Utah State Board of Education

STEM REPORT 2021

ADA Compliant: 5/25/2022

A special thank you goes to all of the LEA leaders who have contributed to the formation and evolution of our various STEM communities. The next generation of STEM Leaders thanks you for all your hard work.

Contributors:

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LEAs have the duty to select instructional materials that best correlate to the core standards for Utah public schools and graduation requirements. (UCA 53G-4-402(1(a)). Posting of these resources by USBE staff curriculum content specialists does not imply the resources have received official endorsement of the State Board. Educators are responsible to ensure use of these materials complies with LEA policies and directives.

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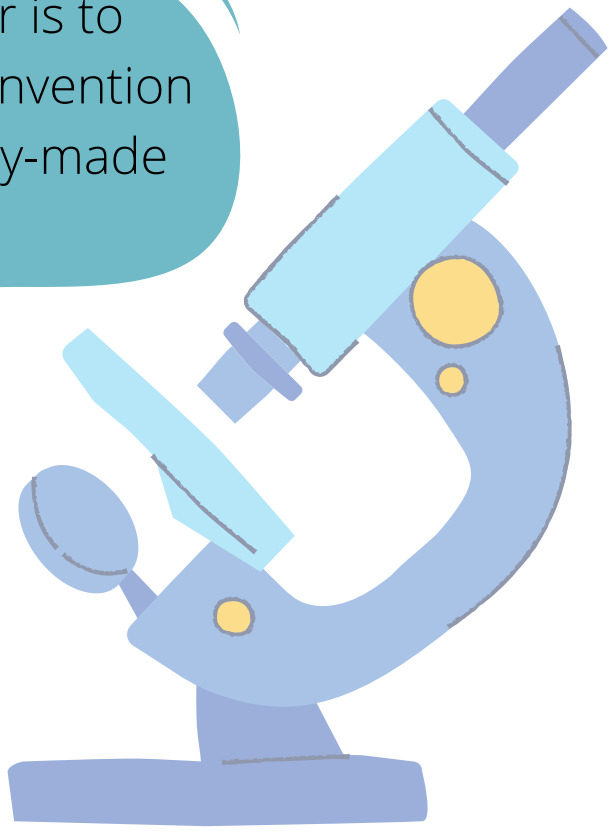
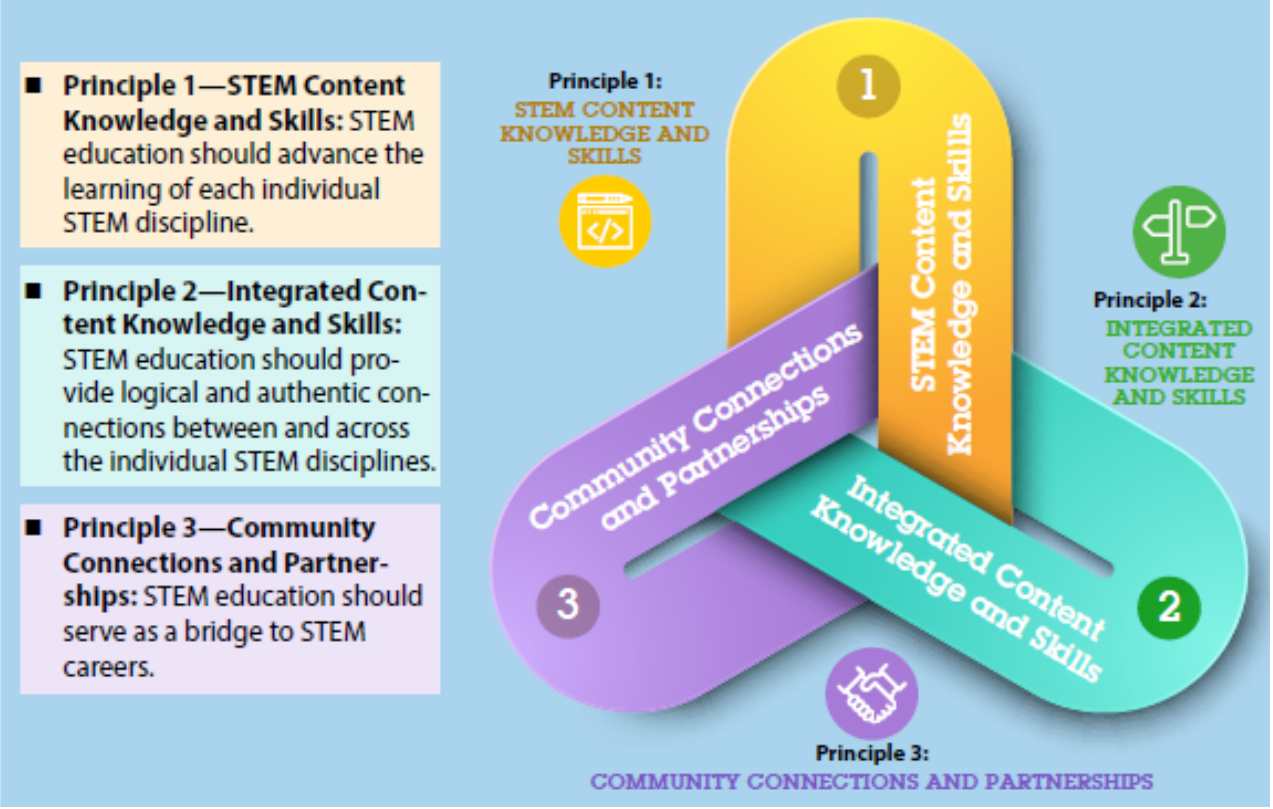
"The role of the teacher is to create the conditions for invention rather than provide ready-made knowledge."



