US Chamber of Commerce Foundation STEM Scholars

2017-2018 Impact Report
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This report contains an analysis of data from more than 4,057 students participating in the U.S. Chamber of Commerce Foundation’s STEM Scholars program. The 2017-2018 program consisted of three digital courses on STEM career exploration and digital citizenship.*

Overall, findings suggest that connecting students’ personal interests and strengths to STEM skills helps students better see themselves in STEM.

*Radius course activation will be sunsettled in subsequent years
According the US Department of Labor, only 5% of US workers are employed in fields associated with science and engineering, yet these jobs are responsible for 50% of our sustained economic expansion.

It it critical that we help students understand the path to a career in STEM and ignite their curiosity and interest in STEM topics. Our nation’s ability to compete in a global marketplace depends on it.

This effort starts in the classroom by providing STEM learning through an inclusive digital environment. But STEM education should not be limited to high school students. Leading research indicates that most students form their career aspirations by age 14, a compelling rationale to bring career exploration front and center during the critical middle school years.

• As of 2016, only 16% of students graduating high school are proficient in and interested in a career in STEM\(^1\).

• One key indicator determining high school graduates’ interest in STEM is learner interest upon entering high school (i.e. leaving middle school).

• Science and Engineering career opportunities are expected to grow at double the rate of growth of the overall workforce.\(^1\)

• Non-STEM workers with a masters degree typically earn 26% less than STEM workers with similar education.\(^1\)

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1 Pew Research Center of U.S. Census Bureau, 2018
Endeavor is a first-of-its-kind digital STEM career exploration program that meets learners where the ground for STEM career exploration is most fertile – in middle school. Endeavor encourages students to reflect on their unique skills, interests, and aptitudes and how they might connect to future STEM career opportunities.

Endeavor is aligned to the Common Career Technical Core, and the practices from the Common Core State Standards and Next Generation Science Standards.

Course Topics Include:

- Diverse career opportunities in STEM
- How learner interests and skills may translate to career opportunities
- Advanced manufacturing (3D printing)
- The design process
- Internet of things
- Online recommendation engines
- Patient care and medical machines*

*NEW in the 2018–2019 academic year
Connects in the Classroom
While boys and girls do not differ in their STEM abilities, girls are more likely to feel engaged in STEM within a structured school environment. Because Endeavor is implemented in the classroom, students of both genders are given the opportunity to explore real-world STEM careers in an environment where they feel comfortable and motivated.

Inspires with Role Models
Strong role models that have varying appearances, backgrounds, and skills counter student assumptions about who can be a “STEM person.” In Endeavor’s visually compelling career cards, professionals in STEM are represented by a diverse set of individuals who are shown “in-action” in all kinds of exciting work environments.

Gender Neutral Design
According to a study, three times as many high school girls were interested in enrolling in computer science if the classroom designs were seen as less “geeky.” Endeavor’s combination of photographs and animations ground the content in learners’ real STEM experiences, while playfully appealing to all genders as well as to learners who do not see themselves as the “STEM type.”

Endeavor is designed to appeal to a variety of students by widening their perception about what constitutes a STEM career and who can fill these roles. By creating an environment where all types of students— including those underrepresented in STEM fields— feel comfortable learning, Endeavor encourages kids to find their unique STEM path. Endeavor’s course methodology follows three key educational pillars:

2 Sammet, K & Kekelis L, 2016. Changing the Game for Girls in STEM.
Radius – STEM Career Readiness provides students with the foundations of Science, Technology, Engineering, and Math, as well as the fundamentals of computer science and coding.

Radius immerses students in a stimulating learning environment where they assume a secret agent identity and are responsible for delivering a package to headquarters. Along the way, students are assessed in their new skills areas and exposed to a variety of potential career opportunities that leverage the lessons they have just learned.

Course Topics Include:

- Linear equations, functions, and graphs
- Introduction to HTML and key terms related to computer networks
- Working with binary numbers
- Creating and interpreting network trees that represent algorithms
- Ratios, rational and irrational numbers, and estimation
- Pythagorean Theorem and distance formula
- Logical operates and true or false statements

*Radius course activation will be sunsetting in subsequent years*
Addressing the 21st century skill of digital citizenship is increasingly important. Good digital citizenship involves understanding digital footprints, security, privacy, cyberbullying, and digital time management. As of 2015, 80% of 8th graders report using a computer for school work on a weekday. However, only 33% of parents say they can properly explain digital dangers because they do not understand the risks themselves.

