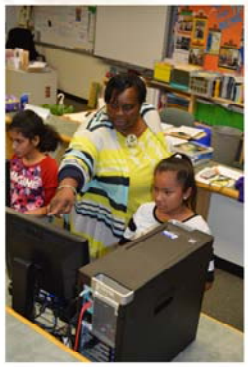
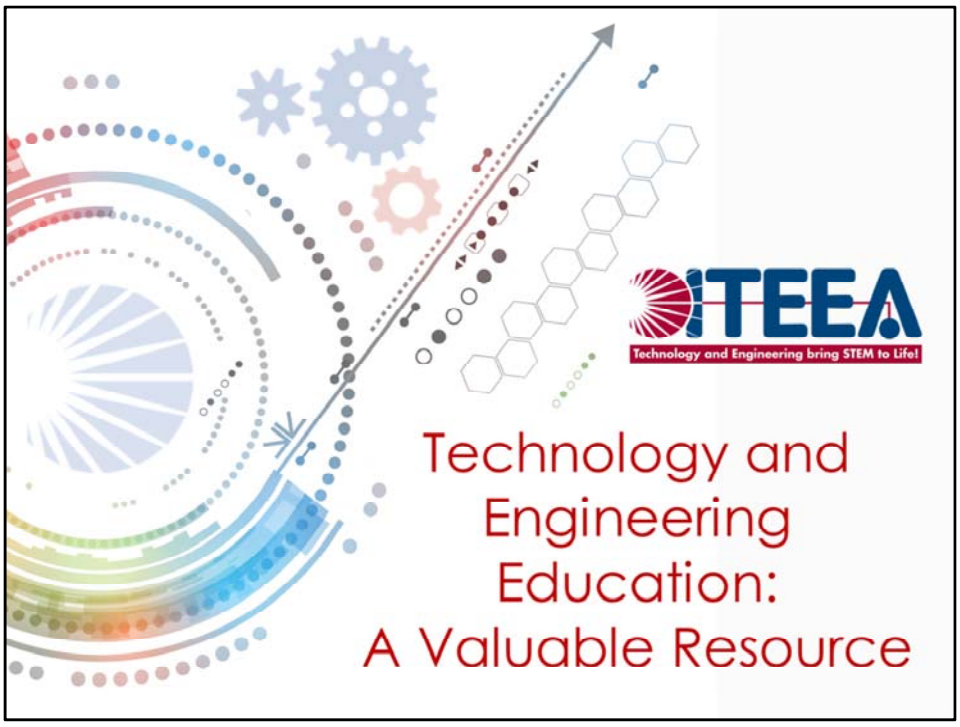
Presenter Information

- Use the following presentation to promote your technology and engineering education programs.
- Use as much or as little as you need.
- Add information that may be specific to your school division or courses you teach.
- If you have any questions or comments, contact jmoye@iteea.org.
- Start presentation with next slide.



iteea.org

NOTE FOR PRESENTER: This slide is for your information only, do not use it in your presentation. Start presentation with the title slide (next slide).



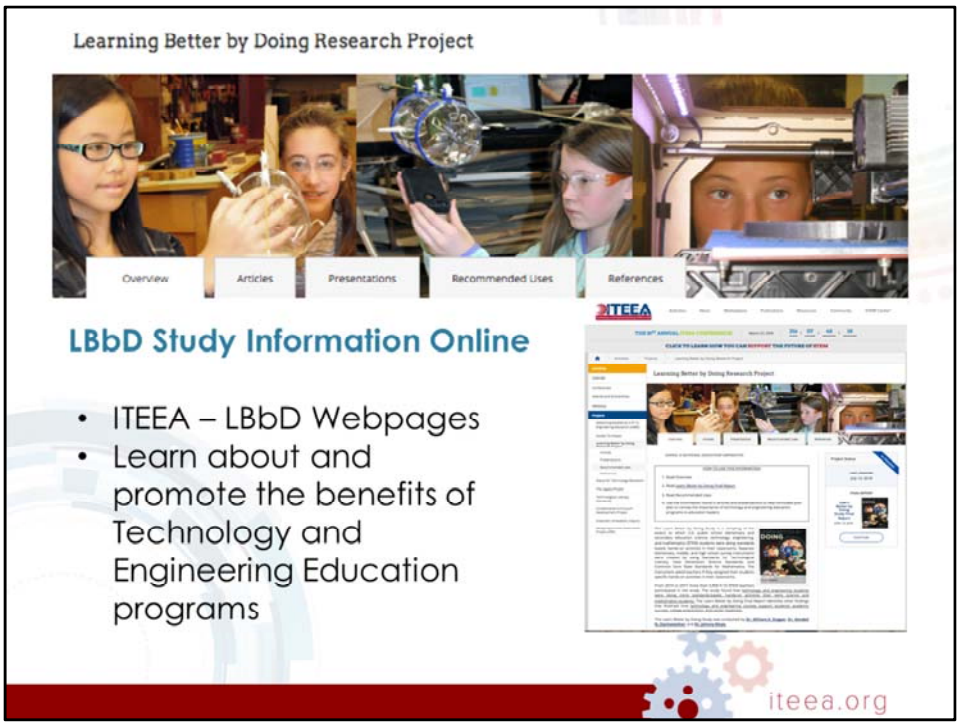
Good morning/afternoon, my name is ____, I am a _____(teacher/administrator, etc.) and I would like to present you with some valuable information concerning technology and engineering education courses and programs. **NOTE TO PRESENTER**: You could mention whether or not you currently have technology and engineering programs in your schools. If you do, during the presentation, you could provide some specific examples of how your technology and engineering students benefit from those courses. If you do not currently have technology and engineering programs, you could modify this presentation to encourage leaders to adopt those courses into your elementary, middle, and/or high schools.

Purpose and Goal of Presentation

- Purpose: To identify the benefits of technology and engineering education programs.
- Goal: For education leaders to understand the value of their existing and possibly underutilized programs.

iteea.org

The purpose of this presentation is to identify the benefits of technology and engineering courses and programs.

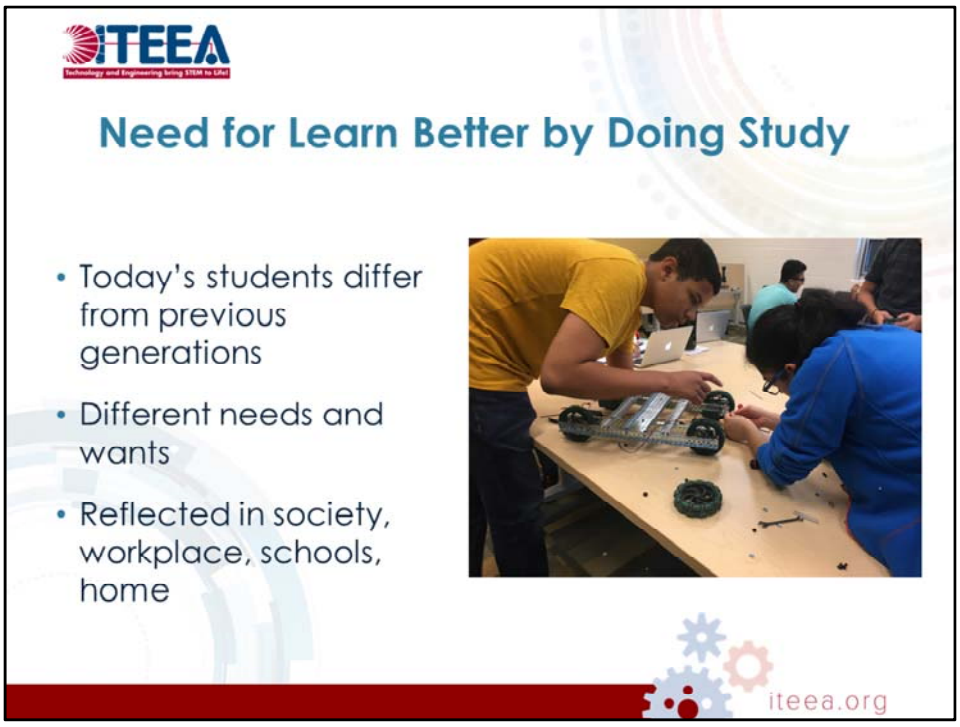


Before we get started with the content of this presentation, I would like to identify that ITEEA has web pages devoted to the Learn Better by Doing Study and benefits of technology and engineering education courses and programs.

We will quickly look at some points identifying that the United States is in the midst of education reform. TEE must be involved with this reform.