What is STEM Education?

STEM Education is a pathway to support a vibrant STEM community while empowering individual students to pursue and achieve their aspirations. It is "rigorous academic concepts…coupled with real-world…contexts to make connections between school, community, work" (National Science and Technology Council, 2018, p. 1), and the global enterprise enabling the development of STEM literacy. STEM education leverages effective and quality learning, integrated across disciplines in an effort to "impart skills such as critical thinking and problem solving along with soft skills such as cooperation and adaptability" (p. 7).

STEM^4: The Power of Collaboration for Change, a document written by leadership from the National Council of Teachers of Mathematics (NCTM), the National Science Teaching Association (NSTA), the International Technology and Engineering Education Association (ITEEA), and the International Society for Technology in Education (ISTE) provides the following guiding principles that promote a collaborative vision for STEM Education:



By implementing these principles, STEM communities can extend learning beyond the memorization of facts, requiring students to form arguments based on evidence and communicate them to an authentic audience. Students are challenged to develop solutions to open-ended design challenges to collaborate with one another in order to solve problems in their communities. Ultimately, STEM education is about facilitating the creation of citizens who can make informed decisions for themselves and their communities in promoting a just and equitable society.

Purpose

This report's purpose is to provide an overview of the supports the Utah State Board of Education (USBE) STEM team provided STEM communities during the 2020/21 school year, alongside some of the applicable statewide data relevant to STEM Education in UT. Following that, some courses of action have been identified for the following year, based on the trends that the data has elicited. This year was a particularly challenging year for education worldwide, but in spite of the many challenges that UT educators faced during the global pandemic, there is much to celebrate! Below are some highlights:

280+

The number of science educators that participated in comprehensive SEEd standards professional learning

343

The number of registrants for Secondary Mathematics book studies

203%

The percentage increase in the number of (QL College Math Credits earned during high school, between the 2015/ 2061 school year and the 2019/ 2020 school year.