Many adults erroneously think that because children have been immersed in technology since a young age, they are naturally “literate” or skilled in using technology. Like traditional literacy, children and adults alike benefit from guidance, instruction, and practice. This effort starts in the classroom by providing students with real-world simulations that allow them to apply lessons as they learn.

- As of 2015, 94% of US children between the ages of 3-18 had a computer at home. That figure is up from 85% in 2010. It is also higher for older children and kids whose parents have more education or a higher income.

- In 2013, the White House’s ConnectED Initiative set a goal of providing 99% of students with broadband internet access in their classrooms and libraries by 2018.

- As of 2015, 61% of children had internet access at home.

- Almost 1/3 of parents do not monitor their child’s connected device usage.
Ignition – Digital Literacy & Responsibility educates students on the nuts and bolts of how technology works, while placing them in virtual environments to tackle issues surrounding digital citizenship.

The course covers everything from internet safety and cyberbullying to how to evaluate online content and properly credit creators of online content. Ignition equips students to meet a set of learning objectives derived from The National Educational Technology Standards (NETS).

**Course Topics Include:**

- Digital relationships and respect
- Internet resources and credibility
- The future of technology
- The viral world
- Wireless communication
- Choosing a computer
Program Reach and Demographics

US Chamber of Commerce Foundation’s STEM Scholars Program
“The course gives a good idea of future careers and explains how they work. The course always tries to help you figure out your future life by recommending jobs that we may like. With STEM Scholars you can learn a lot about STEM and what effects it has on the world.”

Student West Virginia

STEM Scholars Program Reach 2017-2018

4,057 Students

27 Schools

11,007 Hours of Learning
STEM Scholars Student Demographics

Gender

- Male: 45%
- Female: 55%

Race and Ethnicity

- Black/African American: 23%
- White/Caucasian: 21%
- Hispanic/Latino: 8%
- Asian/Pacific Islander: 5%
- Native American Indian: 1%
- Other: 1%

Low to Moderate Income Communities

- Low to Moderate Income Schools: 58%
- Moderate to High Income Schools: 42%

Grade Level

Teachers reported using the courses in the following grades:

- 6th Grade: 18%
- 7th Grade: 17%
- 8th Grade: 18%
- 9th Grade: 20%
- 10th Grade: 39%
- 11th Grade: 38%
- 12th Grade: 45%
Attitudinal Changes and Knowledge Gains

US Chamber of Commerce Foundation’s STEM Scholars Program
Helping Students Identify their STEM Strengths

For learners who are already interested in STEM, **Endeavor** feeds their curiosity by providing real-world context and content on how they can leverage their skills in a STEM career.

For learners who have not previously shown interest in STEM topics, **Endeavor** piques learners’ interest by highlighting how STEM concepts and careers connect to topics that interest them, contextualizing and supporting classroom learning with real-world examples.

The course begins with an interactive self-assessment that asks students about their interests, skills, and aptitudes. Based on their responses, learners receive one of four “STEM Types.”

Assigning students a “STEM Type” helps students identify and focus on strengths and talents that could translate into a STEM career.

- **34%** Visionary, imaginative yet analytical
- **18%** Curious, inquisitive about ‘how’ and ‘why’
- **26%** Creative, knack for solving problems
- **22%** Natural leaders, sought out for people skills
**STEM Scholars - Attitudes around STEM**

Surveys explore how students view STEM in their surroundings, and whether they can see themselves excelling in STEM as an academic subject and potential career.

Given the aforementioned growth in STEM career opportunities and importance of middle school students’ interest in STEM, career awareness and self-agency could have long term implications for students. Like *Endeavor*, *Radius* also invites students to picture themselves in STEM careers.

- **67%** of students say they are interested in a STEM career.
- **38%** of students say they are more interested in STEM.
- **51%** of students say they will use STEM when they get out of school.
Based on pre-course surveys, we know that students approach their digital lives with a discerning eye, yet sometimes fail to know how to act responsibly as digital citizens.