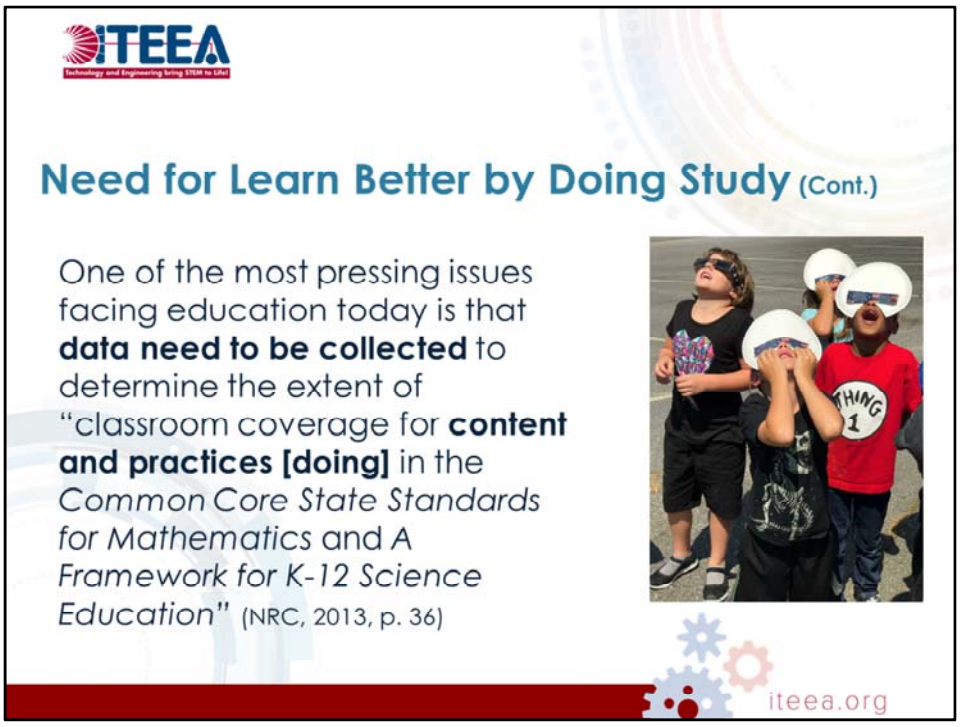
We will look at some of the LBbD Study results identifying and discussing the implications and benefits of TEE – based on those results. We will look at documentation supporting the benefits of TEE and how TEE programs should be part of any educational reform.

Lastly, we will see how this information illustrates the importance of technology and engineering programs as a valuable resource.



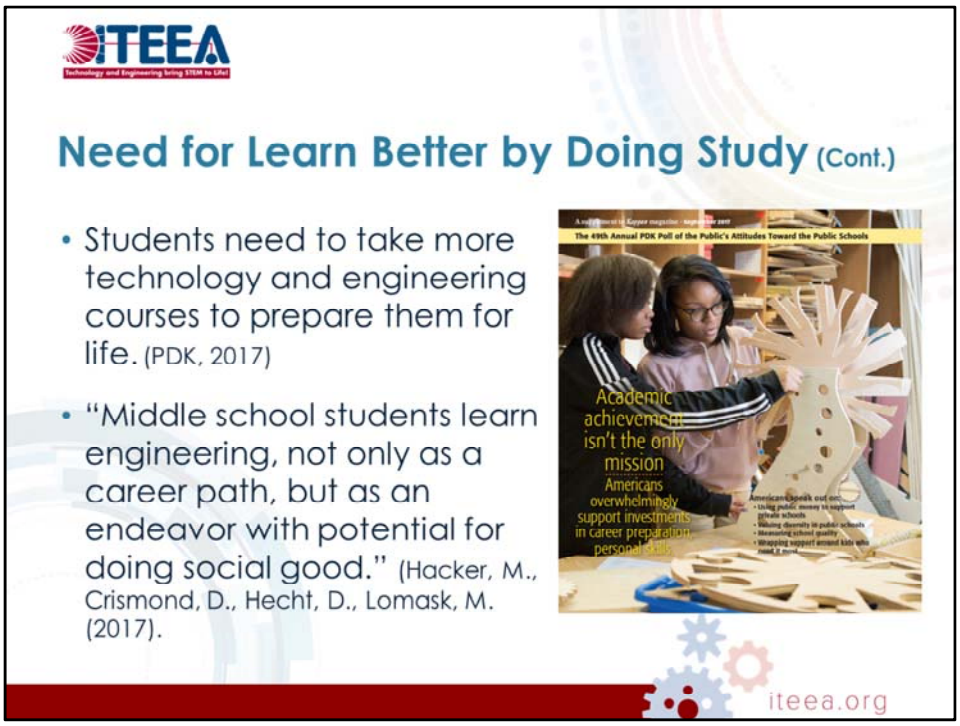
Today's students are much different from those in the past. People's interests, attitudes, and actions are not what was expected, and sometimes even accepted, years ago.

We realize that things are different, but what are we doing differently to keep students engaged and moving forward in life, especially in education?



This is one reason why researchers conducted the LBbD Study. We now have data telling us in which classes students are “doing” standards-based, hands-on activities.

Now that we realize where "doing" in classes occurs, we need to do something with that information.

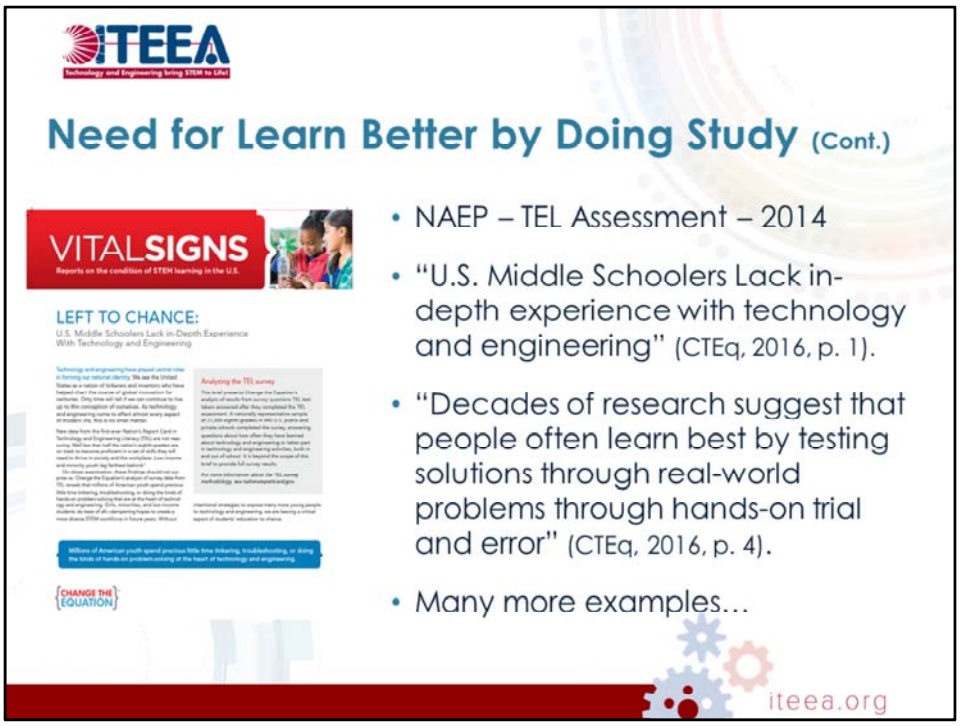


Preparing students to do well in school is a goal. But what does it mean to do well? Certainly it is more than just memorizing information long enough to pass a standardized test.

82% of U.S. adults surveyed in the 2017 Phi Delta Kappa Poll of the Public's Attitudes Toward the Public Schools felt that students need to take technology and engineering courses to prepare them for life. We can assume that the surveyed people feel that what the technology and engineering courses offer is beneficial to students.

This finding would imply that the U.S. public feels that students also need to apply what it is that students are to learn. The LBbD study shows that TEE students use standards-based, hands-on activities to apply what it is that they are to learn in science, technology, engineering, and mathematics classrooms.

The second bullet is the title of one of the resources we will identify during this presentation. These resources, published articles, provide evidence of why TEE is important in preparing students for life. You will find that this presentation cites many references supporting each study finding.