782%

The percentage increase in 1040 credits earned between 2015/ 2016 and 2019 / 2020 school years

$734K

The amount of money reimbursed to Utah STEM educators during the 2019/ 2020 and 2020/ 2021 school years for taking STEM endorsement coursework

1,273

The number of STEM endorsements earned by Utah educators during 2019, a 193 endorsement increase from the previous year

K-12

The grades for which science formative assessment items were created.

Goals

Effective STEM Education has its foundations in its individual content areas and is predicated upon all students having access. USBE's STEM team focused its efforts on two over-arching goals in the 20/21 school year:

Goal 1: Ensuring that each student is supported in experiencing success

Goal 2: Building the Capacity of LEA Leaders

Though the pandemic altered the projects that were planned initially, these two goals continued to drive the focus of our work.

Goal 1:
Ensuring that each student is supported in experiencing success

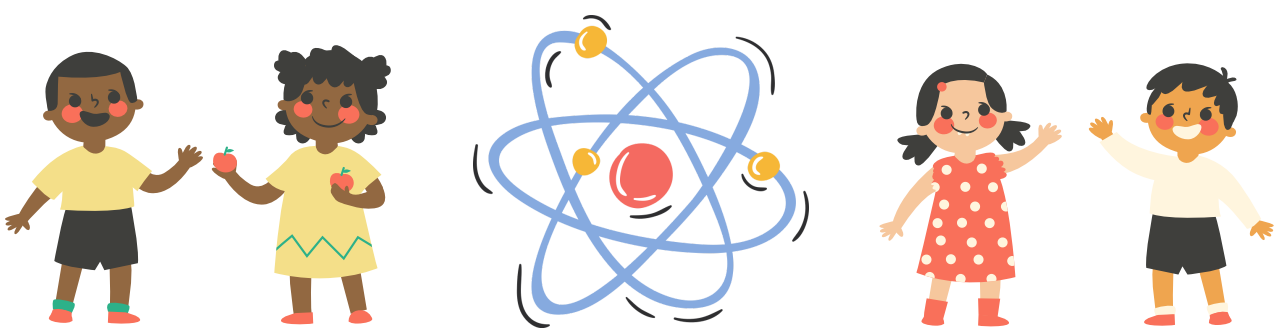
Despite signs of progress over the past few years, representation gaps remain among the state disaggregated student groups in Utah's STEM communities. The following opportunities were offered to science and math educators across the state (in addition to LEA-designed efforts) to improve instructional effectiveness and to keep closing the gaps identified above. They include a mix of professional learning, informational sessions and workgroups.

Equity Labs
Early College Grant Programs
Mathematics coaching institute
Statewide coordinator meetings
Lead with SEEd facilitator training
Formative assessment item creation

