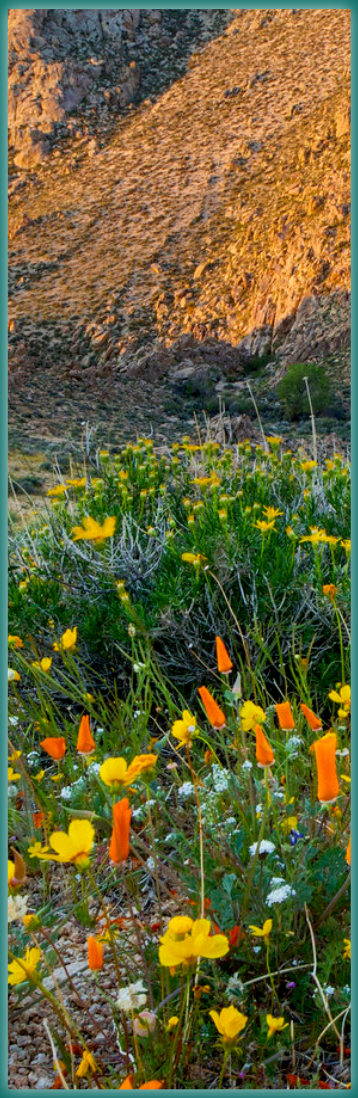
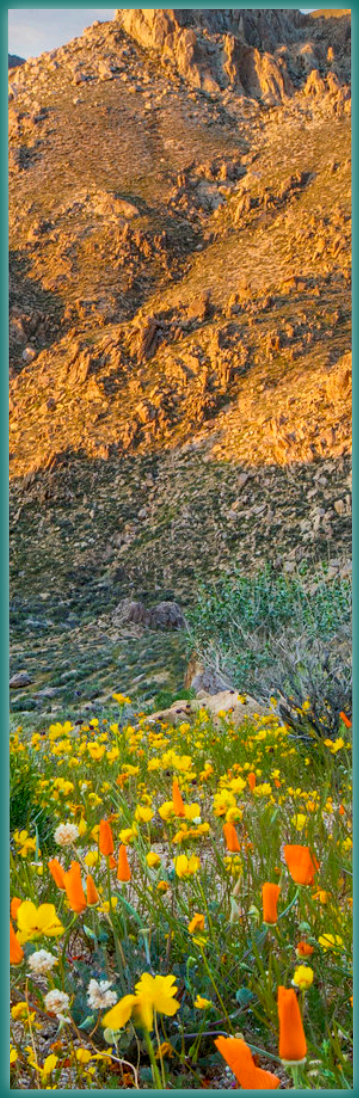
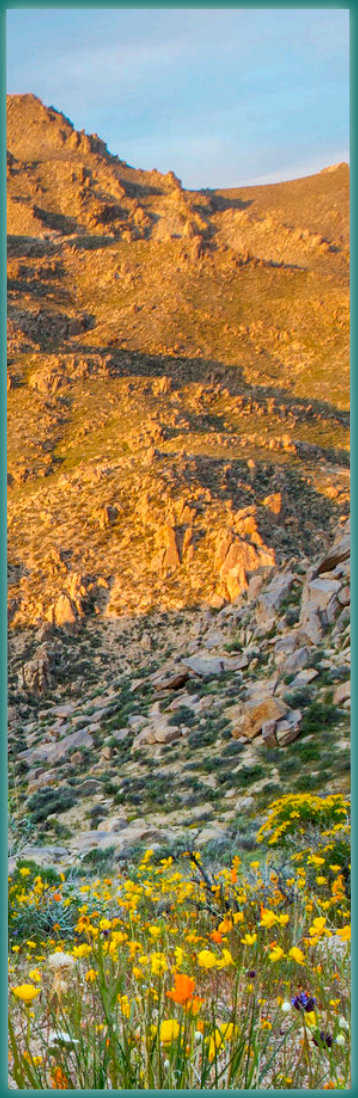
Math and Science Annual Report







2022–2023

MATH and SCIENCE
ADVISORY COUNCIL

The State of New Mexico
New Mexico Public Education Department

Teaching, Learning, and Innovation
Division of Curriculum & Instruction

Math and Science Annual Report

Issued 2023

Michelle Lujan Grisham
Governor of New Mexico

Arsenio Romero, Ph.D.
Secretary of Education

Amanda DeBell
Deputy Secretary of Teaching, Learning, and Innovation

Jacqueline Costales, Ed.D.
Division Director of Curriculum and Instruction

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Notes

- This report is available at https://webnew.ped.state.nm.us. Locate it on the Math and Science Bureau webpage.
- This document is intended to be Americans with Disabilities Act (ADA) compliant in its entirety. Should a reader encounter any difficulties in accessing the document, please contact the PED to assist in accessing information.

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ARSENIO ROMERO, PH.D.
SECRETARY OF EDUCATION

MICHELLE LUJAN GRISHAM
GOVERNOR

December 20, 2023

The Honorable Michelle Lujan Grisham
State of New Mexico
State Capitol Building
Santa Fe, NM, 87501

Charles Sallee
Director
New Mexico Legislative Finance Committee
325 Don Gaspar Avenue, Suite 101
Santa Fe, NM 87501

Gwen Perea-Warniment, Ph.D.
Director
New Mexico Legislative Education Study Committee
325 Don Gaspar Avenue, Suite 100
Santa, NM 87501

Dear: Governor Lujan Grisham, Director Sallee, and Director Warniment:

The New Mexico Public Education Department (PED) is pleased to enclose the *2023 Math and Science Annual Report* from the Math and Science Advisory Council. This annual report fulfills the statutory requirement of the Math and Science Education Act in relevant parts as follows:

> **Subsection E of 22-15E-5 NMSA 1978, Council duties.**
> Produce an annual report on public elementary and secondary mathematics and science student achievement to be submitted to the department, the governor, and the legislature no later than November 30 of each year.