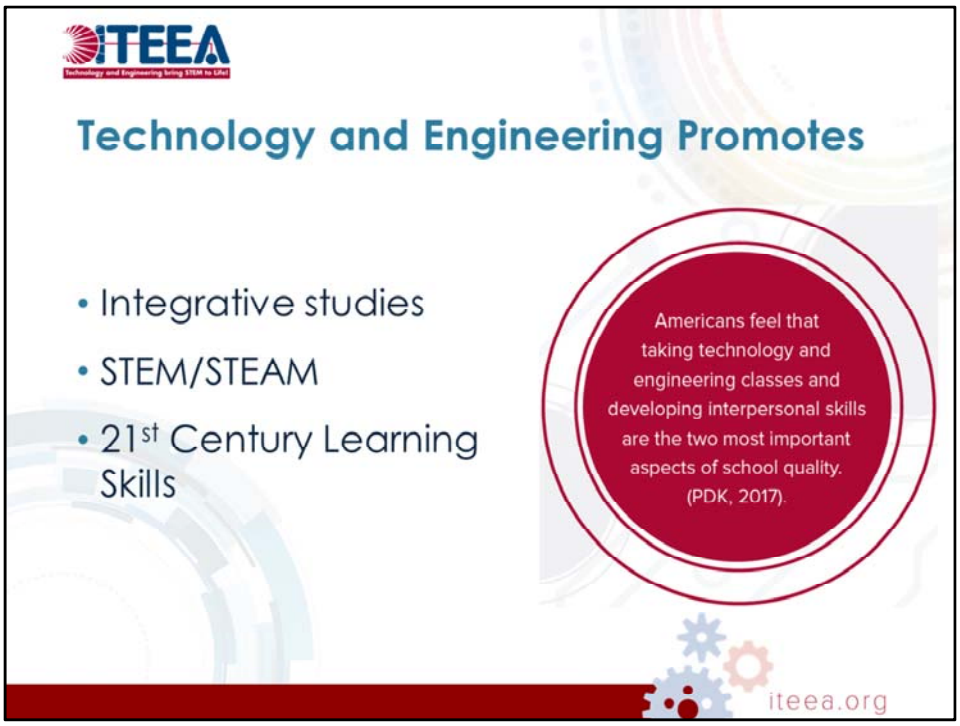
Many of you are aware of the National Assessment of Educational Progress – Technology and Engineering Assessment administered to over 21,000 eighth grade students, across the nation, in 2014.

The Change the Equation organization provides STEM education related information to the U.S. public. The 2016 report stated that MS students lack in-depth T&E experience.

This is only one of many examples of evidence showing that students are not technology an engineering literate. Only 42% of those 8th grade students assessed were considered at or above proficient. (NAEP TEL 2014, n.d.).

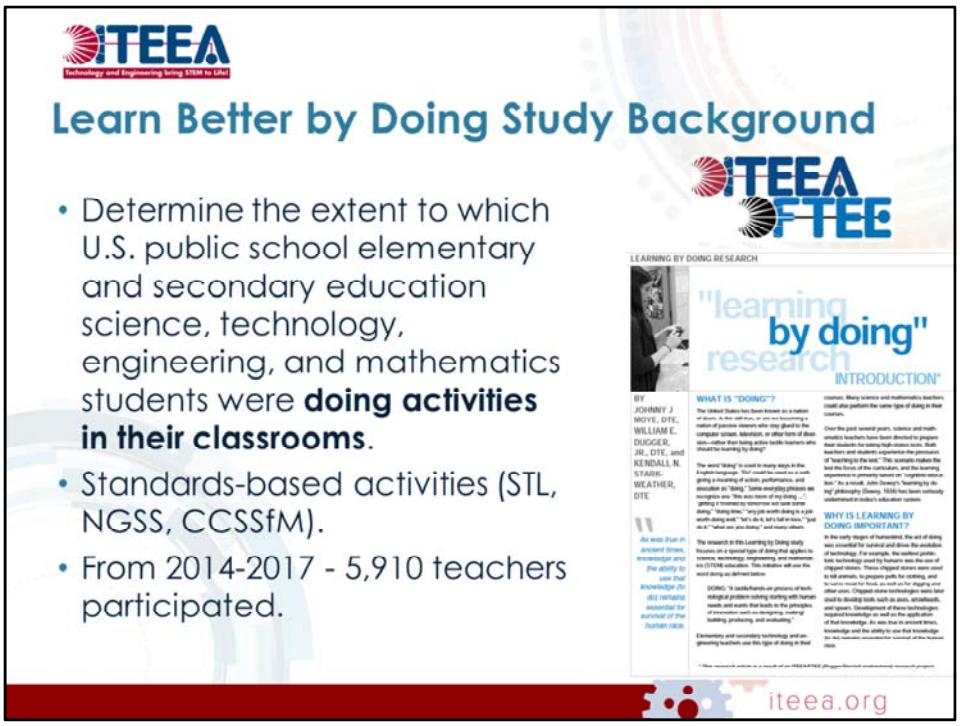
The Vital Signs report also tells us that students benefit from doing hands-on activities in the classroom.

The previous four slides make the point that the US public feels that students need the experiences what TEE courses provide. This is an important point because we should realize the value of TEE courses and how they prepare students for life, both academically and in their chosen profession.



These are a few concepts that educational leaders and law makers are considering and promoting.

Incidentally, these concepts are addressed and used daily in technology and engineering courses.

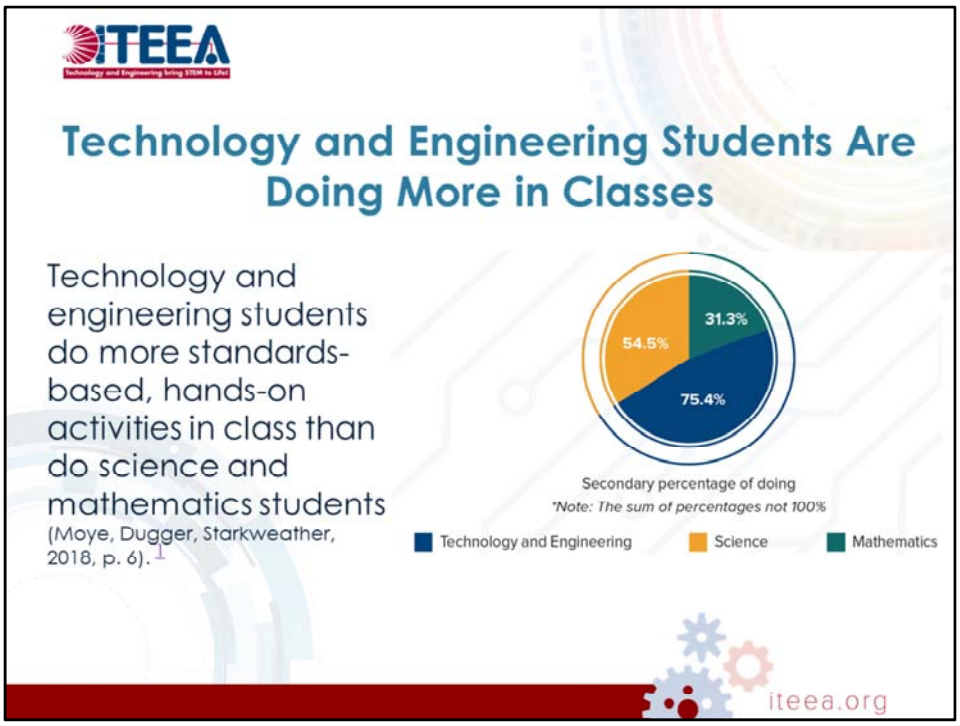


OK, lets shift gears. This is a little background of the LBbD study. It does not go into great detail about the study itself because this presentation is to identify and discuss some of the findings and how those findings illustrate the benefits of TEE courses and programs.

You can see here the purpose of the study.

The study instruments were based on Standards for Technological Literacy (STL), Next Generation Science Standards (NGSS), and Common Core State Standards for Mathematics.

Over 5,900 elementary, MS and HS STEM teachers participated in the study.

