



**Randy I. Dorn** • State Superintendent  
Office of Superintendent of Public Instruction  
Old Capitol Building • P.O. Box 47200  
Olympia, WA 98504-7200

---

# **UPDATE: Science, Technology, Engineering, and Mathematics (STEM) Education**

**2014**

Authorizing legislation: [RCW 28A.300.515](#)  
(<http://apps.leg.wa.gov/RCW/dispo.aspx?cite=28A.300.515>)

Recodified as [RCW 28A.188.020](#) pursuant to 2013 2nd sp.s. c 25 § 8.

**Career and College Readiness,**  
**Kathleen Lopp, Assistant Superintendent**

**Prepared by:**

- Clarence Dancer, Jr., CTE STEM Program Supervisor ([Clarence.Dancer@k12.wa.us](mailto:Clarence.Dancer@k12.wa.us), 360-725-4467)

## Executive Summary

To succeed in the 21st century knowledge economy, Washington students need the ability to create, design, innovate, and think critically to solve complex challenges. Every young person should possess deep knowledge and strong skills in mathematics, science, technology, and engineering, and be excited and ready to use the knowledge in the real world.

The Office of Superintendent of Public Instruction (OSPI), as required by legislation, coordinates STEM education across the state. Our work includes:

- creating curriculum and professional development for teachers;
- coordinating youth opportunities in STEM;
- working with four-year universities on developing articulations for engineering and pre-engineering courses; and
- developing and maintaining public-partnerships to generate business and industry assistance

This report further describes our work over the past year. In some areas, funding was not available, and these are noted in the report. We also summarize the next steps associated with legislation passed in 2013 “to increase learning opportunities and improve educational outcomes in STEM through multiple strategies and statewide partnerships.”

## Background

In 2013, the Legislature passed [HB 1872](#), which provides a results-driven approach to align state agencies and resources around a comprehensive pre-kindergarten to grade 20 (PK–20) STEM strategy and evidence-based framework for accountability. Specifically, this will:

- Provide tools to align the state’s STEM education efforts and target state dollars towards promising innovations and best practices.
- Ensure STEM outcomes are embedded in existing state policy and planning efforts, such as the [Washington Student Achievement Council’s Ten-Year Education Roadmap](#).
- Establish a multi-sector Governor’s STEM Education Innovation Alliance, [RCW 28A.188.030](#).
- Create a pathway for future state investments to accelerate STEM efforts currently led by the nonprofit Washington STEM. These efforts include supporting the growing number of regional STEM networks around the state and making competitive investments to improve STEM teaching and learning.
- STEM skills enhance opportunity for students and economic vitality.

Washington has important work ahead and the following goals developed by the STEM Work Group will continue to be areas of collaboration and focus with the STEM education and business partners in Washington.

**Goal 1:** Teachers and leaders are recruited, prepared and retained to provide effective STEM instruction.

**Goal 2:** Establish STEM-based K–12 educational programs that ensure students graduate from high school STEM literate, well-prepared for college, careers, and informed about civic participation.

**Goal 3:** School districts provide all K–12 students with opportunities in STEM-related activities, coursework, and advance programs of study to prepare for STEM-related post-secondary educational pathways and careers.

**Goal 4:** Families, communities, and employers advocate for excellent STEM education for every student, every day.

**Goal 5:** Business and Industry partner with teachers, schools and districts to plan and provide support and opportunities to engage all students in STEM.

Students must be prepared and engaged in a robust STEM foundation that leads to advanced STEM instruction and training no matter their gender, race, or background. Students will be able to meet the demand in STEM-related fields and to compete in the global economy.

## Update Status

**Goal 1: Teachers and leaders are recruited, prepared and retained to provide effective STEM instruction.**

- [The Professional Educator Standards Board \(PESB\)](#) received suggestions from OSPI staff on STEM professional development requirements for [RCW 28A.410.2212](#) – Certification renewal rules for teachers in STEM-related subjects.

Based on our suggestions, the PESB voted on certificate renewal rules for teachers at the elementary and secondary levels for STEM professional development in September 2014. The revised rules included the requirement that continuing education or professional growth plans for these teachers include a specific focus on the integration of science, mathematics, technology, and engineering instruction.

- As part of the 2010 System Design Plan legislation ([SSB 6355](#)), the status of applied baccalaureate degrees offered by Washington's community and technical colleges was changed from pilot to regular status. [The State Board for Community and Technical Colleges \(SBCTC\)](#) approve all proposals for applied baccalaureate degrees from the community and technical colleges. These programs are intended to:
  - Serve professional and technical degree-holding students who have limited access to bachelor degree programs after completing their technical associate degree.
  - Provide opportunities for working adults who are place-bound and want to earn a bachelor degree.
  - Fill skills gap needs in specific occupations.