The report is a comprehensive compilation of data that describes the efficiency, the effectiveness, and the progress of math and science education.

We look forward to working with you and your colleagues to ensure that math and science education increases student achievement for all New Mexico students.

Sincerely,

DocuSigned by:
Arsenio Romero
140A3ED72F6C41E...

Arsenio Romero, Ph.D.
Secretary of Education

AR/AD/jc/sc

Enc: (1) 2023 Math and Science Annual Report

cc: Amanda DeBell, Deputy Secretary, Teaching, Learning and Innovation
Jacqueline Costales, Ed.D., Division Director, Curriculum and Instruction
Shafiq Chaudhary, Director, Math and Science Bureau

Acknowledgements

The Secretary of Education is grateful to the following individuals for their contributions to this report:

New Mexico Public Education Department Math and Science Bureau

Shafiq Chaudhary,
Director

Patricia Gharrity,
Assistant Director

Therese Baca-Ralder, Ph.D.,
Outdoor Learning Specialist

Vanessa Barela,
Outdoor Learning Specialist

Philip Friedman,
Computer Science K–8 Specialist
(until July 2023)

Lisa Sanchez,
Science Specialist

David Ubinger,
Math Specialist

The Math and Science Advisory Council

Paulo A. Oemig, Co-Chair,
Director, New Mexico Space Grant Consortium &
NM NASA EPSCoR, New Mexico State University

Marcia Barton, Co-Chair, (until Dec. 2023),
Member,
NM Partnership for Math & Science Education

Angela Alderete,
Secondary Science Educator,
Albuquerque Public Schools (beginning Jan. 2023)

Kim Ayres,
Secondary Computer Science Teacher,
The ASK Academy (beginning Jan. 2023)

Dave Dooling, (until Dec. 2023),
Exhibitor Consultant,
NM Museum of Space History

Deborah Elder, Ed.D.,
Chief Academic Officer
Los Lunas Public Schools (beginning Jan. 2023)

Nathaniel Evans,
Dean of Students,
Taos Municipal Charter (beginning Jan. 2023)

Ling Faith-Heuertz, (until Dec. 2023),
Executive Director,
New Mexico MESA Inc.

Tamara Gaudet,
Instructional Support Specialist K–12,
Albuquerque Public Schools

Monica Martinez-Archuleta,
K–12 STEM Outreach Specialist
Los Alamos National Laboratory (beginning Jan. 2023)

The MSAC would like to thank outgoing co-chair Marcia Barton and MSAC members Dave Dooling and Ling Faith-Heuertz whose four-year terms end in December 2023. Their dedication, time and expertise have helped improve the quality of STEM education across the state.

Table of Contents

Executive Summary

As part of its charge, the Math and Science Advisory Council (MSAC) ensures all students can access equitable, high-quality mathematics and science education. In addition, the MSAC advises the PED and the Legislature to promote equitable, relevant, and high-quality computer science, and outdoor learning educational opportunities for K–12 students.

The MSAC supports the 2022 New Mexico Public Education Department (PED) Comprehensive Strategic Plan. We have aligned our priorities listed in this report with the four strategic pillars identified in the plan. The MSAC recommends continuing to provide robust professional learning in math, science, computer science, and outdoor education, updating and implementing an Elementary Science Specialist endorsement, and creating a stipend for the Elementary Math Specialist endorsement. These recommendations will ensure every student has well-prepared, well-supported, and effective educators.

The MSAC recognizes the importance of honoring the local communities where our children live, and we recommend that professional learning focuses on culturally and linguistically responsive education, local phenomena, critical and creative thinking, and connecting educators and students with community resources such as museums and nonprofits to deepen learning. By making learning contextualized and place-based, we want to ensure that all students have a sense of belonging to a learning community.

As stated in previous MSAC reports, we support the following science and mathematics graduation requirements: All students complete at least three high school science credits that fully address the New Mexico STEM Ready! Science Standards, including two years of lab science; all students complete four high school mathematics credits that fully address the Common Core State Standards for Mathematics; and Algebra II should continue to be an option for students in all districts across the state.

Chaudhary, S. (Photographer). (2023, June 9) [Division Director Jacqueline Costales, Ed.D., welcome science content experts to a one-day professional learning session with Instructional Materials Bureau and WestEd.] Albuquerque, NM

Activities of the Math and Science Advisory Council (MSAC) in SY2022–23

The MSAC held quarterly meetings throughout the year and invited the public to attend

- August 16, 2022
- October 5, 2022
- February 3, 2023
- May 5, 2023

The MSAC collaborated with several community organizations, including Environmental Education New Mexico and Wild Friends, to support Senate Bill 32 (SB 32), the Outdoor Learning Program Bill sponsored by Senator Siah Correa Hemphill. The Senate Education Committee unanimously passed SB 32, later added as an amendment to House Bill 2 (HB 2), the General Appropriations Act. After both chambers of the Legislature passed it, Governor Michelle Lujan Grisham signed HB 2 on March 9, 2023.

The bill resulted in the creation of two new positions in at the New Mexico Public Education Department (PED) to support outdoor learning statewide; more professional learning opportunities focused on outdoor education for New Mexico's teachers; and microgrants for the construction of outdoor classrooms on school grounds throughout the state.

Members of the MSAC engaged with the VISIONS working group to set the vision for the equitable math pathways and outline items such as course frameworks, expectations of the pathways. They also worked with the Science Content Experts on analysing high-quality instructional materials.

Members participated in reviewing and selecting the 2023 Presidential Awards for Excellence in Math and Science Teaching (PAEMST) state finalists.

Chaudhary, S. (Photographer). (2023, Feb2 2) [Members of the 2023 MSAC gather to open the first hybrid meeting for the 2023 calendar year.] Albuquerque, NM.