Goal 2: Building the Capacity of LEA Leaders

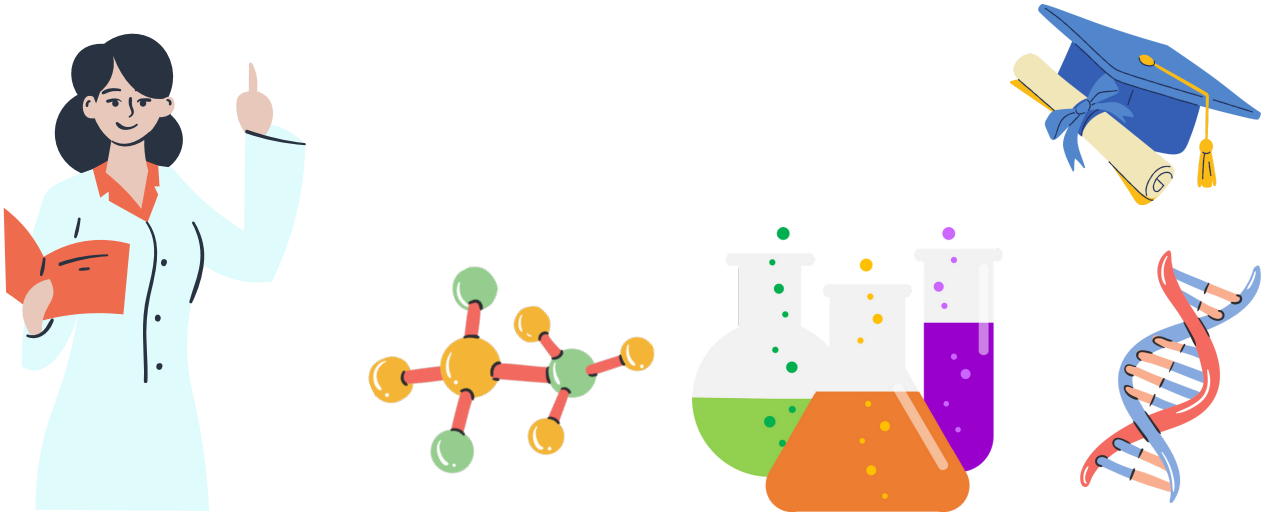
Elementary: Science and Mathematics

Subject	Description	Number of Participants
Math Professional Learning	Working with Numbers in Early Grades	68
Math Professional Learning	Progressions in Place Value for K2	75
Math Professional Learning	Progressions in Multiplication and Division for Teachers Gr. 3-5	70
Math Professional Learning	Progressions in Fractions for Teachers Gr. 3-5 for Teachers Gr. 3-5	52
Science Professional Learning	SSECC Leaders that attended one or more sessions	61
Science Professional development	Number of Participants Lead with SEEd (Developing Formative Assessments)	137



Secondary: Science and Mathematics

Subject	Description	Number of Participants
Science & Math	Competency-Based Endorsement pathway initiative	250+
Math	SMECC	107
Math	Book Studies	243+
Math	CBMS Steering Committee	50+
Math	Grassroots Workshops	78 with 80 waitlisted
Math	Stanford University Professional Learning courses	38 with 45 waitlisted



Success testimonials

Here's what some participants from the experiences above had to say:

Before I read this book, I though...because...

Before I read this book, I did not think anything about status because it was an idea that had not been presented to me before.

I thought group work was just laying down a problem for students and having them muddle their way through it because that's the way I have always done it.

Now that I have read this book, I think...because..

Now that I have read this book, I am aware of status in the classroom and will take measures to allow students to be heard because all students have amazing ideas and I want them all to have a voice.