However, after taking Ignition, a majority of students say they feel prepared to set privacy controls on social networks and judge the veracity of websites.

| 23% increase in students who feel prepared to understand copyrights and other protections. | 73% of students say they feel prepared to pick a credible website to use for research on a school project. |
| 25% increase in students who feel prepared to create a multimedia blog post or presentation. |
STEM Scholars – Endeavor Knowledge Gains

Students complete assessments before and after taking each module, providing valuable data on the efficacy of the course. Upon completing the post-assessment, learners receive feedback regarding how they performed; the feedback is designed to encourage students based on their strengths, rather than focus on correcting weaknesses.

This data can help educators and administrators effectively guide students towards STEM careers.

<table>
<thead>
<tr>
<th>The Future of Manufacturing</th>
<th>Internet of Things</th>
<th>Perfect Playlist</th>
</tr>
</thead>
<tbody>
<tr>
<td>After completing the module, students are able to:</td>
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<td>After completing the module, students are able to:</td>
</tr>
<tr>
<td>• Explain the basic process for additive 3D printing</td>
<td>• Identify appropriate visual data formats for specific data sets</td>
<td>• Explain how recommendation engines utilize data to predict user preferences</td>
</tr>
<tr>
<td>• Identify the steps of the design process and explain how it is utilized by designers and engineers</td>
<td>• Understand the steps necessary to create a secure password</td>
<td>• Distinguish between content and collaborative filtering</td>
</tr>
<tr>
<td>• Identify STEM careers that utilize engineering-related skills</td>
<td>• Identify STEM careers that utilize data literacy-related skills</td>
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A Tailored Path Toward a Career in STEM

Throughout the course, students are introduced to different career opportunities based on their interests, skills, and course progress.

When students indicate interest in a particular career, the selected career(s) will appear in their custom Career Report, which contains a basic description as well as sample projects, average national salary, required skills, recommended classes, and actionable next steps to prepare for the career.

Students are able to 'like' or 'dislike' careers; they are also able to return to their Career Report at any time to review the careers they "liked" and search for additional career opportunities.

Data shows that the careers below were the most “liked” by students.

Most ‘Liked’ Careers:

- Video Game Designer
- Industrial Designer
- Front End Web Developer
- CNC Machinist
- UI Designer
- Information Security Analyst
- CNC Programmer
- Multimedia Designer
After completing *Ignition*, students were able to determine short- and long-term personal effects of digital decisions, as well as the human, legal, and social implications of digital citizenship. This includes using digital tools to appropriately, responsibly conduct online research, and exploring the benefits of helping peers avoid negative online behavior.
Voices of Students & Educators

US Chamber of Commerce Foundation’s STEM Scholars Program
### National Teacher Feedback

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<th>Endeavor</th>
<th>Radius</th>
<th>Ignition</th>
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<tbody>
<tr>
<td>Percent of teachers who agree that the course content was important and relevant to their students.</td>
<td>97%</td>
<td>88%</td>
<td>97%</td>
</tr>
<tr>
<td>Percent of teachers who agree that the course was easy to fit into the curriculum.</td>
<td>92%</td>
<td>82%</td>
<td>96%</td>
</tr>
<tr>
<td>Percent of teachers who agree that the course covered content that students would not otherwise have seen.</td>
<td>84%</td>
<td>88%</td>
<td>79%</td>
</tr>
</tbody>
</table>
“I really liked that I actually got to get a feel of what people who hold these jobs actually do.”

_Student_ Michigan

“What I like best about this course is the way they test out what skills I have to connect it to a career I may pursue in the future.”

_Student_ Tennessee

The thing I liked best about this course was the Perfect Playlist module. It showed me what people have to do as a living in sorting peoples favorite and least favorite songs..I’d be good at the job because I like to organize a lot! so I might look into careers like that”

_Student_ Michigan
“My favorite part about the course was the great amount of interaction I was allowed, and how I was actually able to learn about real-world tasks and then see STEM career related the tasks I enjoyed.”

Student California

“I liked how it lets you interact and control certain situations. It also give you job ideas. Even if you’re not interested in STEM, it still gives you the opportunity to know what jobs are out there.”

Student New Jersey

“I loved the graphics, content and awesome reactions of my students after they accomplished it! This was hands down one of the best resources I have ever used and plan to do so again!”

Endeavor Teacher Maryland

“The students particularly enjoyed all of the different engineering careers that they got to explore. They hadn’t known that making shoes or choosing music was engineering.”

Radius teacher Tennessee