Activities of the Public Education Department Math and Science Bureau (MSB) in SY2022–23

The MSB Mission & Vision

We build collaborative communities that support equitable access and opportunities for all, honoring the rich cultural heritage of New Mexico and putting our students first.

As a STEM, computer science, and outdoor learning education champion, the Math and Science Bureau has tirelessly promoted our students' brighter future. The Legislature's continued investment in STEM education and American Recovery Plan Elementary and Secondary School Emergency Relief (ESSER) funding allowed the Bureau to offer grants, professional learning courses, convene stakeholder working groups and highlight outstanding educators. These opportunities continue to empower educators and communities to inspire and guide our youth. Through their collaborations with the University of New Mexico, sister bureaus, and other organizations, they are building a strong foundation for STEM education in K-12 schools and communities.

Continuing to utilize frameworks such as the NM Math Framework, the NM Computer Science Strategic Plan, the New Mexico Instructional Scope and the Outdoor Learning Taskforce report, the MSB is taking bold steps to scale mathematics pathways, from high school through postsecondary education and into the workplace, to empower communities and build capacity in the K–12 system. The highlighted activities below are examples of this work:

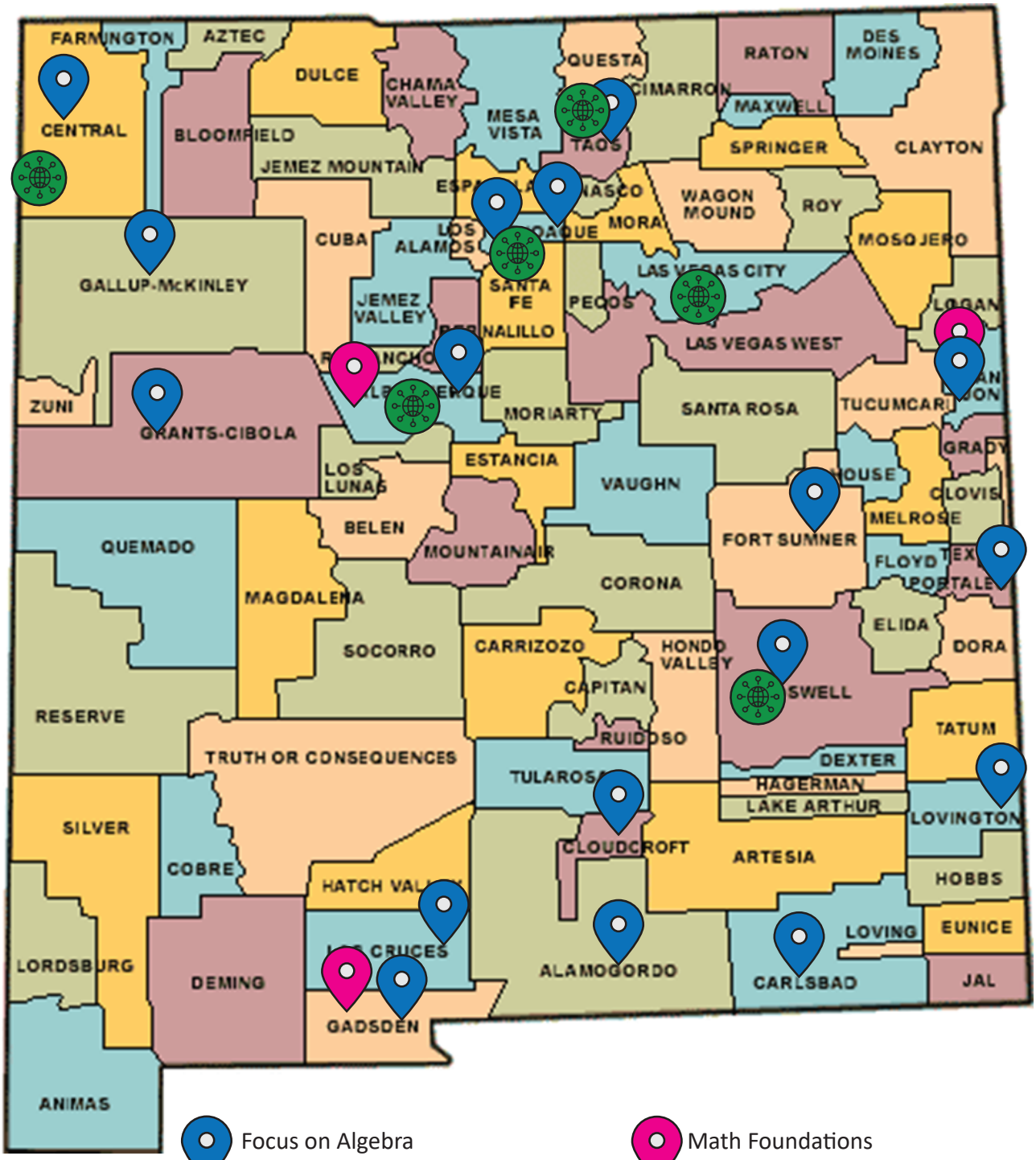
- **Computer Science Working Definition:** Developed a working definition for what Computer Science is to help guide programs of study, course descriptions, and other important areas for Computer Science Education. The PED will use this definition to guide our work within Computer Science Education.

- **Outdoor Classrooms Initiative:** Through the hiring of two outdoor learning specialists, one focused on STEM integration and one focused on Literacy and Humanities integration, the team quickly worked to support a community of practice for Outdoor Learning Start-Up Grantees, reached out to local educational agencies (LEAs) to support expansion or start-up of programs or to provide site-specific professional learning, and embarked on the development of an asynchronous Canvas course designed to support educators looking to implement outdoor learning, new to the profession, new to New Mexico, or educators looking to refine their practice.

- **Leveraging Stakeholders' Expertise:** A Re-Envisioning High School Math Pathways group of New Mexico stakeholders from various sectors interested in developing recommendations that envision coherent high school math pathways to ensure high-quality mathematics education for all students. In collaboration with the Instructional Materials Bureau, science content experts support and develop revised rubrics for selecting high-quality science instructional materials.