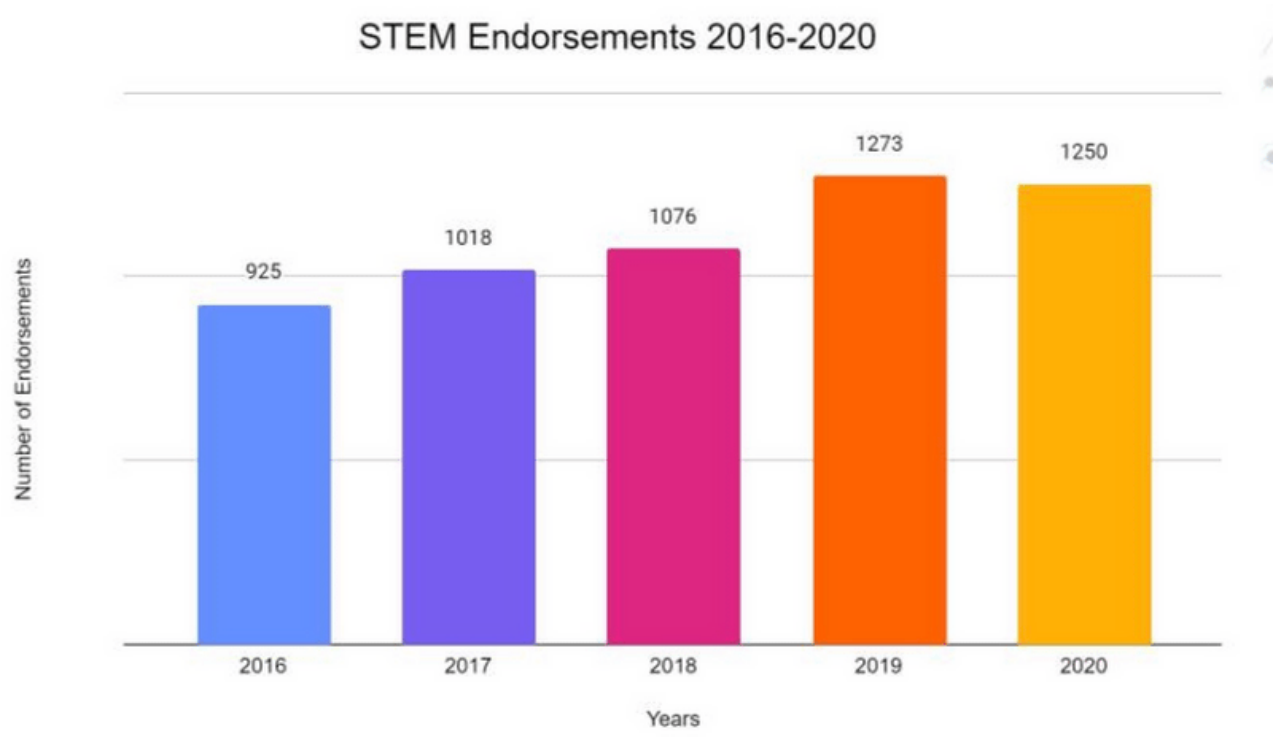
We need to provide opportunities for our students to think on their own.

I know that effective group work takes a lot of purposeful and intentional planning to ensure that students get rich problems and support to better explore mathematical concepts.

It is important to enhance the curriculum in order to fully engage the students in their own learning and take into consideration their background and their forming identity as a student of mathematics.

STEM Endorsement Incentive Program

The STEM EIP is a program that was created to incentivize educators to achieve their endorsements in the different STEM disciplines. This year and last, despite all of the added stressors of teaching during the pandemic, teachers took a remarkable number of courses related to earning these endorsements. During this time, Utah has reimbursed educators for over $1,000,000 worth of coursework. Below is a breakdown of STEM endorsement earning during the past 5 years across the state of Utah:



Advisory Teams

Focus groups were incorporated this year, made up of leaders from K-12 science and mathematics communities. Leaders were selected based on their previous credentials and their insights regarding the future of their discipline. Teams are made up of leaders from a variety of communities, including rural, suburban, big and small, teachers, administrators, and specialists, as well as charters and school districts. They met monthly to provide feedback on upcoming statewide meetings and USBE initiatives. The advisory teams played a crucial role in ensuring that the work that was done by USBE reflected the immediate and prioritized needs of communities as the state grappled with the ever-evolving challenges the pandemic through at it.

Elementary Mathematics Advisory Team:

USBE Members:

Patricia Stephens-French, Elementary Mathematics and Gifted &Talented Specialist
Molly Basham – Early Mathematics Specialist

Community Members:

Joe Backman – Curriculum Director, Alpine School District
Sallianne Wakley – Mathematics Specialist, Canyons School District
Stacy Stoker – 5th Grade Teacher, Juab School District
Joe B. Wright – Executive Director, SEDC
Chantel Cowan – Curriculum Director, Tooele County School District
Ashley Lennox – Teacher Specialist - Canyons School District
Jessica Shumway - Assistant Professor, Mathematics Education, Utah State University
Tracy Dobie – Assistant Professor, Mathematics Education & Learning Sciences, University of Utah
Lindsey Depasquale – Mathematics Coach, Salt Lake City School District
Hailey Faiola – Mathematics Specialist, Ascent Academies of Utah - West Valley
Rory Hansen – Mathematics Specialist, Nebo School District
Chris McIntosh – 5th Grade Teacher & Instructional Coach, Weilenmann School of Discovery

