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## STEM - Joint Meeting of Strategic Planning and Data & Metrics Subcommittees

August 21, 2015  
10:00am – 12:00pm  
2 World Trade Center  
Mezzanine Rooms 3&4  
121 SW Salmon St., Portland

*Call In Information:*

*Dial: (888) 204-5984*

*Code: 992939*

### AGENDA

- 1. Review of current draft documents**
- 2. Aligning proposed strategies and outcomes**
- 3. Prioritizing short- and long-term outcomes**
- 4. Follow-up actions**
- 5. Public Comment**

*Members of the public wanting to give public testimony must sign in.*

*There will only be one speaker from each group.*

*Each individual speaker or group spokesman will have three (3) minutes.*

*All meetings of the STEM Investment Council are open to the public and will conform to Oregon public meetings laws. The upcoming meeting schedule and materials from past meetings are posted online. A request for an interpreter for the hearing impaired or for accommodations for people with disabilities should be made to Seth Allen at 503-378-8213 or by email at Seth.Allen@state.or.us. Requests for accommodation should be made at least 48 hours in advance.*



## DRAFT STEM Strategic Plan

### Our Vision

To build an inclusive, sustainable, innovation-based economy by reimagining and transforming how we educate and empower individuals and communities. Oregonians of all races, economic status, and locations will develop the fundamental STEM-enabled innovation skills and mindsets necessary to: #

- Fully contribute to an increasingly complex and technologically rich global society.#
- Address high-demand workforce and industry needs.#
- Improve the prosperity of all individuals and communities across the State.#
- Become creative, life-long learners who can adapt to changing social and economic conditions.#

### Our Beliefs#

1. **All people have creative potential.** Our students should not just be consumers of knowledge, they need to be creators of it in a way that unleashes their creative genius, interests, and talents.
2. **Each student deserves an opportunity at prosperity.** There continues to be persistent inequities in race, ethnicity, gender, and educational background in high-wage, high demand professions. Many students in poverty and from rural areas are being left behind. No one's talents should be left behind.
3. **Diversity is our strength.** Differences of gender, ability, race, ethnicity, and culture provide critical and diverse perspectives and voices to address today's complex challenges. Innovation emerges where different ideas and cultures interconnect.
4. **Engaged learners succeed.** How we teach our students is as important as what we teach them. We must create meaningful learning experiences that empower all students to embrace their curiosity, take ownership of, and joy in their learning, and become lifelong learners.
5. **Education is a collective responsibility.** Effective STEM learning takes place both in and outside of classrooms. Everyone in our community is a potential educator and we need to build solutions that develop partnerships with all of the human capital in our communities.
6. **Innovation is the cornerstone of prosperity.** STEM is not just about filling jobs but creating jobs to address challenges and opportunities. Building an innovation-based economy is essential for long-term prosperity resulting in competitive advantage in a global marketplace.
7. **Learning takes courage, persistence, and humility.** Pushing the boundaries of one's understanding requires us to embrace ambiguity and to take intellectual risks. What we do with what we don't know is as important as what we do know. We should prioritize questions over answers.

8. **STEM skills are essential skills.** Advancements in science, technology, engineering, and mathematics are transforming every industrial and service sector, from agriculture to energy, medicine to manufacturing, forestry to nanotechnology.
9. **All learning is cross disciplinary.** It is the interconnectedness of ideas that enable people to integrate new learning with their prior experiences. STEM by its nature synthesizes analytical and creative thinking. It is a powerful tool that sits at the crossroads of the sciences, arts and humanities.
10. **The best way to learn STEM, is to DO it.** Education is not about retaining facts or disconnected bits of information. Utilizing purpose-driven learning challenges students to pursue deeper questions and to solve problems that are relevant and meaningful.

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## Goals

1. **Inspire and empower our students** to develop the knowledge, skills, and mindsets necessary to thrive in a rapidly-changing, technologically rich, global society.
2. **Ensure equitable opportunities and access** for each and every student to become a part of an inclusive innovation economy.
3. **Continuously improve** the effectiveness, access to resources, and the number of formal and informal STEM educators.
4. **Create sustainable and supportive conditions** to achieve STEM outcomes aligned to Oregon's economic, education, and community goals.

