Clayton County Public Schools
STEM and STEAM Education
Frequently Asked Questions

1. What are STEM and STEAM?

STEM is the acronym for **Science**, **Technology**, **Engineering** and **Mathematics** (STEM). STEAM denotes the inclusion of the **Arts**. When incorporating the arts in a STEM initiative, the arts curriculum must expressly include math and/or science concepts and principles.

STEM education may be implemented at all grade levels (i.e. elementary, middle and high school) STEM education is based on rigorous curriculum that integrates subjects (e.g. math and science) as opposed to teaching them separately in isolation. STEM teachers plan and work collaborative as a team to deliver instruction that is driven by innovation, real-world problem solving, exploratory, and student-centered development of creative ideas and solutions. STEM education is not a prescribed curriculum, but a combination of several researched-based best practices proven to improve student achievement:

- Inter-disciplinary instruction
- Problem and project-based learning
- Inquiry-based learning
- Collaborative learning
- Laboratory investigations
- Research projects
- Real-world experiences via work-based learning opportunities
- Advance Placement (AP), International Baccalaureate (IB), college Dual Enrollment programs, and Career, Technical and Agricultural Education (CTAE)

In Georgia, STEM education may include curriculum from career clusters beyond Engineering and Technology. Those career pathways are: **Healthcare Science, Agricultural Science, Biotechnology, Engineering, and Computer Networking/Computer.** These programs are a part of the district's Career, Technical and Agricultural Education (CTAE) program. The state Department of Education considers CTAE a vital part of STEM and encourages the inclusion of CTAE, especially in middle and high school programs.

2. Why Implement STEM Education Programs?

By utilizing hands-on, real world learning tasks, coupled with academic theory, STEM education helps students master complex, higher-level math and science concepts and enables them to do better on standardized assessments. STEM also improves achievement by equipping students with the skills, abilities, and knowledge that will prepare them for college and future careers, such as:

- Critical and analytical thinking skills
- Proficiency at solving non-routine problems
- High-level communication abilities
- Project management experience
- Teamwork and leadership skills

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According to U.S. Secretary of Education, Arne Duncan, "Everyone has a stake in in improving STEM education. Inspiring all our students to be capable in math and science will help them contribute in an increasingly technology-based economy, and will also help America prepare the next generation of STEM professionals – scientists, engineering, architects, and technology professionals – to ensure our competitiveness."

In addition to improved academic outcomes for students, a STEM education enables students to eventually earn high wages in high demand occupations and encourages self-sufficiency and financial independence. STEM education, therefore, addresses the workforce development needs of industry and strengthen the local, state, and national economy. The US Bureau of Labor Statistics reports that over the past 10 years, growth in STEM jobs was 3 times faster than growth in non-STEM jobs, and that STEM workers command higher wages, earning 26% more than those in non-STEM jobs.

3. Is STEM for the average student?

Yes, a STEM educational program would be an excellent choice for most students. There is no mandatory GPA requirement for STEM. In many cases, students who do not perform well in traditional educational programs do much better in STEM because they find the "real world" problem solving and hands-on projects are more engaging. STEM is equally appropriate for high achieving students because of the focus on analysis and investigation.

4. If a school has a STEM program, do all the students have to participate?

No, a school may decide to be a STEM "program" model instead of being a "whole school" model. In that case, only the students in the STEM Program would participate.

5. Does STEM help improve literacy skills?

STEM education helps improve reading comprehension and writing skills because they are required to read and write, not only in their English and social studies courses, but also in their math and science courses. STEM projects include writing research reports, using technical manuals, and conducting oral presentations. STEM teachers often collaborate with other core academic teachers to develop joint projects. In these projects, students work on different aspects in each core class.

6. What are the costs of implementing STEM?

Any additional expenses related to implementing STEM vary dependent upon which grades are being addressed (elementary, middle or high school) and the existing resources a school already has as a part of its instructional program. There are no fees associated with STEM, nor is there mandated curriculum that must be purchased. The design of STEM programs is based on the vision of the school. Associated costs may include, but are not limited to:

- Additional math and science teachers
- STEM specific professional development for teachers
- Computers (hardware and software) and other technology
- Equipment (cost varies greatly depending on program focus)
- Supplies (annual costs vary based on types of projects)
- Creating and maintaining a "wet" lab (in not already in place)

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7. Is STEM a nationally recognized program?

Yes, in general, STEM programs that are rooted in best practices are recognized as good instructional programs. In Georgia, the Department of Education (GADOE) has a STEM certification process to validate high quality STEM education programs and to provide guidance for new programs.

8. What are the specific steps toward STEM certification?

In Clayton County Public Schools, the steps toward STEM Certification by the Georgia Department of Education are as follows:

1. School leadership meets with math and science teachers (and CTAE where applicable) to determine capacity to fully implement a STEM program.

2. The school's leadership convenes the school community (e.g. staff, parents, business partners) to determine if a STEM educational is the most appropriate program for the school and to determine if the school should select the "whole school" or "program" model.

3. School leadership meets with district STEM Support Team (TBD) for guidance on the GADOE STEM framework

4. School leadership submits a proposal to Deputy Superintendent for approval to pursue STEM certification.

5. School contacts state GADOE for pre-application visit where input and feedback is provided by the STEM Coordinator (school site/district level coordinator or designee apportioned the time to work with STEM Team, Business Partners, Colleges/Universities, etc.).

6. School submits STEM application to the state.

7. School implements STEM or STEAM in line with GADOE framework ***(takes 2 – 3 years).***

8. Several visits are made by the district team and state STEM Coordinator to monitor progress.

9. Official certification visit is scheduled and on-site evaluation conducted.

9. Can a school have a STEM focus without going through certification?

Yes, certification is only intended to validate the quality of the program. Applying for STEM certification is optional, not mandatory. However, a school can only get credit for having a STEM program through the state's school evaluation system, College and Career Readiness Index (CCRPI), if the program is certified.

10. Can a school have more than one focus like STEM and International Baccalaureate?

The GADOE STEM Coordinator has stated that STEM and IB can not only co-exists, but are complementary based on the focus of rigorous instruction and highly qualified teachers. However,

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implementing STEM whole school and an IB program (or vice versa) at the same time would be very challenging. And, it may be difficult for 11th and 12th grade students who are pursuing the IB diploma to participate in all of the components of STEM. However, a school could implement a STEM "program" and an IB program serving two different groups of students.

11. How are schools evaluated for STEM certification?

There are fifteen (15) scored elements for elementary and middle schools and seventeen (17) for high schools. For certification, each element is evaluated using a using a four-point scoring rubric (0, 1, 2, 3). A school must score 3s on most elements and have no 0s or 1s on any element to be certified.

12. How can I obtain more information on STEM and/or STEAM?

For additional information email: eboni.chillis@clayton.k12.ga.us or Felicia Cullars at fcullars@doe.k2.ga.us.

Click on the STEM Roadmap@ http://stemgeorgia.org/roadmap/#

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