Mathematics Program Map

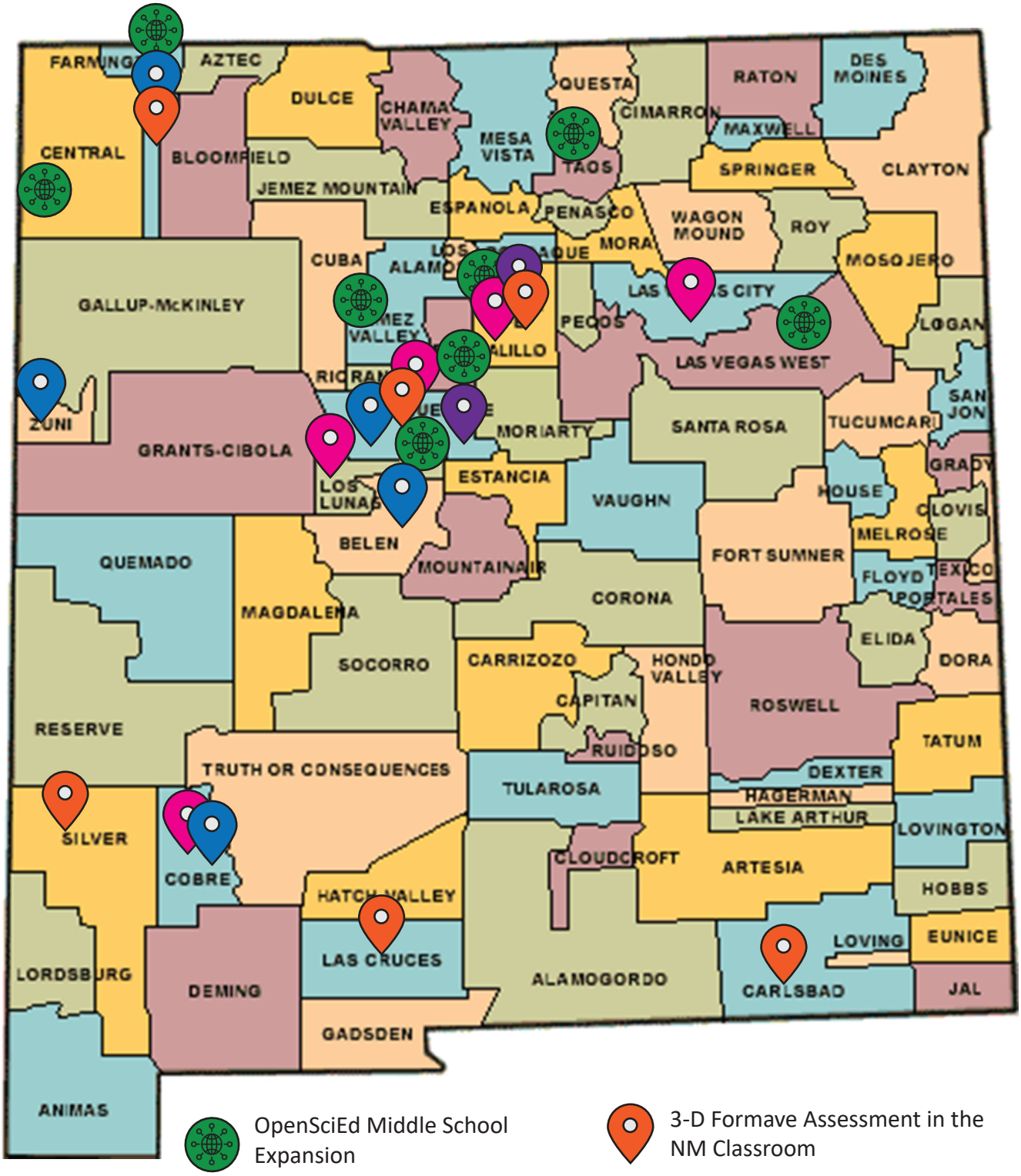
The map below shows districts that participated in mathematics professional learning programs during the 2022–23 school year.