### **Goal 1: Inspire and empower our students to develop the knowledge, skills, and mindsets necessary to thrive in a rapidly-changing, technologically rich, global society.**

- Promote the development of new teaching approaches that challenges students to be creative, resourceful, persistent, and collaborative in developing knowledge and skills to solve real-world problems.
- Increase the interactions of students with STEM professionals who can help students develop aspirations and personal identities as life-long learners and inspired innovators utilizing STEM skills.
- Develop new opportunities for students to enhance their critical thinking and problem-solving skills in afterschool or summer programs that are focused on solving complex challenges.
- Increase the availability of early college credits in STEM courses by strengthening local partnerships and articulation agreements between high schools, community colleges and 4-year institutions.
- Increase the development and acceptance of industry-recognized credentials based on demonstrated skills, including traditional and nontraditional certifications (e.g., micro-credentials, digital portfolios, etc.).
- Provide program "start-up" or retooling funds to incentivize post-secondary programs aligned to high-wage, high-demand industry needs.

- Increase student interest, understanding, and success in mathematics through solving real-world problems.
- Improve the quality and relevance of post-secondary mathematics placement processes and align course offerings to relevant degree/certificate program needs.
- Transform P-20 STEM teaching and learning by supporting the spread of effective approaches and connecting research to practice.
- Other:

**Goal 2: Ensure equitable opportunities and access for each and every student to become a part of an inclusive innovation economy.**

- Improve student advising by strengthening career counseling services and tools, increasing access of students to alumni, professional, and near-peer networks, and increasing student access to up-to-date market data about high-wage, high-demand jobs.
- Increase STEM internships, work-based and service learning opportunities, and undergraduate research opportunities in high-demand fields.
- Increase the number and quality of P-20 support services and pre-college transition/bridge programs for students who are traditionally underserved and underrepresented in STEM.
- Increase the number of STEM role models and access to professional networks for students who are underrepresented in STEM.
- Increase needs-based financial support and access to flexible, micro-loan/funds for first-generation and underrepresented students pursuing high-wage, high-demand credentials.
- Other: #

**Goal 3: Continuously improve the effectiveness, access to resources, and the number of formal and informal STEM educators.**