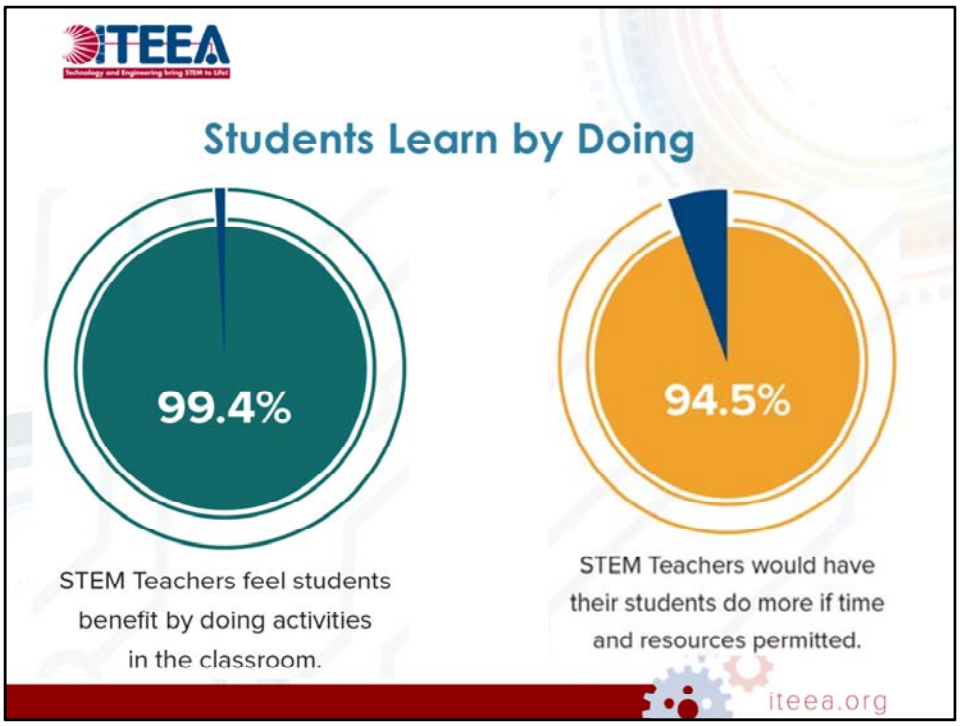


Technology and engineering students do more standards-based, hands-on activities in class than do science and mathematics students.

This is a very important point.

Referring back to thoughts and concerns identified in previous slides:
1. The NAEP-TEL Assessment found that students lack in-depth technology and engineering experience.
2. The U.S. public feels students should take technology and engineering courses.
3. Students can learn science, technology, engineering, and mathematics (as well as other) content in a STEM classroom setting.

Technology and engineering courses and programs are a valuable resource to address, and resolve, these thoughts and concerns. Keep this point in mind as we progress through this presentation.



Almost 100% of teachers indicated that they felt students benefit by doing activities in their classrooms.

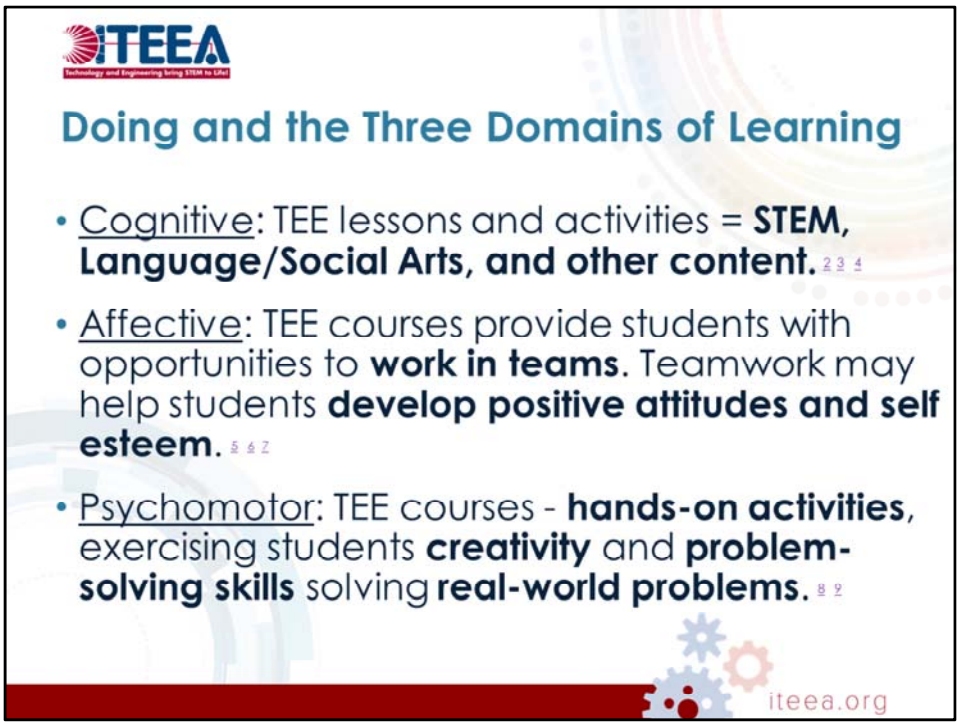
94.5% of teachers would have their students do more if time and resources permitted.

These two findings identify that teachers feel that students learn by doing and would like for their students to do more hands-on activities in class. .

As identified in the previous slide, technology and engineering students are doing more hands-on activities in their classrooms than are science and mathematics students in their classrooms.

Remember, the U.S. Public feels students should take more technology and engineering courses to prepare students for life.

Keep these points in mind because they lay the groundwork to realize even more opportunities technology and engineering education provides students.



Why do teachers think that students learn by doing? Here are some thoughts.

Students doing hands-on activities support the three Domains of Learning: Cognitive, Affective, and Psychomotor.

The three domains and short descriptions are shown here. Students experience, and learn from, these three domains in technology and engineering courses.

Specifically addressing each domain, Integrative STEM/STEAM is a reality in Technology and Engineering Education that directly addresses the Cognitive Domain.

Concerning the Affective Domain: technology and engineering students often work in teams doing hands-on activities. As we have seen, hands-on activities are more available in technology and engineering than in other courses.

The Psychomotor Domain is where TEE students learn by using hands-on activities and is the area by which TEE courses may be best known.

Notice that we have included footnotes to each bullet. These footnotes are hyperlinked and by clicking on these footnotes, one may go to articles that specifically identify how

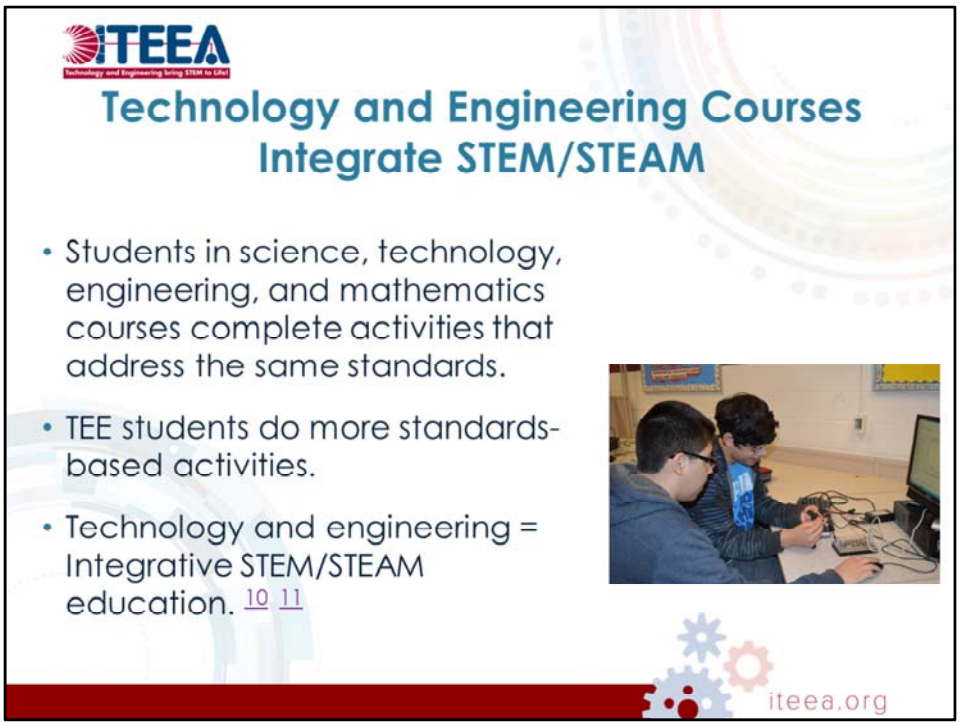
technology and engineering courses support student learning in each of the three Domains of Learning. These footnoted references are also included in slides at the end of this presentation.

For example, we have identified three articles that show how technology and engineering courses support the Cognitive Domain, the titles of those articles are:

- STEM integration: Solids, CAD, and 3D printers – *Technology and Engineering Teacher*.
- Vocabulary development in technology and engineering education.
- Beyond science and math: Integrating geography education.

All of these references provide specific information and activities used in technology and engineering courses.

As we progress through the presentation we will see how students are doing hands-on activities in technology and engineering courses directly addressing each of the Domains of Learning, as well as many other areas we educators should consider.

