Business leaders in Kentucky cannot find the science, technology, engineering and mathematics (STEM) talent they need to stay competitive. Students’ lagging performance in K-12 is a critical reason why. The good news is that the nation’s most effective STEM education programs can help turn the tide.

Kentucky students have made real progress over the past decade, especially in fourth-grade math. Yet not enough students get the chance to learn rich and challenging content that prepares them for college and careers, and few eighth graders have teachers with an undergraduate major in math or science. Many of those teachers report that they don’t have all the resources they need to succeed.

Programs in STEMworks, CTEq’s honor roll of STEM education programs that have proven their effectiveness, have the potential to address these and other challenges in the state.

THE KENTUCKY STEM SKILLS SHORTAGE STARTS EARLY

Progress in math has faltered
After years of progress, eighth-grade scores have fallen.
Trends in 8th grade math scores, 2003-2015

Students of color lag farthest behind
Closing achievement gaps must remain a priority.
Percentage of Kentucky students at or above proficient, by race/ethnicity

KENTUCKY NEEDS MORE STEM TALENT

STEM fields are growing in Kentucky
Between 2014 and 2024:

STEM jobs will grow  Non-STEM jobs will grow

19%  10%


*Data not available or reporting requirements not met.
The state must plug the gaps in the STEM pipeline

The Kentucky STEM pipeline loses young people at every level of the education system. Some fail to graduate from high school and many do not finish college, which narrows the pipeline of students who can gain advanced STEM skills. The 2-year college graduation rate is particularly low. Of those students who do graduate, few get a post-secondary degree in STEM.

What percentage of high school students graduate? (2013-2014)

- Kentucky: 87.5%
- United States: 82.3%

Of high school graduates who enter a 4-year degree program, what percentage graduate? (2012-2013)

- Kentucky: 49.3%
- United States: 59.6%

Of high school graduates who enter a 2-year associate's degrees program, what percentage graduate? (2012-2013)

- Kentucky: 24.8%
- United States: 27.6%

What percentage of certificates and degrees is in STEM fields? (2012-2013)

- Kentucky: 26.4%
- United States: 23.9%

TAP KENTUCKY’S FEMALE AND MINORITY TALENT

Together, females and minorities make up more than half of Kentucky's population, yet they are much less likely to earn STEM degrees or become STEM professionals. Closing these gaps can pay big dividends in the state.

Women have lost ground in computing

The available talent in computer science would rise dramatically if the state simply closed the gender gap in these subjects.

Number of computing degrees/certificates in Kentucky

Women have lost ground in engineering degrees

It is critical to prepare and inspire many more students of color to pursue STEM subjects such as computer science and engineering.

People of color are not gaining ground in engineering degrees

Underrepresented minorities in Kentucky earning engineering degrees/certificates

*Data not available or reporting requirements not met.

For the complete state report, methodology, and sources, see vitalsigns.changetheequation.org (vitalsigns.changetheequation.org)
GIVE KENTUCKY STUDENTS ACCESS TO BETTER STEM LEARNING OPPORTUNITIES

Lack of access to such opportunities severely limits young people’s college and career prospects.

The state should make time for elementary science

Hours per week spent on science, grades 1-4

The state should improve access to advanced courses

Many students lack access to such courses.

Students in Kentucky schools that do not offer challenging math and science courses, 2009/10

Success in Advanced Placement courses can put more students on a path to STEM careers.

Of the high school graduating class of 2015 in Kentucky:

<table>
<thead>
<tr>
<th></th>
<th>Took AP Math Exam</th>
<th>Scored 3+ on AP Math Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Students</td>
<td>13%</td>
<td>6%</td>
</tr>
<tr>
<td>White</td>
<td>13%</td>
<td>6%</td>
</tr>
<tr>
<td>Black</td>
<td>4%</td>
<td>1%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>13%</td>
<td>5%</td>
</tr>
<tr>
<td>Asian</td>
<td>37%</td>
<td>25%</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td>40%</td>
<td>10%</td>
</tr>
</tbody>
</table>

DEVELOP AND RETAIN TALENTED STEM TEACHERS IN KENTUCKY

Research shows that teachers’ content knowledge and teaching experience can affect student performance

Boost teachers’ content knowledge

Eighth-graders whose math teachers have an undergraduate major in math, 2015

The state should improve access to advanced courses

Many students lack access to such courses.

Students in Kentucky schools that do not offer challenging math and science courses, 2009/10

Success in Advanced Placement courses can put more students on a path to STEM careers.

Of the high school graduating class of 2015 in Kentucky:

<table>
<thead>
<tr>
<th></th>
<th>Took AP Math Exam</th>
<th>Scored 3+ on AP Math Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Students</td>
<td>13%</td>
<td>6%</td>
</tr>
<tr>
<td>White</td>
<td>13%</td>
<td>6%</td>
</tr>
<tr>
<td>Black</td>
<td>4%</td>
<td>1%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>13%</td>
<td>5%</td>
</tr>
<tr>
<td>Asian</td>
<td>37%</td>
<td>25%</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td>40%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Retain excellent teachers

Minority students are most likely to have inexperienced teachers

Eighth-graders whose teachers have 5+ years of experience teaching their subject

<table>
<thead>
<tr>
<th></th>
<th>Kentucky</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>78%</td>
<td>70%</td>
</tr>
<tr>
<td>Black</td>
<td>70%</td>
<td>68%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>82%</td>
<td>73%</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td>75%</td>
<td>73%</td>
</tr>
</tbody>
</table>

*Data not available or reporting requirements not met.
GIVE KENTUCKY SCHOOLS AND TEACHERS THE RESOURCES THEY NEED

Teachers in Kentucky need better resources, facilities, and teaching materials to succeed.

Too many teachers lack the tools of their trade

Eighth-graders whose science teachers say they have all or most of the resources they need, 2011

The state should improve access to science facilities and supplies

Eighth-graders whose schools have science labs, 2011

*Data not available or reporting requirements not met.

Turn to STEMworks for proven solutions

Kentucky’s children and youth need immediate help to reach their potential. Change the Equation’s STEMworks honor roll of proven STEM education programs features programs that have been rigorously vetted for effectiveness and address critical issues as diverse as teacher training, school curriculum, and summer camp.