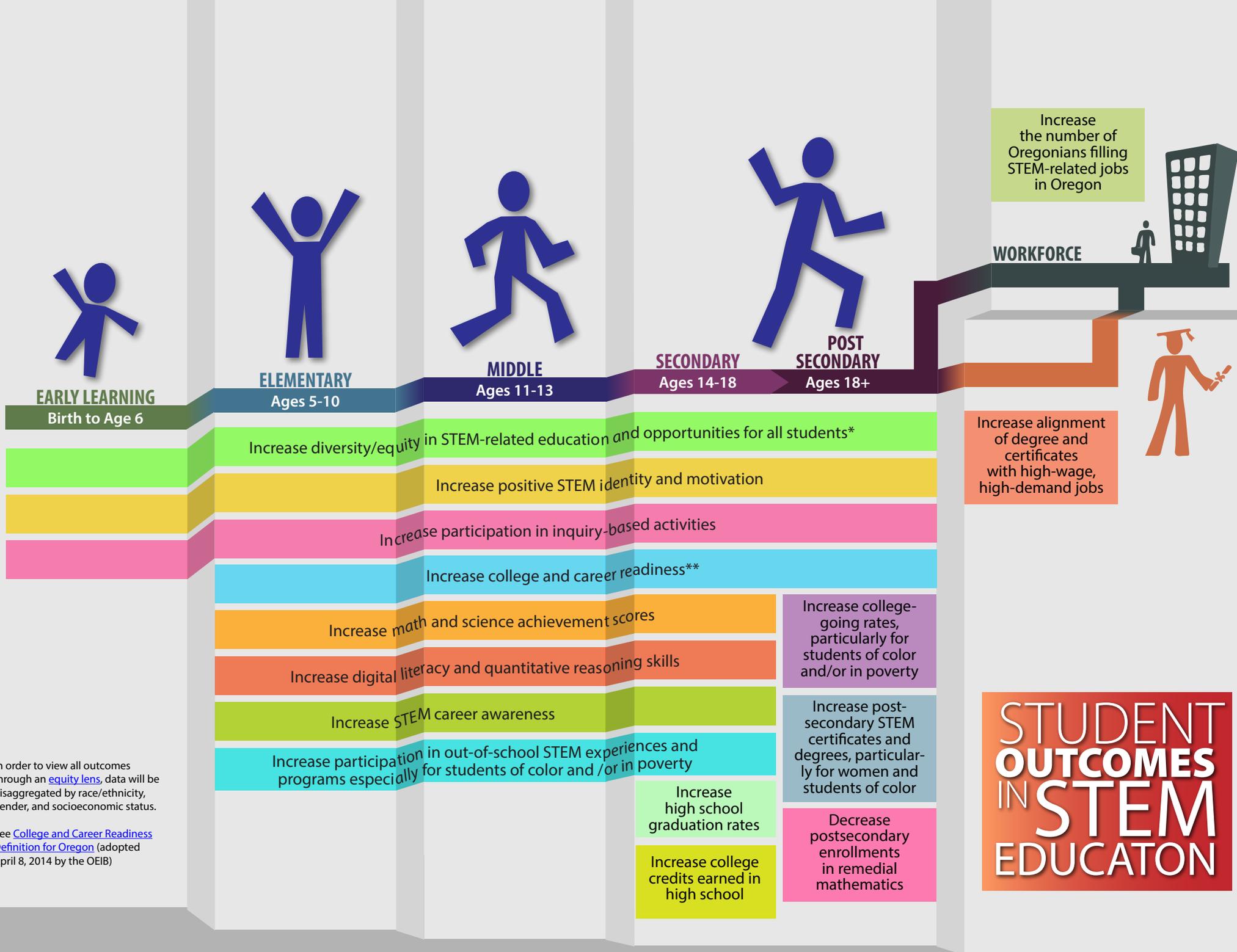
- Create opportunities for STEM educators to experience STEM in industry and research as part of their professional development.
- Build, strengthen and support statewide partnerships for STEM education through our STEM hubs.
- Provide incentives to teacher preparation programs to develop, evaluate, and disseminate effective STEM pre-service teaching strategies including continued support during the first three years of teaching.
- Increase career transitions of STEM professionals into teaching for CTE, math, and science.
- Provide time and resources for educator-to-educator and educator-industry collaborations around implementation of promising STEM instructional practices and materials.
- Other:

**Goal 4: Create sustainable and supportive conditions to achieve STEM outcomes aligned to Oregon's economic, education, and community goals.**

- Build public awareness and demand for improved STEM outcomes and programs.
- Develop a sustainable funding and policy environment for STEM and CTE.
- Create and support an implementation network of Regional STEM Hubs to increase adoption and spread of effective practices, leverage resources, and provide critical feedback to inform policies and investments.
- Produce promotional materials that connect STEM learning opportunities to high demand industry sectors, and which convey the exciting career and research opportunities that exist amongst Oregon businesses, organizations, and institutions.
- Publicly showcase individuals, classrooms, and organizations that are effective in achieving positive STEM outcomes.
- Create and implement a community engagement campaign to increase STEM interest and access amongst traditionally under-represented populations.
- Other:

**Significant Barriers to overcome**

- Perceptions of STEM careers and coursework as boring and difficult.#
- Content is disconnected from relevant context and few educators have worked in STEM fields.
- Lack of mathematical reasoning and skills necessary to advance through the system.
- Few opportunities for youth to experience potential career options.
- Isolated pockets of excellence with little exchange of ideas.
- Few role models and positive messages to encourage students of color to enter STEM fields.
- Competing “noise” and initiatives in the system regarding what’s effective.
- Unequal access to quality out-of-school STEM experiences for students in poverty.
- Insufficient time and structures in the system for educators to engage students in deeper, open-ended learning.#
- Other: #



\* In order to view all outcomes through an [equity lens](#), data will be disaggregated by race/ethnicity, gender, and socioeconomic status.