MATH & SCIENCE ADVISORY COUNCIL

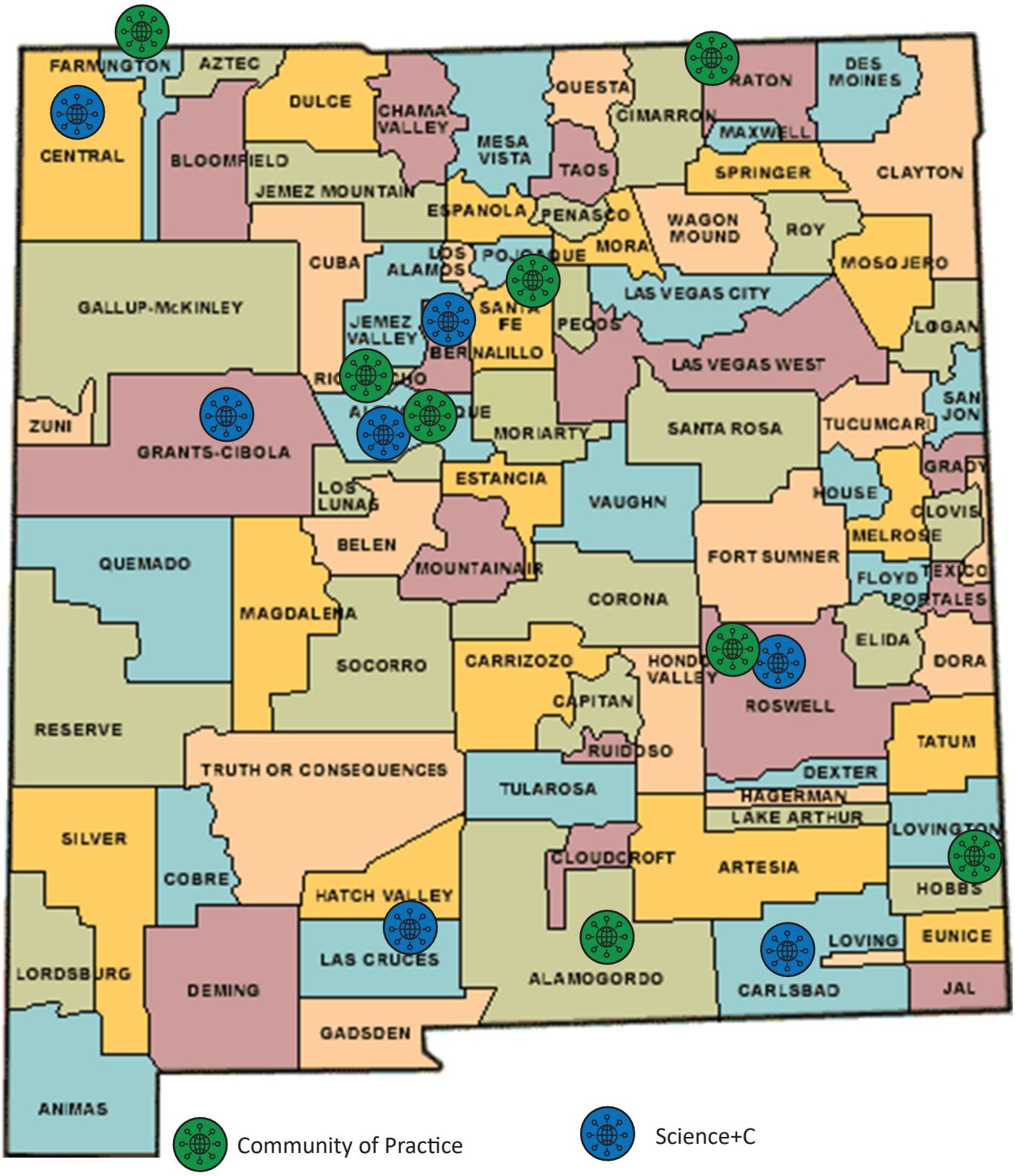
Science Program Map

The map below shows districts that participated in science professional learning programs during the 2022–23 school year.



Computer Science Program Map

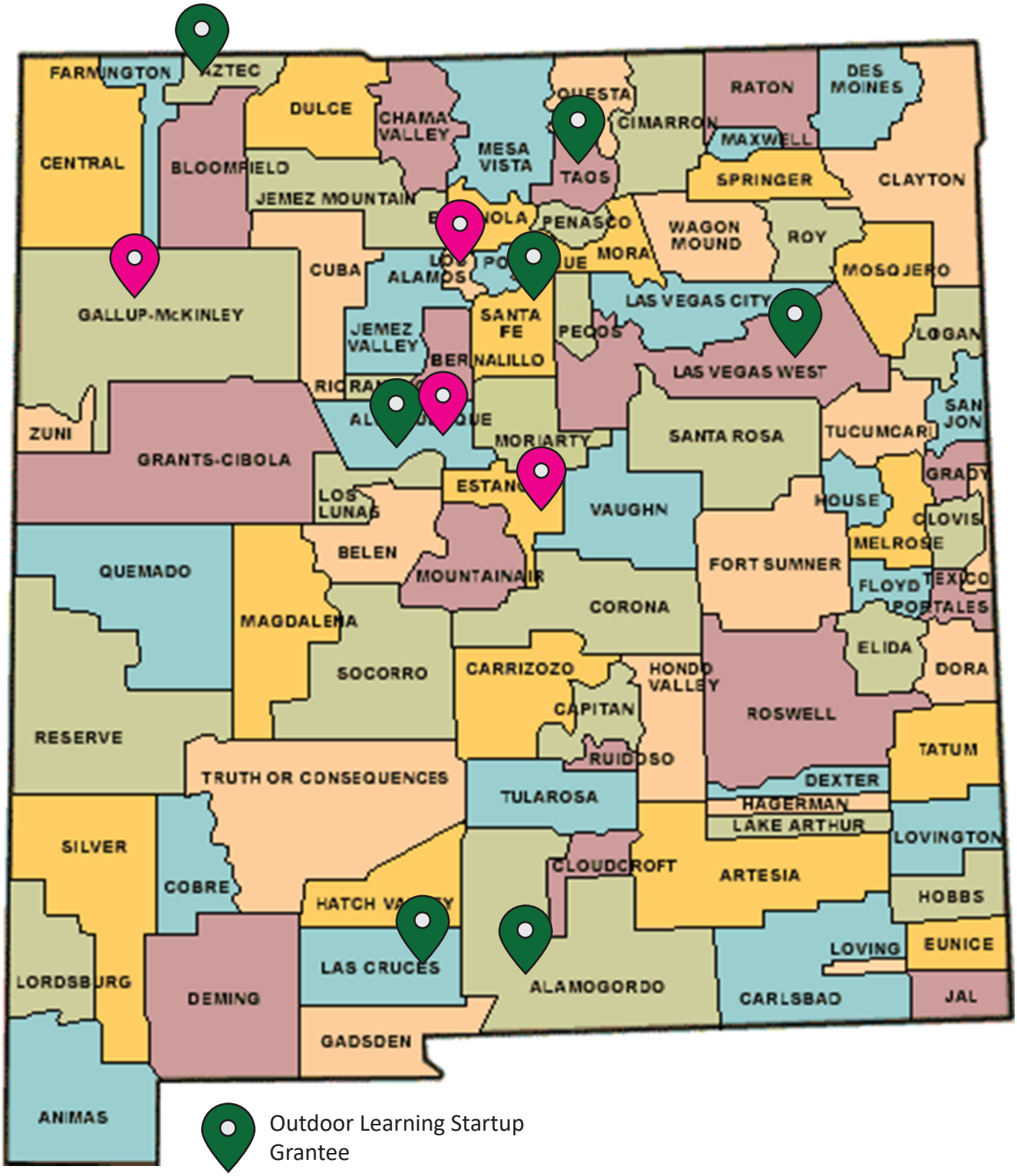
The map below shows districts that participated in computer science professional learning programs during the 2022–23 school year.