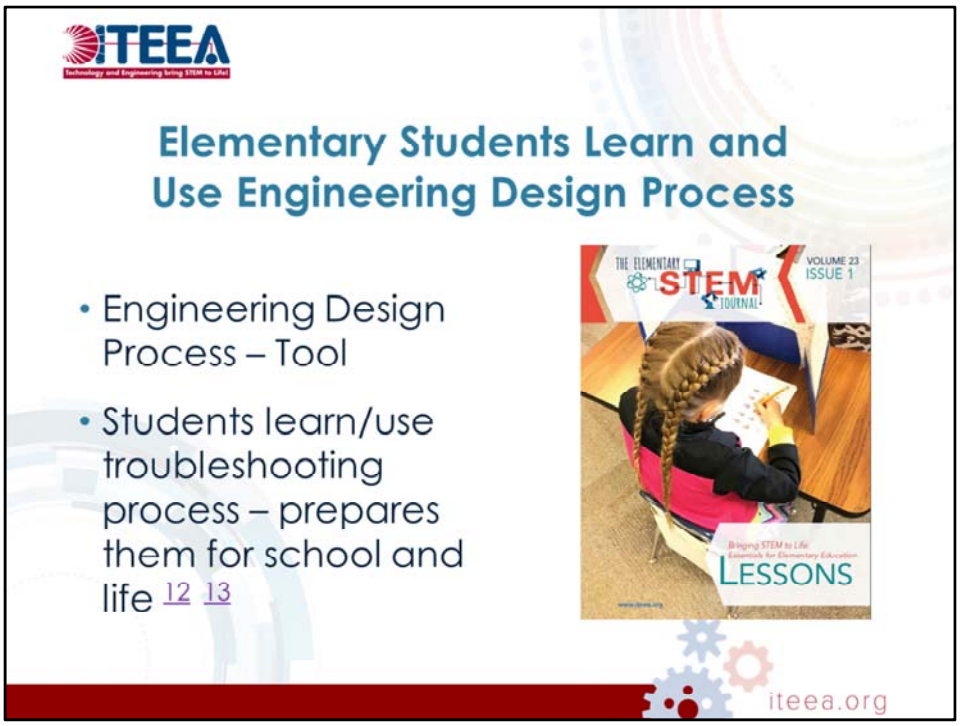


As mentioned in a previous slide, the LBbD study instruments were based on STL, NGSS, and CCSSfM.

Science, technology, engineering, and mathematics teachers reported that a percentage of their students were doing activities that address specific and related science, technology and engineering, and mathematics standards.

This is an important point. If Integrative STEM is on the agenda of many educational leaders and lawmakers today, and if students learn by doing, coupled with the fact that TEE students are currently doing more of these standards-based activities in their classrooms, it is easy to see and understand that TEE is an important resource to achieve Integrative STEM in those classrooms.

Realizing these points, we should evaluate our current TEE programs, and determine how and if we could better utilize this resource to promote and realize authentic STEM education in our schools. An additional point – this could occur with no extra financial expense to the school division.

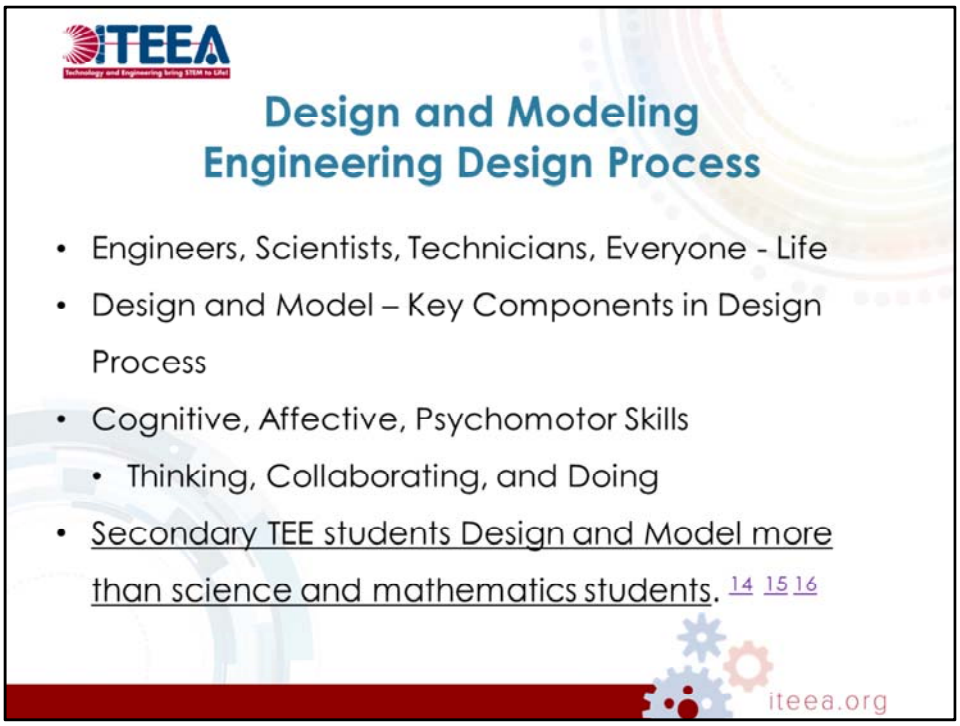


The adults surveyed in the 2017 PDK poll feels that students should take more technology and engineering courses to prepare them for life. But – why do they think technology and engineering is such a valuable resource?

During the next few slides, we will look at some additional benefits that technology and engineering can offer students academically, as well as into their future lives.

An engineering design process is a tool. As we know, there are different examples of engineering design processes. One consistent point is that people (students included) can use this tool, or process, to determine and design solutions to problems. As we have seen in the literature, including the 2014 NAEP-TEL Assessment results, U.S. students' problem-solving skills are lacking.

Students will benefit by learning and practicing an engineering design process early in their school years. This knowledge and ability to "do" things will help students in their classes, and also in life.

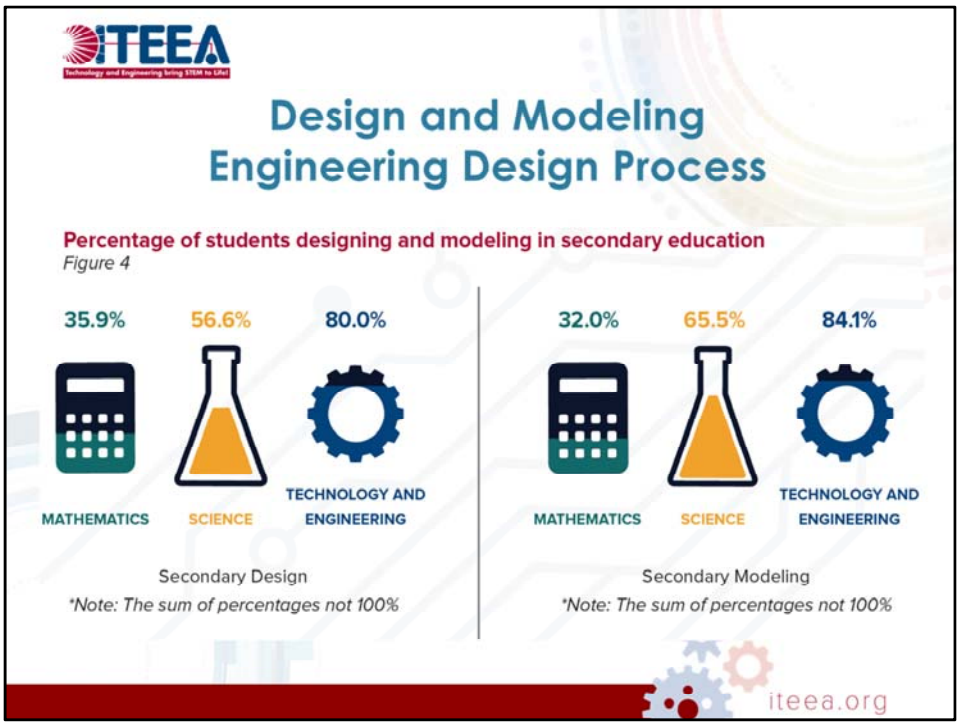


The Engineering Design Process is used by many professionals.

Again – we can see the three Learning Domains that TEE students experience while Designing and Modeling to find solutions to problems.

Designing and Modeling are two key components in the EDP. The LBbD study found that TEE students use the EDP more frequently than do science and mathematics students.

To reiterate, the 2017 PDK poll found that 82% of U.S. adults feel that students need to take more technology and engineering courses in school to prepare them for life… Those adults seem to realize the benefits of TEE programs. We, as educators, should also realize the benefits of Engineering Design, realize where it is being used in our schools, and continue to develop that resource in an effort to make our students more academically and personally successful.

