Top 5 Must-Have STEM Initiatives in the 21st Century Classroom

MAD learn
by CRESCERANCE

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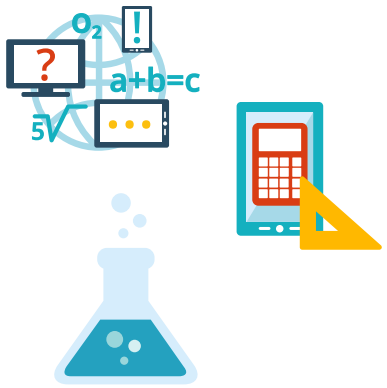
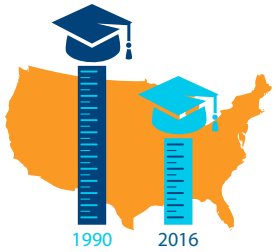
The 21st century classroom looks a little different than before (or at least it should). The students in your classrooms are the future leaders, innovators, and educators of the world. To best equip these young minds with the skills they will need to thrive in the dynamic, fast-paced environment, classrooms must implement leading STEM initiatives to teach:[1]

- Problem-solving
- Scientific inquiry
- Innovation
- Mathematical reasoning
- Critical thinking
- Technicaltroubleshooting
- Entrepreneurship



Despite the STEM movement and supporting research, classrooms across the country are still falling short.

These statistics paint a dismal picture of the current state of our students' education:

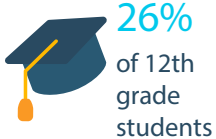


In 1990 the United States led the world in high school and college graduation rates. Currently, the United States now ranks 20th in high school graduation rates and 16th in college graduation rates.[2][3][4]

It is estimated that by 2018, the United States will have 3 million high-skilled jobs that will be left unfilled.

80% of the fastest growing occupations depend on mastery of mathematics and scientific knowledge - making STEM initiatives a must-have in the 21st century classroom.

STEM-related jobs are growing three times faster than other non-STEM related jobs.



Only 26% of 12th grade students scored at or above the proficient level on the National Assessment of Educational Progress' math assessment.

Leading schools, both public and private, have found creative ways to bring STEM into the classroom, like never before. Members of the League of Innovative Schools, are introducing cutting-edge STEM initiatives to provide their students with ample opportunities to explore the latest in Science and Technology. These STEM-centered schools are boosting student engagement and increasing standardized test scores - with over 95% of students passing required testing each year.[5]

Here are the top must-have STEM initiatives to implement in your classrooms this school year.

01
3D Printing

Scientific exploration and inquiry require students to try new things. For students that may be afraid of failing, giving them access to 3D printing enables them to expand their scientific thinking and creativity with confidence, in new (and cool) ways. Unlike more traditional STEM initiatives, 3D printing encourages experimentation and risk-taking. Students learn to work within abstract concepts and a level of uncertainty. In addition, 3D printing enables students to take a mental model or intangible idea and transform it into tangible objects that can be touched and held. Science materials like fossils that were once too delicate to touch and explore, can now be copied, printed, and handled - taking students' understanding of fossils to a new level. In fact, the iterative process inherent with 3D printers teaches students that making improvements and revisions are an integral part of Science and innovation.[6]

02
Mobile Application Development

Introducing coding and mobile application development in the classroom is one of the fastest growing STEM initiatives. You don't have to tell that to Haines Middle School students who are designing mobile apps to enhance day-to-day school operations. With programs like Cresearance's MAD-learn app development curriculum, students as young as third grade are being exposed to computer programming, entrepreneurship, and marketing. Recent studies have found that coding offers a host of benefits to students including increased problem-solving skills, enhanced logical reasoning, and detail-oriented thinking.[7] Coding is also providing a source of inclusion in the classroom for students of various abilities. Non-profits such as nonPareil are using coding to teach high school students with autism spectrum disorder, equipping them with skills to enter into IT-related jobs.[8] Coding programs similar to MAD-learn have also been attributed with improved parietal cortex development, the area of the brain responsible for language comprehension. Recent studies have found that learning a computer language has very similar cognitive effects to a student's brain as learning a foreign language.[9]

With a generation of students accustomed to using mobile applications on a regular basis, what better place to start scientific exploration than with mobile application development?