Advisory Teams

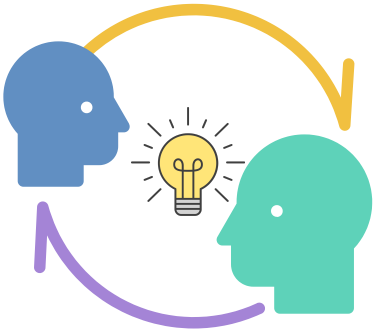
Elementary Science Advisory Team:

USBE Members:

Melissa Mendenhall – Elementary Science and STEM Specialist

Community Members:

Megan Black – Science Specialist, Granite School District
Ryan Cain – Assistant Professor, Weber State University
Kathryn Clark – Mathematics and Science Specialist, GreenWood Charter School
Sandie Erickson – 4th Grade STEM Teacher, Washington School District
Michael Hammond-Todd – Professor, Dixie State University
Danielle Kennedy – Science Specialist, Alpine School District
Sara McAffee – STEM Specialist, Iron County School District
Laura Reina – Curriculum & Assessment Director, Edith Bowen Elementary and Adjunct Faculty Utah State University



Secondary Mathematics Advisory Team:

USBE Members:

Lindsey Henderson – Secondary Mathematics Specialist
Nathan Auck – STEM Program Coordinator & Concurrent Enrollment Early College Specialist

Community Members:

Rachel Marshall – Instructional Specialist, Canyons School District
Alees Lee –
Anand Bernard –
Karen Feld – 9th Grade Math Teacher, Alpine School District
Laurie Dyer – K-12 Math Coordinator, Washington County School District
Amanda Cangelosi – Instructor, University of Utah
Natalie Darrington – Teacher/PAEMST Awardee, Juab School District
Allison Duncan – Mathematics Specialist, Canyons School District
Heather Hardy – Teacher w/ District Leadership Assignment, Iron School District
Noelani Ioane – Mathematics Specialist, Jordan School District
Bonita Richins – Teacher w/ District Leadership Assignment, Cache County School District
Heidi Hall – Secondary Math Specialist & High School Teacher, Cache County School District

Secondary Science Advisory Team:

USBE Members:

Richard Scott – Secondary Science Education Specialist

Community Members:

Jamie Carling – Science Teacher, San Juan School District
Jane Harward – Science Specialist, Jordan School District
Leslie Allen – Science Specialist, Canyons School District
Kyle Johnson – STEM Specialist, Iron County School District
Jess Cleeves – University of Utah
April Thompson – Science Teacher, Lakeview Academy
Candace Penrod – Science Specialist, Salt Lake City School District
Michelle Ormond – Science Specialist, Alpine School District
Amy Pace – Science Teacher Leader, Mountain Heights Academy
Angela Stewart – Secondary Science Specialist, Davis School District
Josh Stowers – Biology PreService Teacher Advisor, Brigham Young University
Natalie Dutrow – Secondary Science Coach, Salt Lake City School District
Shannon Buchanan – K-12 Educational Coach, Uintah School District

Next Steps:

The USBE STEM Team is excited to adhere to a cycle of continuous improvement, while leveraging the assets that our community members bring. While the pandemic caused an incalculable disruption to our community, with disruption comes opportunity and the chance for innovation. To this end, the following goals have been identified to help guide or work in the 2021/2022 school year:

1. **Create an asset-based culture to support educators and students**

2. **Leverage principles from the High-Quality Instruction framework to increase equitable instructional practice**

Every step of USBE's work is dependent on stakeholder input and feedback. The work that the STEM team pursues exists at the intersection of community insights and evidence-based promising practices. Heartfelt appreciation is extended to all of the individuals who have spent countless hours performing these services to our STEM community. The USBE STEM Team pledges to never take that effort for granted and to do its best to reflect the commitment, professionalism, and innovation that communities from across the state show in serving their students.

STEM Team

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