\*\* See [College and Career Readiness Definition for Oregon](#) (adopted April 8, 2014 by the OEIB)

# STEM Hub Shared Outcomes Framework\* - DRAFT

## Shorter-Term Outcomes (1-2 years)

## Longer-Term Outcomes (3-5 years)

### Student Outcomes (Disaggregated by Student Characteristics)

Increase participation in inquiry-based activities

Increase positive STEM identity and motivation

Increase participation in out-of-school STEM experiences and programs, especially for students of color and/or in poverty

Increase STEM career awareness

Increase college and career readiness\*\*

Increase digital literacy and quantitative reasoning skills

Increase students taking STEM-related elective courses

Increase access to, and participation in, undergraduate research opportunities and internships

Increase math and science achievement scores

Increase high school graduation rates

Increase early college credit in STEM subjects

Increase college-going rates, particularly for students of color and in poverty

Decrease postsecondary enrollments in remedial mathematics

Increase postsecondary STEM certificates and degrees, particularly for women and students of color

### K-16 Formal and Informal Educator and Administrator Outcomes

Increase time allocated for science instruction in elementary school

Increase interactions between educators and STEM professionals in classrooms, workplaces, and the community

Increase educator access to high-quality STEM professional development and resources

Increase educator access to high-quality professional development on digital literacy and quantitative reasoning

Increase availability of high-quality instructional materials and resources that support and promote effective STEM education

Increase educator pedagogical content knowledge in STEM subjects

Increase educator understanding of how STEM content is applied in STEM fields

Increase educator confidence in teaching digital literacy and quantitative reasoning skills

Increase educator confidence in teaching STEM subjects

Increase educator use of inquiry-/problem-based learning approaches

\* Whether outcomes are short-term or longer-term may depend on the developmental stage of the collaborative.

\*\* See College and Career Readiness Definition for Oregon (adopted April 8, 2014 by the OEIB)

## Shorter-Term Outcomes (1-2 years)

### Community Outcomes

Increase parental and community awareness of the value of STEM education and career opportunities

Increase parental and community support for STEM education programs

Increase partnerships between educational institutions and local stakeholders/businesses

Increase availability and access to community-based out-of-school STEM programs

### Workforce Outcomes

### STEM Hub Infrastructure Outcomes

Governance includes high-level leadership from multiple sectors and community stakeholders, including workforce development, industry, and P-20 education

Leadership includes partners from culturally and linguistically diverse backgrounds

Partners implement an aligned plan of action to address a common agenda

STEM Hub plan includes regular monitoring of data focused on improving outcomes

## Longer-Term Outcomes (3-5 years)

Increase the number of Oregonians filling STEM-related jobs in Oregon

Increase alignment of degree and certificates with high-wage, high-demand jobs

An efficient and effective backbone infrastructure with clearly defined roles and responsibilities is maintained

Regional efforts are aligned to reduce service gaps and overlaps in STEM education programming to improve outcomes

Sustained human, financial, and in-kind support from partners and external sources

Structures and processes are in place to share data and support ongoing learning related to STEM Hub efficiency and effectiveness