03
Robotics

Considerable anecdotal evidence has been gathered that support the idea that students respond well in subject areas involving programming and robots. There are a number of great robotics curricula and materials available to bring robotics into the classroom. Lego Mindstorms, Vex Robotics, and more sophisticated programs like NAO robot are helping to teach students scientific inquiry and abstract concepts related to engineering and mathematical algorithms. With a tangible walking and moving object, students are reminded that precise control of the robot is a reflection of the clarity of their programming directions. Students learn about the intricate balance between science, engineering and math and get a deeper understanding of how these subject areas are intimately linked together. With the increase popularity of drones, teaching robotics and how to manipulate mechanical devices will be a much needed skill that the 21st century student will need to master.[10] [11]

04
Gamification

With innovative schools like New York City's Quest to Learn leading the way, bringing video games into the classroom will be one of the fastest growing STEM trends in 2016. Classrooms across the country are incorporating Minecraft, Gamestar Mechanic, and other computer programs into the classroom to reinforce concepts, teach digital literacy, and introduce game design principles. Some researchers attribute the "gamification of education" as the new wave of the future. Others assert that there is limited research to support the effectiveness of video games in boosting student achievement scores.[13] Either way, experts do agree that using video games does provide students the opportunity to take on a more active role in learning and can increase student engagement. Though video games, themselves, have not been attributed directly to higher test scores or increased retention, improving student engagement with class material is linked with higher academic performance.[14] Leading technology-focused universities like the Massachusetts Institute of Technology (MIT) are exploring the role that video games and gamification can and should have in the classroom. MIT's Education Arcade initiative was created to explore how games can be used to promote learning and in turn lead to higher Math/Science scores, increased graduation rates, and the development of college-readiness skills.[12]

05
Animation

As Sheldon High School students are learning firsthand, animation is a brilliant and creative new way to explore problem-solving, self-expression, and collaboration. For students that may be challenged with communicating verbally, teaching them animation helps to unlock a new world of communicating. With simple programs like Domo, students can be encouraged to explore their self expression and create clear, colourful cartoon environments that embody their own ideas and views of the world. Like many of the up-and-coming STEM initiatives, animation can be tailored to a younger or older student audience. For older students, animation is a great gateway into teaching more difficult technical and Math-related skills. Take the Anim8or tool for example. It allows students to use algebraic and calculus functions within the program to create 3D animations. As an added bonus, creating animations can help to build a more cohesive school community. In fact, schools are creating animation clubs to invite students, of all levels, to partner with one another to produce animations - effectively building ties and establishing a sense of community across student backgrounds.[15]

Conclusion

The growing need for more STEM-focused programs in our schools is rather apparent. With STEM-related jobs expected to outpace non-STEM related jobs, our students must be equipped with the technical, math, and science skills they need to be competitive in the workplace. Implementing technology and STEM programs are the first steps schools can take to reinvent education for the 21st century student. With technology partners like Crescerance, schools can find innovative and affordable ways to introduce students to computer programming and mobile application development.

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To learn more about MAD-learn's full programming curriculum, designed to blend mobile development technology with classroom learning, visit www.MAD-learn.com

[1] http://www.iseek.org/careers/stemskills.html
[2] http://www.edutopia.org/stw-college-career-stem-infographic
[3] https://www.nms.org/AboutNMSI/TheSTEMCrisis.aspx
[4] https://www.nsf.gov/nsb/sei/edTool/data/highschool-06.html
[5] http://stemwire.org/2013/04/01/at-stem-centered-high-school-test-scores-rise-to-the-top/
[6] http://3dprintingsystems.com/why-have-3d-printers-in-the-classroom/
[7] http://www.edutopia.org/discussion/coded-success-benefits-learning-program
[8] http://www.edutopia.org/blog/coding-classroom-long-overdue-inclusion-merle-huerta
[9] http://www.nature.com/nature/journal/v431/n7010/abs/431757a.html
[10] http://theconversation.com/five-reasons-to-teach-robotics-in-schools-49357
[11] https://www.bostonglobe.com/magazine/2014/10/02/stem-newest-darling-robotics/FrQEOiiLNbWXL5GI6UE8WP/story.html
[12] http://www.scientificamerican.com/article/fact-or-fiction-video-games-are-the-future-of-education/
[13] http://blogs.scientificamerican.com/observations/2012/10/26/educating-players-are-games-the-future-of-education/
[14] https://www.nwea.org/blog/2015/research-proof-points-better-student-engagement-improves-student-learning/
[15] http://www.fractuslearning.com/2013/12/06/animation-in-the-classroom/