and ethnic minority groups in science and engineering remains below their share of the college-educated workforce.
The Solution Continued

Cultivating the United States’ 21st-century workforce demands ALL students be provided multiple STEM experiences early in their development and throughout K-12. To do this, we need a comprehensive STEM plan – and advocates who are ready to support it.

When learners don’t have access to STEM resources in class, after-school programs, and out of school, they are missing out on valuable skill-building time.

The 21stCentEd STEM platform allows charter schools, private and parochial schools, school districts, after school organizations, and individual homes to launch a Virtual STEM Academy to create an environment in which ALL students have STEM experiences from an early age. We assist school districts by implementing a comprehensive STEM initiative that reaches students anywhere, anytime.

Meeting Students Where They Are

To make STEM curriculum relatable, students need a chance to explore the various skills in each competency. 21stCentEd’s virtual academy is available digitally, making our STEM resources accessible to students, no matter where they live. Enrolling in 21stCentEd’s STEM academy provides multiple course options in the areas of:

- **Design Thinking, Entrepreneurship, Financial Literacy, and Game Development.**
- **Digital Media, Graphic Design, Digital Art, and Animation.**
- **Programming and Coding, Robotics, and Engineering.**
- **Virtual Reality, Artificial Intelligence, Machine Learning, and the Internet of Things (IOT).**
- **And more, including various certifications.**

Working through different STEM-based courses can become a catalyst for a student’s future career. By giving students access to STEM resources early and often, we’re preparing them for the future.
Yes, You CAN Learn STEM

The way to increase the number of students studying STEM is to provide ALL students with STEM experiences early in their development. Equitable access to comprehensive STEM resources ensures every learner has an opportunity to explore the opportunities available to them.

The learners most at risk of being left behind are students of poverty, urban and rural youth, girls, and students of color. Our program immerses ALL students in project-based STEM experiences before they form self-defeating ideas about their abilities – they will experience STEM-related successes before they think they can’t.

Sparking Interest

Our approach introduces students to STEM through fun, engaging courses that build multiple competencies. Because the 21stCentEd online platform has built-in curriculum and lesson plans, it eliminates traditional barriers to launching a comprehensive program. All of our courses are self-paced to prevent students from becoming overwhelmed. And, anyone can be a STEM mentor or coach with 21stCentEd – the curriculum doesn’t require a trained STEM educator, of which there is a shortage, to drive success.

By piquing interest in STEM careers early, your community members, businesses and other stakeholders will reap economic benefits.

STEM Now Equals Success Later

When students are immersed in STEM-based experiences from an early age, they’re less likely to develop self-defeating ideas about their abilities later. When a school district invests in STEM-based education, they are investing in workforce development, economic viability and most importantly, the future success of our children.

Remember, we are already feeling the impact of the U.S. STEM shortage. Over 665,000 STEM-related jobs are sitting unfilled. If we don’t do something to fix it now, what will that number look like by 2030?
The second-most ethnically-diverse school district in the commonwealth of Pennsylvania, Susquehanna Township School District, serves nearly 2,900 students. After realizing the dire need for STEM workers, superintendent Dr. Tamara Willis selected 21stCenturyEd to jumpstart her district’s STEM initiative.

"The research behind 21stCenturyEd is riveting," said Dr. Willis. "To hear Marlon and the rest of the 21stCenturyEd team share current numbers regarding the STEM workforce was alarming. I knew we needed to do something."

Dr. Willis collaborated with county commissioners, the school board and the technology director to implement 21stCenturyEd courses at the elementary, middle and high school levels. "We discussed the current state of the workforce and the existing challenges in trying to find qualified workers for STEM-related jobs," Dr. Willis said. "As a group, we’ve committed to acting as STEM advocates for our community."

Students have ample time to access 21stCenturyEd’s STEM courses. In the district’s elementary building, students can access courses through the school’s library media specialist. Middle schoolers leverage 21stCenturyEd courses during project-based learning time, as well as at the district’s after-school STEM club.

"The benefit of 21stCenturyEd’s curriculum is the ability to give every student several opportunities to explore STEM, which opens the door to career pathways they may not have explored otherwise," Dr. Willis said. "We’re removing barriers to help our learners succeed, and parents are pleased that our district is actively offering high-level opportunities to explore STEM."

21stCenturyEd courses provide exposure and exploratory opportunities to students, according to Dr. Willis. "The fact that 21stCenturyEd courses are challenging, but not graded, is a huge selling point for our students," she said. Students can dive into STEM lessons without the lingering fear of receiving a poor grade.

The STEM crisis is real.

"A problem of this magnitude may leave district leaders wondering where to begin," said Dr. Willis. "The fact is, investing in 21stCenturyEd as a STEM partner is a strong starting point."
Conclusion

If we don’t address the shortage of STEM workers now, we are likely to experience an economic crisis and jeopardize the United States’ position as a leading innovator in STEM industries.

Launching a STEM Revolution
As education leaders, it is our responsibility to provide opportunities for STEM learning to every learner.

An effective STEM initiative takes time. The transformation of a community, town or region into a vibrant STEM community is a three- to five-year project to start – anything less can result in wasted resources, frustration, loss of credibility and demotivation.

However, the benefits provided to students, communities and the country are well worth the investment.

Getting Started
The need to change the way we educate our students is clearer than ever. This is true for all kinds of educational models.

So whether you’re a school district, a charter or magnet school, or a private or parochial school, providing students with access to additional STEM learning resources is crucial. If you are a school superintendent, a school principal, an executive director or a headmaster, the pressure is on to get it right. Thankfully, you can’t go wrong with 21st-CentEd.

The first step is to provide Access to comprehensive STEM resources to ALL learners.

Be the STEM advocate your students need. Our future – and our children’s future – depends on it.
Let’s get them ready!
Appendix & Resources


   https://www.pewresearch.org/fact-tank/2017/02/15/u-s-students-internationally-math-science/

4. Why Computer Science?
   https://code.org/promote

5. BLS Data, Oxford Model, Deloitte Manufacturing Skills research initiative.


7. STEMConnector, State of STEM.


    https://ssir.org/articles/entry/collective_impact

    https://www.nctq.org/dmsView/Teacher_Shortage_Fact_Sheet