MATH & SCIENCE ADVISORY COUNCIL

Outdoor Learning Program Map

The map below shows districts that participated in outdoor learning programs during the 2022–23 school year.



Outdoor Learning Startup Grantee

Wilderness First Aid Training

The ten-member MSAC represents New Mexico's diverse demographics, including geographic distribution, gender, and e The map below shows districts that participated in computer science professional learning programs during the 2021–22 school year. thnic diversity. The members represent public schools, public, post-secondary educational institutions, the private sector, national laboratories, museums, and science- and engineering-based businesses, and one member represents the New Mexico Partnership for Mathematics and Science Education (Appendix A). Seven stakholders will join the MSAC in January 2024 to fill vacant seats for public postsecondary, private sector and the New Mexico Partnership for Mathematics and Science Education. Their role is to support and advise the PED, the MSB, and the Legislature as they seek to implement policy and programs according to the Mathematics and Science Education Act (Appendix A).

In addition, the MSAC produces an annual report on public elementary and secondary STEM student achievement as part of its charge. The 2022–2023 Math and Science Annual Report serves as that document and seeks to (1) provide concrete recommendations for enhancing math, computer science, outdoor learning, and science education in New Mexico based on the STEM Strategic Framework, (2) highlight the activities of the MSAC, (3) describe the activities of the MSB, and (4) summarize student math and science achievement and enrollment data.

The unified STEM vision, outlined in the NM Math Framework, the New Mexico Instructional Scope and the NM Computer Science Strategic Plan, continued to be woven into all professional learning and guidance to support LEAs in providing high-quality instruction. Through the rest of the report, we highlight the strategic work done to make positive change in student oucomes.

Trends in Student Achievement Data

Note: At the time of report publishing, student achievement data was not available for this report, and will be pulished in an addendum when it is available.

Pierce, K. (Photographer). (2022, Dec. 2) [Director Shafiq Chaudhary co-presented with former Secretary of Education Kurt Steinhaus about the PED's vision for STEM education and provided updates on policies which support STEM education.] Albuquerque, NM.

Critical Issues in STEM Education and Associated Action Recommendations of the MSAC for SY2024–25

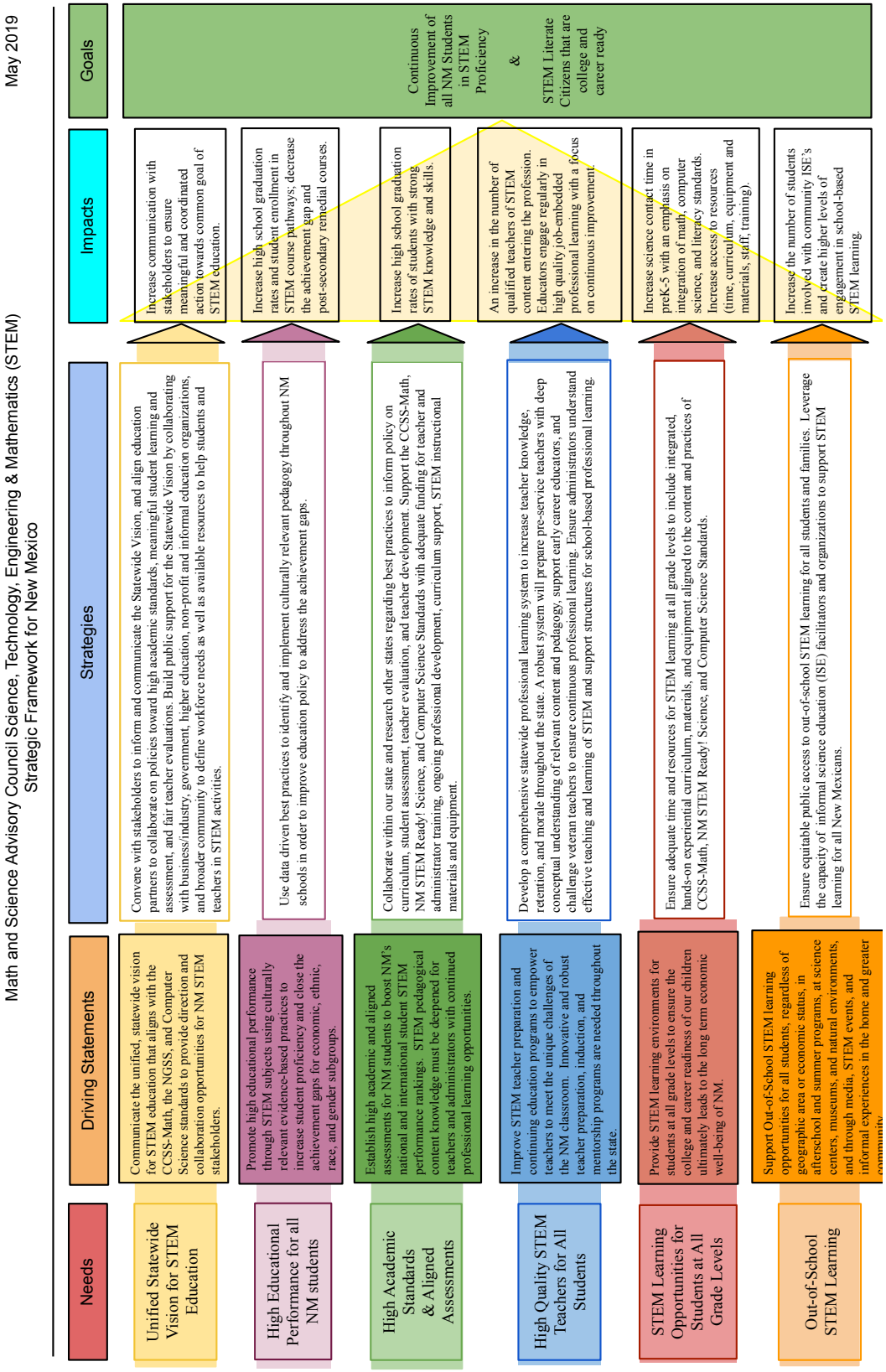
Critical Issues	Action Recommendations
Mathematics MSAC Rationale found in Appendix B	To ensure students have access to high-quality math education, the MSAC recommends the PED work with the Legislature to provide or support the following: • Develop and implement an early numeracy (K–5) initiative similar to the "Structured Literacy" mandate in SB398, 2019 legislative session. • Provide funding for an Elementary Math Specialist endorsement stipend. • Provide teachers with high quality professional learning opportunities to support a positive student and teacher Math Identity. • Provide high school mathematics pathways that meet the rigor of the CCSS-M.