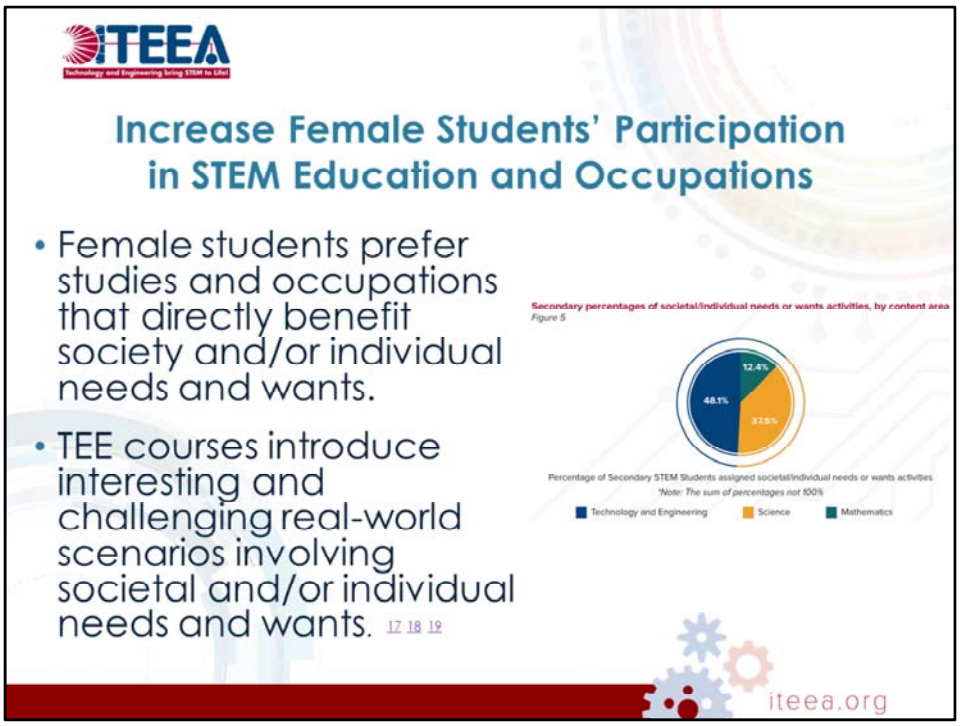


Here are the specific LBbD Study findings.

A specific point to be made here:

Teachers in all three content areas report that, to some extent, their students are Designing and Modeling in their classrooms. This reiterates an earlier point, that an integrative studies course, designed for all students, would be easily accomplished in technology and engineering courses and programs. School leaders and teachers may just need to further develop what is already occurring in TEE courses.

Integrative STEM in TEE courses is a natural fit.

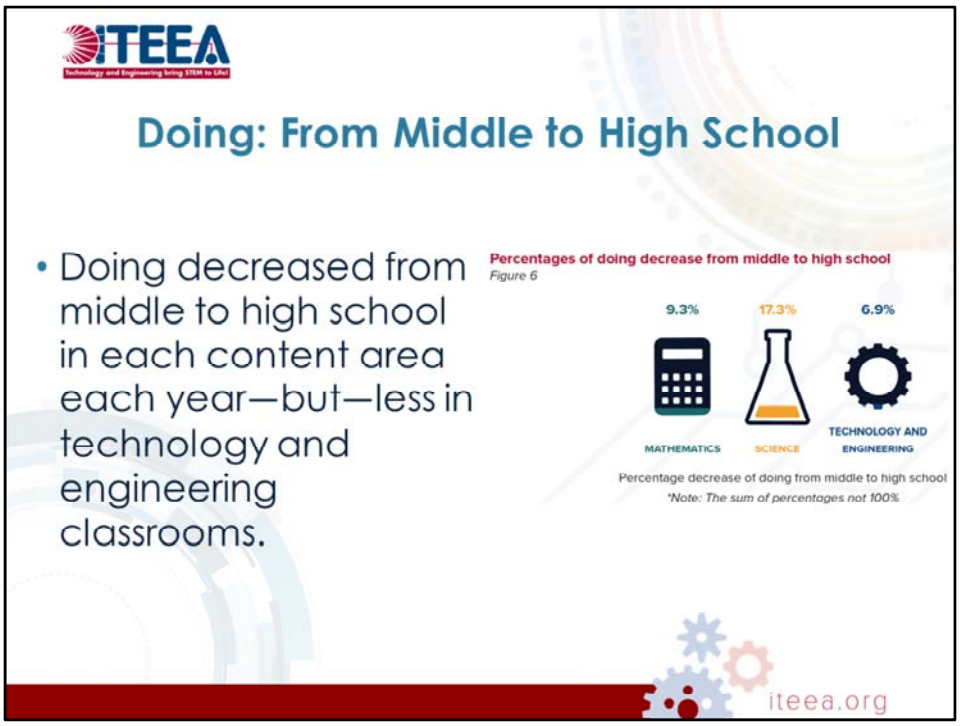


The literature tells us that females tend to prefer studies and occupations that directly benefit society and/or individual needs and wants.

The *Change the Equation – Vital Signs* document previously mentioned states: "Educators who harness TEL's vision of literacy in technology and engineering may well attract many more girls to those fields. The TEL results are an important reminder that we are squandering much of the nation's female talent" (CTEq, 2016, p. 9).

That is a very strong statement designed to remind us that we could be, squandering, opportunities to encourage female participation in STEM education and professions.

The graphic on this slide shows the percentage of activities focusing on social and or individual needs and wants. This is a good illustration of how TEE encourages female student involvement and experiences in STEM education. It should be noted that this trend may be changing as our society changes. The "Technology and Society" area of the NAEP TEL shows "no significant difference" between female and male results. This is a totally different point that can be developed. But – the point is, that both female and male students feel a need to focus on benefits of society and/or individual needs and wants. And – TEE provides that focus more frequently than does science and mathematics courses. https://www.nationsreportcard.gov/tel_2014/#results/overall



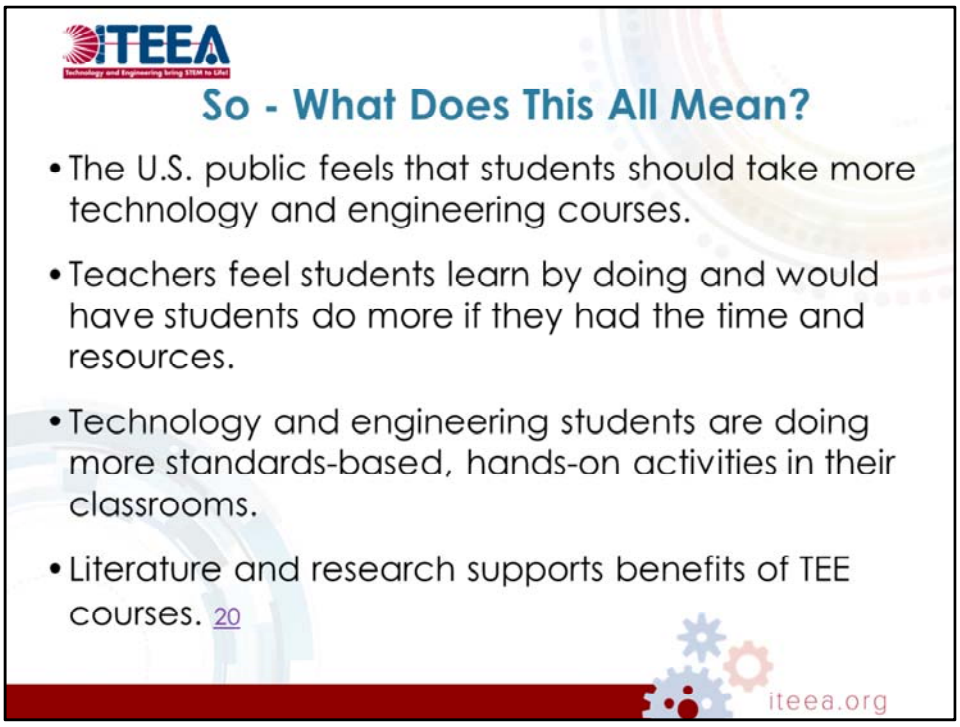
The literature tells us that many students lose interest in school while in high school (NRC, 2004).

The study found that “doing decreased from middle to high school in each content area each year.” But, the data also show that the percentage of “doing” decreased less in TEE courses than it did in science and mathematics courses.

The question exists, is there a correlation between the decrease of “doing” in HS and the decrease of interest and participation in HS?

This is another good point. Although, for the most part, graduation rates have improved over the past few years, there is still work to be done to encourage students to stay engaged and in school.

TEE courses could help keep students interested in school.