### System-Level Support Strategies

Build relationships and trust to improve feedback loop between policy and practice	Sustained investment in STEM Hub backbone infrastructure and programs	Build STEM Hub capacity through organizational support	Provide support and training in implementing the equity lens in STEM Hub work	Foster cross-STEM Hub learning networks	Provide support for communication and community outreach	Provide STEM Hub support for data, research, and evaluation	Advocacy for ongoing STEM education investments
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Outcome	Constituency/Audience
1. Increased positive STEM identity and motivation	Student
2. Increased participation in out-of-school STEM experiences and programs, especially for students of color and/or in poverty	Student
3. Increased digital literacy and quantitative reasoning skills	Student
4. Increased college and career readiness	Student
5. Increased STEM career awareness	Student
6. Increased participation in inquiry-based activities	Student
7. Increased math and science achievement scores	Student
8. Increased high school graduation rates	Student
9. Increased early college credit in STEM subjects	Student
10. Increased college-going rates, particularly for students of color and in poverty	Student
11. Increased postsecondary STEM certificates and degrees, particularly for women and students of color	Student
12. Decreased postsecondary enrollments in remedial mathematics	Student
13. Increased students taking STEM-related elective courses	Student
14. Increased access to, and participation in, undergraduate research opportunities and internships	Student
15. Increased interactions between educators and STEM professionals in classrooms, workplaces, and the community	K-16 Formal and Informal Educator/Administrator
16. Increased time allocated for science instruction in elementary school	K-16 Formal and Informal Educator/Administrator
17. Increased availability of high-quality instructional materials and resources that support and promote effective STEM education	K-16 Formal and Informal Educator/Administrator
18. Increased educator access to high-quality STEM professional development and resources	K-16 Formal and Informal Educator/Administrator

<b>19. Increased educator access to high-quality professional development on digital literacy and quantitative reasoning</b>	<b>K-16 Formal and Informal Educator/Administrator</b>
<b>20. Increased educator pedagogical content knowledge in STEM subjects</b>	<b>K-16 Formal and Informal Educator/Administrator</b>
<b>21. Increased educator confidence in teaching STEM subjects</b>	<b>K-16 Formal and Informal Educator/Administrator</b>
<b>22. Increased educator use of inquiry-/problem-based learning approaches</b>	<b>K-16 Formal and Informal Educator/Administrator</b>
<b>23. Increased educator confidence in teaching digital literacy and quantitative reasoning skills</b>	<b>K-16 Formal and Informal Educator/Administrator</b>
<b>24. Increased educator understanding of how STEM content is applied in STEM fields</b>	<b>K-16 Formal and Informal Educator/Administrator</b>
<b>25. Increased parental and community awareness of the value of STEM education and career opportunities</b>	<b>Community</b>
<b>26. Increased parental and community support for STEM education programs</b>	<b>Community</b>
<b>27. Increased partnerships between educational institutions and local stakeholders/businesses</b>	<b>Community</b>
<b>28. Increased availability and access to community-based out-of-school STEM programs</b>	<b>Community</b>
<b>29. Increased the number of Oregonians filling STEM-related jobs</b>	<b>Workforce</b>
<b>30. Increased alignment between degrees and certificates with high-wage, high-demand jobs</b>	<b>Workforce</b>

**Directions:** For each strategy, identify all target group(s) (i.e. Students, Educators, Community, Systems), those in the system who would enact the strategy (e.g. Legislature, teachers, out of school, STEM Hubs, Dept of Education, etc.), AND identify one or more outcome numbers from the outcomes list. If no outcomes from the list apply, please add a suggested outcome.

**Goal 1: Inspire and empower our students to develop the knowledge, skills, and mindsets necessary to thrive in a rapidly-changing, technologically rich, global society.**

Strategy	Target Group	Who enacts strategy?	Outcome # or suggested outcome
Promote the development of new teaching approaches that challenges students to be creative, resourceful, persistent, and collaborative in developing knowledge and skills to solve real-world problems.			
Increase the interactions of students with STEM professionals who can help students develop aspirations and personal identities as life-long learners and inspired innovators utilizing STEM skills.			
Develop new opportunities for students to enhance their critical thinking and problem-solving skills in afterschool or summer programs that are focused on solving complex challenges.			
Increase the availability of early college credits in STEM courses by strengthening local partnerships and articulation agreements between high schools, community colleges and 4-year institutions.			
Increase the development and acceptance of industry-recognized credentials based on demonstrated skills, including traditional and nontraditional certifications (e.g., micro-credentials, digital portfolios, etc.).			