Science
 	
MSAC Rationale found in Appendix B
	The MSAC Recommends that PED and the legislature continue to support science education with the following:
	• Support implementation of Elementary Science Specialist (ESS)
	  o Update science competencies for ESS to align with the NM STEM Ready! Science Standards and the PED's 2022 Comprehensive Strategic Plan.
	  o Recommend all elementary school students to participate in five hours/week of phenomena-based, three-dimensional science instruction, supported by an Elementary Science Specialist, that aligns with the NM STEM Ready! Science Standards.
	  o Incentivize every elementary school to have an ESS by providing state funding to districts that can only be utilized for school ESS teachers.
	  o Add pay differential to teacher salary for ESS
	  o Support dedicated funding for equipment and consumables to be specifically used for K – 12 classrooms aligned to the NM STEM Ready! Science Standards.
	• Support dedicated funding for equipment and consumables to be specifically used for K – 12 classrooms aligned to the NM STEM Ready! Science Standards.
	• Foster a network of collaboration between formal and informal science organizations.
	  o Fund an annual Science Driving Change Conference to promote partnerships between formal and informal science educators.

Computer Science MSAC Rationale found in Appendix B	In order to ensure high quality computer science education for all students, the MSAC recommends: • Create, implement, fund and recruit educators to earn a K–6 CS licensure endorsement, • Create a baseline, and then continue to track enrollment data in computer science classes for K – 12 breaking out the information by basic demographic information (gender, ethnicity, etc.) as well as English Learners and Special Education, to highlight areas of concern with lack of student engagement. • Continue to support and fund K–12 teacher professional learning opportunities in CS and CS ecosystems (connecting classrooms, non-profits, museums, workforce partners).
Outdoor Learning MSAC Rationale found in Appendix B	The MSAC Recommends that PED and the Legislature continue to support Outdoor Learning with the following: • Develop an implementation framework for the state, districts, and schools. • Provide $5 million in state legislative funding for teacher and administrator professional learning opportunities and materials that create and expand outdoor learning opportunities. • Continue to strengthen and form partnerships with community, government, and nonprofit groups that support outdoor learning.

STEM Strategic Framework for New Mexico

The STEM strategic framework helps the MSAC determine their yearly priorities for STEM education. The MSAC developed an initial framework in 2015 and was last updated in 2019. This framework is adaptive and changes based on the ongoing needs of the state.



Mathematics

Activities of the Math and Science Bureau

Math Foundations: An Early Numeracy Initiative

34 Educators
3 School Districts

Strategy II-A Deeper Learning
Strategy II-B Community-Based Culturally and Linguistically Responsive Education
Strategy II-C Social-Emotional Learning
Action I-D-2f Growth Oriented Professional Learning

Math Foundations was geared toward school teams in Grades 4–5, including administrators, instructional coaches and mathematics educators, to deepen their mathematical content and pedagogical knowledge specific to numeracy. Facilitators will support educators to apply strategies for implementing equitable classroom discourse and fostering a culture of perseverance and problem solving among students.

School teams engaged in seven days of collaborative face-to-face learning throughout the series.

Through a variety of measurement tools, external evaluators found:

- Teacher gains in knowledge and implementation. Teachers reported consistent gains across all strategies related to pedagogical content and the discourse process including proficiency, implementation, and confidence.
- The improvements in student performance are supported by feedback from focus groups as well as teacher observations. Teachers also discussed feeling more empowered to decide how and when to focus on learning standards.
- Teachers described how the professional learning sessions provided the justification needed for productive conversations with school administration.
- Teachers experienced high support from leadership. Support from school leadership, including math coaches and school administrators, increased throughout the professional learning sessions.
- Students benefitted from high discourse and small groups. The strategies teachers have learned are evident in the experiences the students described during focus groups.
- Students commented similarly about their math experiences this school year, particularly in areas that reflect the discourse process and vertical alignment.

Chaudary, S. (Photographer). (2023, Feb. 24). Elementary math teachers discussion vertical progressions during Math Foundations Session 4.] Albuquerque, NM

Fostering Positive Math Identities

17 Educators
5 School Districts
3 State Charter School

Strategy II-A Deeper Learning
Strategy II-B Community-Based Culturally and Linguistically Responsive Education
Strategy II-C Social-Emotional Learning
Action I-D-2f Growth Oriented Professional Learning

This series focused on secondary school teams, including administrators, instructional coaches, and mathematics educators, to support positive educator and student mathematics identities, leveraging the NMIS to sustain mathematical pedagogical shifts in instructional practice.

The theory of change is as follows: In stage (1) teachers first reflect on their math identities and (2) then on their students' math identities. These reflections, in turn, lead to (3) changes in teachers' beliefs, self-efficacy, knowledge of math pedagogy, and instructional practice, which would ultimately (4) increase student agency, as measured by improved classroom experiences and academic outcomes.