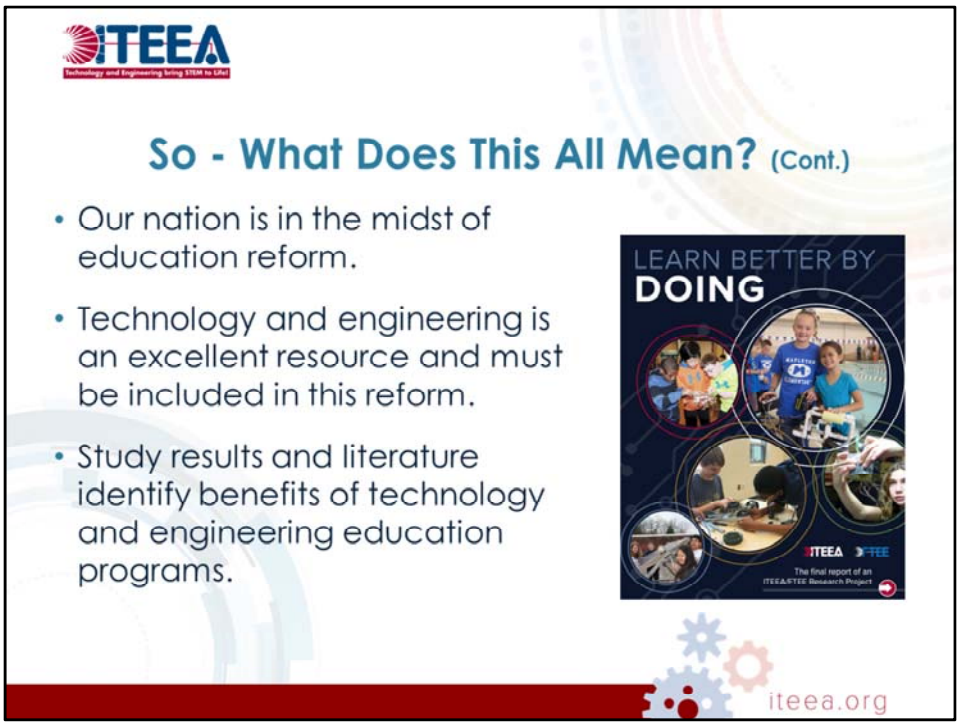


So, what does all of this mean? We have covered a lot of information in this presentation. You may not remember everything but keep in mind that the the presentation is available on the ITEEA website for your review and use.

The main points of this presentation are:

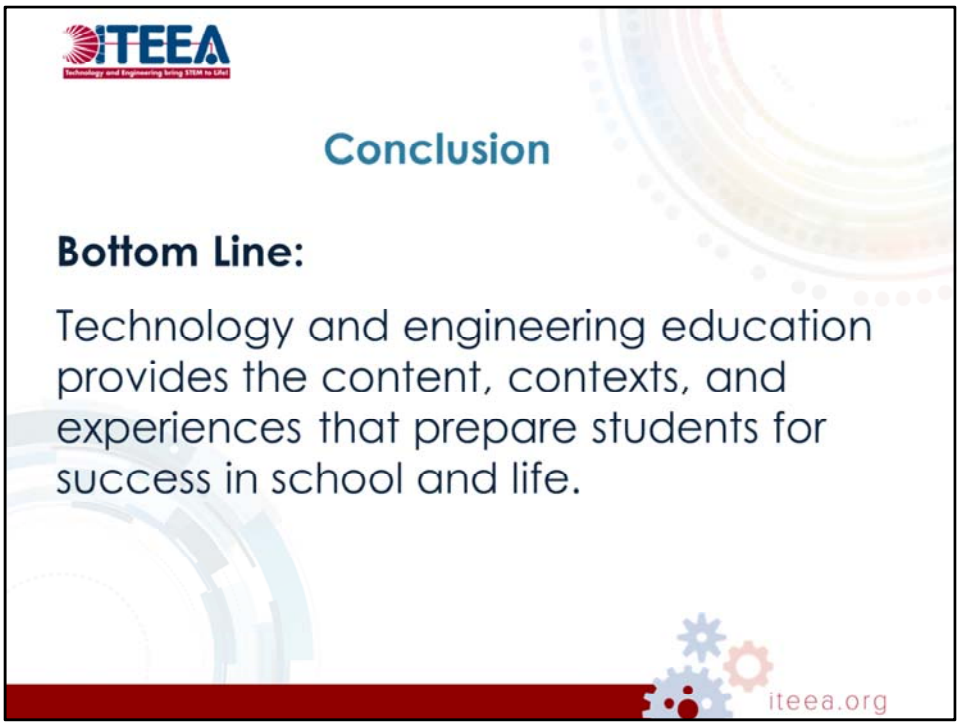
1. The U.S. Public feels that students should take technology and engineering courses to be successful in life.
2. NAEP-TEL Assessment results tell us that students should have more technology and engineering experiences in schools.
3. Teachers feel that students learn by doing and they would have their students doing more hands-on activities in class if they had the time and resources.
4. TEE students are doing more standards-based (STL, NGSS, CCSSfM), hands-on activities than are science and mathematics students.

There are many other benefits to TEE courses. Education leaders, policy makers, and law makers should realize the importance of TEE courses and programs.



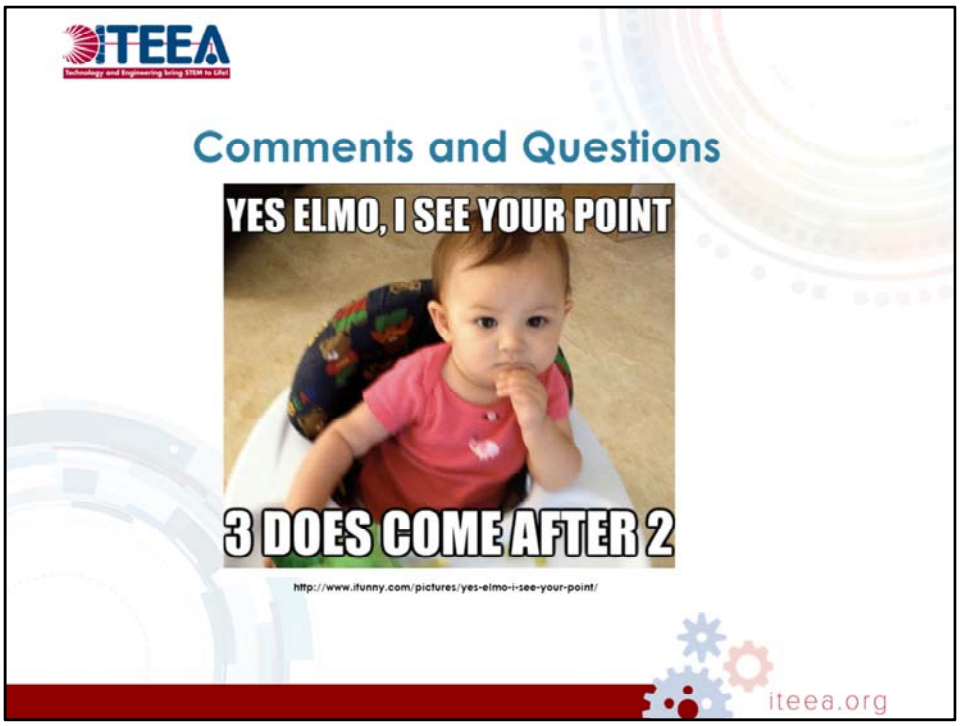
As the great Poet Laureate, Bob Dylan, said many years ago, “The Times They Are A Changin’.” That was true in the 1960s and it remains true today.

Education leaders realize that changes to our system of education are on the horizon. National assessments have identified that U.S. students are not technology and engineering literate. The U.S. public has told us what is needed. We need to realize that the answer is already in place in technology and engineering education. Our students would benefit if we revaluate what we already have, make any necessary changes, and move forward with this valuable resource.