**Goal 2: Establish STEM-based K–12 educational programs that ensure students graduate from high school STEM literate, well-prepared for college, careers, and informed about civic participation.**

[Project Lead the Way \(PLTW\)](#): The Legislature mandated funding to provide grants of \$2,500 to 20 middle and high school teachers. The teachers received development training for implementing integrated science, technology, engineering, and math programs in their schools.

[Seattle University](#) and [Washington State University \(WSU\) Spokane](#) provided professional development training to middle and high school teachers in a curriculum rich in STEM. PLTW

requires teacher training in the basics of a pre-engineering program so the instructor can teach high level STEM in a nationally established curriculum. Local companies such as Boeing, Microsoft, Kenworth, AT&T, and Cisco partner with school districts and teachers to present students with real problems needing real solutions. These business and community members provide mentorship and assist students in developing leadership and communications skills.

The hands-on, project-based program engages students on multiple levels, exposes them to subjects they typically would not pursue, provides them with a strong foundation for achieving their academic goals in any chosen field of study, if pursued, and establishes a proven path to college and career success in STEM related industries.

**Table 1: PLTW Teacher Training**

School Year	Number of Teachers	Number of School Districts	Total Funds*
2011–12	20	20	\$50,000
2012–13	33	20	\$50,000
2013–14	24	15	\$31,000

[Washington Applied Math Council \(WAMC\)](#): provides professional learning opportunities for Washington State teachers who are interested in and have met the certification requirements to teach an Applied Math course.

**Table 2: WAMC Teacher Training**

School Year	Number of Teachers	Number of School Districts	Total Funds*
2011–12	239	110	\$6,500
2012–13	215	107	\$6,500
2013–14	171	85	\$6,500

**Goal 3: School districts provide all K–12 students with opportunities in STEM-related activities, coursework, and advance programs of study to prepare for STEM-related post-secondary educational pathways and careers.**

Students are part of Career and Technical Education programs at their local high schools. These students are enrolled in courses that include Pre-Engineering, Architecture, Manufacturing, Construction, Industrial Design, Information Technology, Graphics Design, Video Production, Video Game Design, and many other technical areas. One of the goals of these programs and this association is to help students develop the skills that will make them successful later in life.

- Competitions—Students participate in approximately 64 different competitive events at the middle and high school level that allow students to explore, develop, and test their technical, leadership, and employability skills at the regional, state, and national levels.

These events range in content from engineering design to public speaking. Students are judged by industry professionals from companies such as Microsoft, PACCAR, Boeing, and POP.

[Washington Technology Student Association \(WTSA\)](#) is a non-profit nationally recognized student leadership organization devoted to teaching STEM, pre-engineering, technology education and industrial technology. With an emphasis on STEM, middle and high school students participate in competitions to demonstrate their technical and leadership skills along with leadership and employability training.

**Table 3: WTSA – Student and District**

School Year	Number of Students	Number of Schools	Total Funds*
2011–12	3,947	51	\$25,000
2012–13	2,001	60	\$35,714
2013–14	2,683	70	\$34,000

[Washington First Robotics](#) is part of a national non-profit student centered STEM organization. The mission of the organization is to inspire young people to be science and technology leaders, by engaging them in exciting mentor-based programs that build science, engineering and technology skills, that inspire innovation, and that foster well-rounded life capabilities including self-confidence, communication, and leadership. Washington State students have the opportunity to participate at three different levels: [Lego League](#), [Tech Challenge](#), and [First Robotics Challenge](#).

**Table 4: Lego League (Middle School Only)**

School Year	Number of Middle Schools	Number of School Districts	Total Funds*
2011–12	51	29	\$30,600
2012–13	65	34	\$33,200
2013–14	60	34	\$33,600

**Table 5: Tech Challenge**

School Year	Number of Schools	Number of School Districts	Total Funds*
2011–12	28	15	\$73,945
2012–13	35	20	\$42,800
2013–14	33	20	\$42,800

**Table 6: First Robotics Challenge**

School Year	Number of Schools	Number of School Districts	Total Funds*
2011–12	62	39	\$291,560
2012–13	56	49	\$217,000
2013–14	87	59	\$381,800

[Real World Design Challenge \(RWDC\)](#) is a national non-profit organization. The organization creates an annual competition that provides high school students, grades 9–12, the opportunity to work on real world engineering challenges in a team environment. Each year, student teams are asked to address a challenge that confronts our nation’s leading industries. Students will utilize professional engineering software to develop their solutions and will also generate presentations that convincingly demonstrate the value of their solutions. The RWDC provides students with opportunities to apply the lessons of the classroom to the technical problems that are being faced in the workplace.

**Goal 4: Families, communities, and employers advocate for excellent STEM education for every student, every day.**

In conjunction with other Washington State STEM non-profit agencies and STEM corporations, the STEM Program Supervisor provides ongoing technical assistance to schools and school districts supporting STEM programs.