Provide program "start-up" or incentive funds to increase the responsiveness of post-secondary institutions to align programs to high-wage, high-demand industry needs.			
Increase student interest, understanding, and success in STEM, with a particular emphasis on improving mathematics teaching, through solving real-world problems.			
Improve the quality and relevance of post-secondary mathematics placement processes and align course offerings to relevant degree/certificate program needs.			
Transform P-20 STEM teaching and learning by supporting the spread of effective approaches and connecting research to practice.			
More time on science in elementary school			
More attention to engineering and digital literacy in K-12.			

**Comments:**

**Other suggested strategies/outcomes:**

**Goal 2: Ensure equitable opportunities and access for each and every student to become STEM literate and a contributing member of society, able to participate in an inclusive innovation economy.**

Strategy	Target Group	Who enacts strategy?	Outcome # or suggested outcome
Improve student advising by strengthening career counseling services and tools, increasing access of students to alumni, professional, and near-peer networks, and increasing student access to up-to-date market data about high-wage, high-demand jobs.			
Increase STEM internships, work-based and service learning opportunities, and undergraduate research opportunities in high-demand fields.			
Increase the number and quality of P-20 support services and pre-college transition/bridge programs for students who are traditionally underserved and underrepresented in STEM.			
Increase the number of STEM role models and access to professional networks for students who are underrepresented in STEM.			
Increase needs-based financial support and access to flexible, micro-loan/funds for first-generation and underrepresented students pursuing high-wage, high-demand credentials.			
More out-of-school STEM experiences for culturally and linguistically diverse students and those navigating poverty			
Improve student advising by strengthening career counseling services and tools, increasing access of students to alumni, professional, and near-peer networks, and increasing student access to up-to-date market data about high-wage, high-demand jobs			

Increase STEM internships, work-based and service learning opportunities, and undergraduate research opportunities in high-demand fields			
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**Comments:**

**Other suggested strategies/outcomes:**

**Goal 3: Continuously improve the effectiveness and the number of formal and informal STEM educators, as well as access to quality resources.**

Strategy	Target Group	Who enacts strategy?	Outcome # or suggested outcome
Dramatically increase quality professional development for educators, including opportunities for STEM educators to experience STEM in industry and research			
Provide incentives to teacher preparation programs to develop, evaluate, and disseminate effective STEM pre-service teaching strategies including continued support during the first three years of teaching			
Increase career transitions and preparation of STEM professionals into teaching for CTE, math, and science			
Provide time and resources for educator-to-educator and educator-industry collaborations around implementation of promising STEM instructional practices and materials			
Dramatically increase quality professional development for educators, including opportunities for STEM educators to experience STEM in industry and research			
Provide incentives to teacher preparation programs to develop, evaluate, and disseminate effective STEM pre-service teaching strategies including continued support during the first three years of teaching			

Increase career transitions and preparation of STEM professionals into teaching for CTE, math, and science			
Provide time and resources for educator-to-educator and educator-industry collaborations around implementation of promising STEM instructional practices and materials			

**Comments:**

**Other suggested strategies/outcomes:**

**Goal 4: Create sustainable and supportive conditions to achieve STEM outcomes aligned to Oregon's economic, education, and community goals.**

Strategy	Target Group	Who enacts strategy?	Outcome # or suggested outcome
Build public awareness and demand for improved STEM outcomes and programs			
Develop a sustainable funding and policy environment for STEM and CTE			
Create and support an implementation network of Regional STEM Hubs to increase adoption and spread of effective practices, leverage resources, and provide critical feedback to inform policies and investments			
Produce promotional materials that connect STEM learning opportunities to high demand industry sectors, and which convey the exciting career and research opportunities that exist amongst Oregon businesses, organizations, and institutions			
Publicly showcase individuals, classrooms, and organizations that are effective in achieving positive STEM outcomes			
Create and implement a community engagement campaign to increase STEM interest and access amongst traditionally under-represented populations			
Build and engage a cross-institutional research consortium to connect policy, practice, and research			

**Comments:**

**Other suggested strategies/outcomes:**