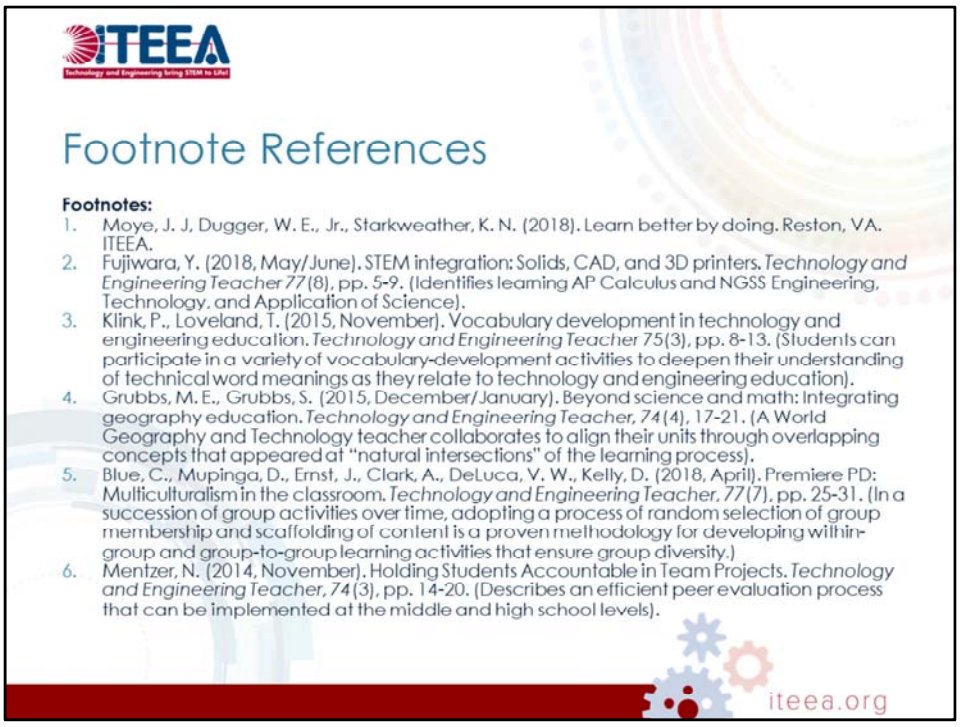


This is the bottom line: Technology and engineering.....

The question is – how are we using this resource?

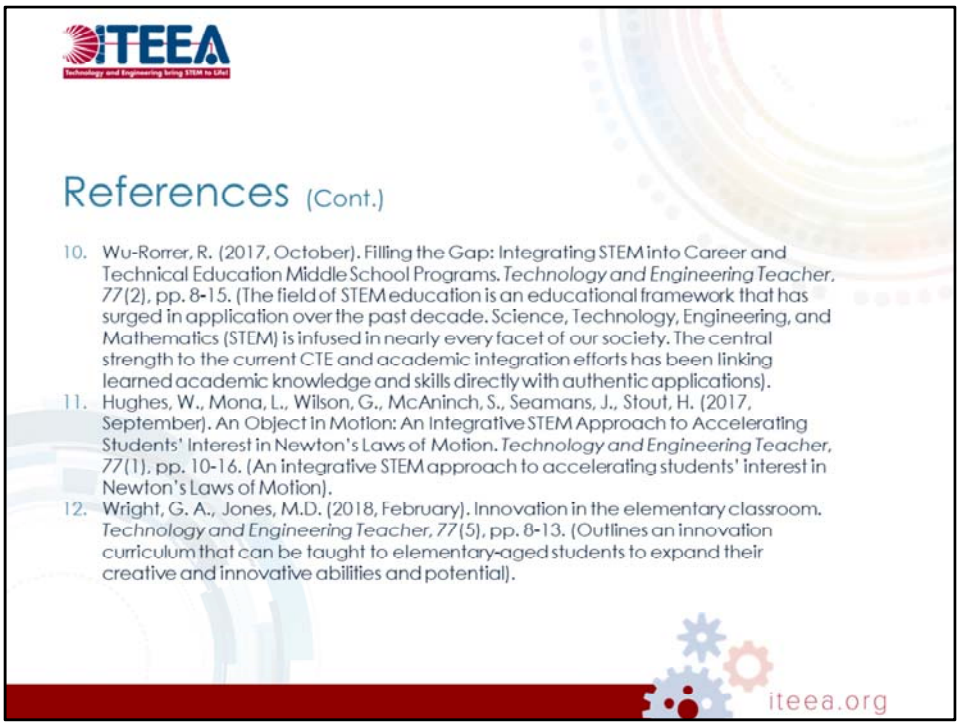


Thank you for your time and attention. Please, let us discuss comments and answer any questions.



These are the footnote references that are associated with each footnote identified in this presentation.

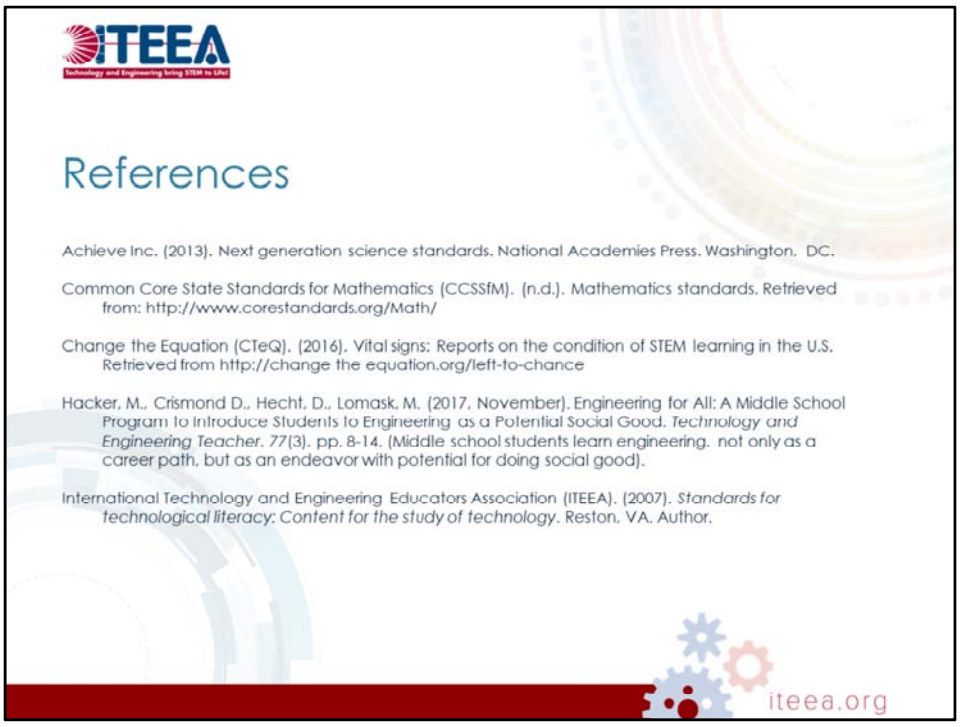
These are the footnote references that are associated with each footnote identified in this presentation.



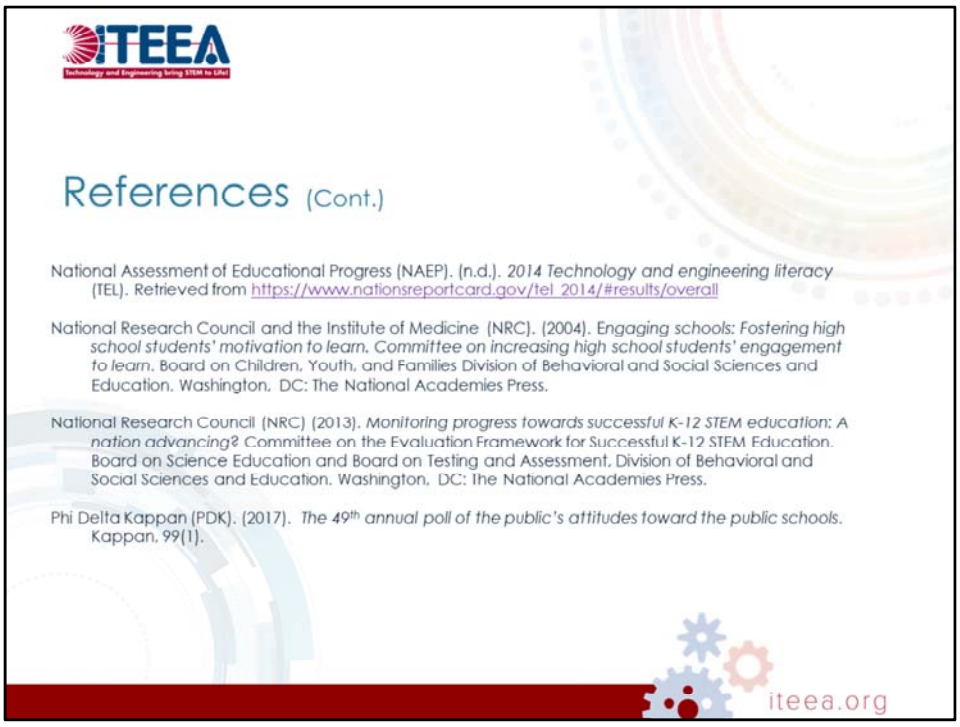
These are the footnote references that are associated with each footnote identified in this presentation.

These are the footnote references that are associated with each footnote identified in this presentation.

These are the footnote references that are associated with each footnote identified in this presentation.



These are additional references cited in this presentation.



These are additional references cited in this presentation.