**Goal 5: Business and Industry partner with teachers, schools and districts to plan and provide support and opportunities to engage all students in STEM.**

There are over 100 middle school districts participating in STEM education. There has been steady growth over the last three years with the number of districts, number of students participating, and the number of approved courses.

**Table 7: Middle School CTE Enrollment**

School Year	Number of School Districts	Number of Annual Average FTE	Number of Approved Courses
2011–12	112	4,119.39	369
2012–13	131	5,809.00	441
2013–14	166	6,626.01	520

STEM Lighthouse schools originated in 2010 with the Legislature’s passage of [House Bill 2621](#). The bill directs OSPI to designate as many as three middle and three high schools each year as lighthouse schools.

STEM Lighthouse Schools are used as best practice models. Schools may come to visit, observe, and replicate teaching strategies and course work. STEM Lighthouse schools will provide advanced STEM-related academic and CTE programs of study that are engaging, rigorous, and lead to industry certification and/or dual credit (high school/college credit).

2014 STEM Lighthouse Schools:

- [Riverpoint Academy](#) (Mead School District)
- [Cascade K-8 Community School](#) (Shoreline)
- [Toppenish Middle School](#) (Toppenish)
- [Tesla STEM High School](#) (Lake Washington)
- [Lakeside High School](#) (Nine Mile Falls)
- [Columbia Crest A-STEM Academy](#) (Eatonville)
- [Franklin Pierce High School](#) (Franklin Pierce)

Further details about each district and school's participation is available at <http://www.k12.wa.us/STEM/LighthouseSchools.aspx>.

**Table 8: STEM Lighthouse Schools**

School Year	Number of STEM Lighthouse Schools	Funds Allocated to each STEM Lighthouse School	Total Funds*
2011–12	6	\$20,000	\$120,000
2012–13	6	\$19,000	\$114,000
2013–14	7	\$18,000	\$126,000

\* Trainings and programs funded with Carl D. Perkins federal monies.

## Conclusion and Next Steps

The need for K–12 education to prepare our students for the future STEM job market is upon us. As a state educational agency, OSPI has been at the forefront in preparing our students for just that, but there is still much to do.

Our next steps include:

Continue the progress that has been made on HB 1872 and expand on the work that has already been done within the five goals for this bill.

- **Goal 1:** Teachers and leaders are recruited, prepared and retained to provide effective STEM instruction.
- **Goal 2:** Establish STEM-based K–12 educational programs that ensure students graduate from high school STEM literate, well-prepared for college, careers, and informed about civic participation.
- **Goal 3:** School districts provide all K–12 students with opportunities in STEM-related activities, coursework, and advance programs of study to prepare for STEM-related post-secondary educational pathways and careers.

- **Goal 4:** Families, communities, and employers advocate for excellent STEM education for every student, every day.
- **Goal 5:** Business and Industry partner with teachers, schools and districts to plan and provide support and opportunities to engage all students in STEM.

#### Computer Science

- Create a working definition for Computer Science
- Increase the number of Computer Science CTE courses
- Partner with strong curriculum providers
- Provide resources and tools that will allow for districts to engage their students in authentic computer science learning inside and outside of the classroom

#### STEM Teacher Professional Learning

- Continue to work with SBCTC, 4-year colleges/universities, and other teacher certificate providers to include STEM course materials in the certificate program and/or create STEM certifications
- Create a system for teachers seeking recertification that will provide clear guidance on meeting the requirements for RCW 28A.410.2212
- Provide guidance and clarity to STEM Professional Learning providers as we move towards the new recertification process that will best equip them with the tools to provide our teachers with the resources they need

All students must be prepared and engaged in a robust STEM foundation that leads to advanced STEM instruction and training no matter their gender, race, or background. Students will be able to meet the demand in STEM-related fields and to compete in the global economy.

*OSPI provides equal access to all programs and services without discrimination based on sex, race, creed, religion, color, national origin, age, honorably discharged veteran or military status, sexual orientation including gender expression or identity, the presence of any sensory, mental, or physical disability, or the use of a trained dog guide or service animal by a person with a disability. Questions and complaints of alleged discrimination should be directed to the Equity and Civil Rights Director at (360) 725-6162 or P.O. Box 47200 Olympia, WA 98504-7200.*

Download this material in PDF at <http://www.k12.wa.us/LegisGov/Reports.aspx>. This material is available in alternative format upon request. Contact the Resource Center at (888) 595-3276, TTY (360) 664-3631. Please refer to this document number for quicker service: 15-0008.



**Randy I. Dorn** • State Superintendent  
Office of Superintendent of Public Instruction  
Old Capitol Building • P.O. Box 47200  
Olympia, WA 98504-7200