Facilitators guided teams through analyzing mindsets and beliefs around the '5 Equity-based Mathematics Practices' in service of culturally and linguistically responsive education and support leadership in schools and districts to continue this work.

School teams engaged in collaborative virtual and asynchronous learning through the PED Canvas learning management system (LMS). Alongside this series, school leaders participated in additional support sessions to lead their teams in ongoing support between sessions.

Based on an independent evaluation of the program through mixed measures, including educator and student surveys and classroom observations, preliminary findings indicate this PL positively impacted students' classroom experiences and mindsets across various measures.

- PL increased student reports that their teachers engaged in culturally responsive and sustaining pedagogies challenged students with rigorous academic content, and built strong interpersonal relationships with students.
- PL also increased students' self-efficacy in their belief that they can successfully complete math tasks.
- Evaluators also noted that there was mixed impact on teacher survey measures & outside observations on these topics, which will need additional data to make a clear determination:
    - Knowledge of math pedagogy
    - Asking for student justifications during instruction
    - Overall student engagement

Mathematics

Focus on Algebra

100 Educators
13 School Districts
2 State Charter Schools

Strategy II-A Deeper Learning
Strategy II-B Community-Based Culturally and Linguistically Responsive Education
Strategy II-C Social-Emotional Learning
Action I-D-2f Growth Oriented Professional Learning

The Focus on Algebra professional learning series will engage Grades 6–9 math educators, including administrators and instructional coaches, to develop effective pedagogy and instructional practices emphasizing algebraic thinking and algebra concepts. The series will leverage the NM Instructional Scope for Mathematics-2.0 (NMIS-M) to prioritize content and standards for algebra in Grades 6–9 and develop formative assessment practices through the lens of culturally and linguistically responsive instruction (CLRI) to meet the learning needs of all students. This series will be conducted through in-person and virtual synchronous formats, with two intensive summer academies, year-long synchronous support and asynchronous activities through June 2024.

The Summer Math Academy, the first piece of the professional learning series, took place in June and July to accommodate schools interested in participating but involved with extended-year learning opportunities. The 4-day workshop supported educators in deepening their understanding of the key shifts in the Common Core Math standards, focusing on the progression of skills that lead up to Algebra 1 and provided strategies for promoting rich discourse and engagement with the Standards for Mathematical Practice.

During the school year, school teams came together to engage in two, 2-day fall and spring in-person convenings and monthly virtual synchronous learning throughout the school year to continue vertical alignment conversations with each session focusing on progressions of standards, discourse practices, interweaving social-emotional learning and culturally & linguistically responsive instruction.

This program will continue with face-to-face and virtual sessions throughout this year, with a second cohort starting next year.

Based on independent evaluation of the program through mixed measures, including educator and student surveys and focus groups, findings indicate:

- Most students reported that math problems they worked on involved some level of discourse.
- Teachers implement various instructional strategies in the classroom, even during the same lesson.
- Students use several strategies to figure out how to solve math problems in class.
- Social-emotional learning is an important aspect of learning math.
- Students generally felt confident about approaching math problems and were excited to take up a challenge.

I think the students are more confident. They feel confident in their ability and they belong. They know it's okay to make mistakes and it's okay that we're going to learn from it. If I'm... It's okay to clear up the error in my thinking, it's okay to be wrong and then let's get to the right part of it and let's work together. It's more or less, there's no right or wrong. We're working to an answer that's reasonable, kind of."
-Focus on Algebra Participant

Top Photo: Chaudhary, S. (Photographer). (2022, June 9). [Secondary math teachers discussing the importance of discourse in math classrooms.] Albuquerque, NM

"What I liked most in the Focus on Algebra sessions, it doesn't only focus on algebra itself, not only about math, but it is also touching the social-emotional learning....of our students when it comes to working with math? Is it all about numbers? That's one way to motivate our students to be more, to encourage them learning mathematics, letting them know that it's not all about numbers."
-Focus on Algebra Participant

Re-Envision High School Math Pathways Working Group

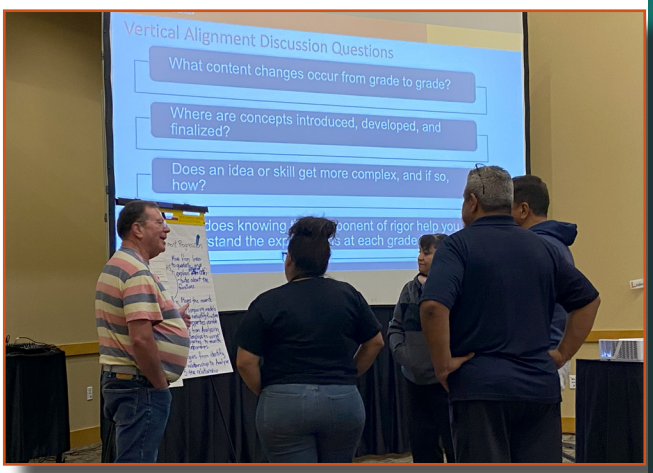
35 Members

This working group is a collaborative effort between stakeholders in K-12 mathematics, postsecondary, workforce, informal education and national labs. They started their work in March 2023 to create modern and innovative mathematics pathways aligned with students' goals and aspirations. They are developing recommendations for re-envisioning high school math pathways to present to the PED in June 2024.

Math Micro-credential Development

The MSB is working with New Mexico State University Mathematically Connected Communities to develop a series of micro-credentials for elementary teachers responsible for mathematics instruction. They are designed to build mathematics content knowledge for K-6 teachers and provide them with the resources to build strong conceptual understanding and mathematical reasoning for elementary students. We plan to release this series next school year with a cohort of K-6 educators.

Ubinger, D. (Photographer). (2023, May 16). [Secondary math teachers discussing standards vertical alignment.] Las Cruces, NM



Ubinger, D. (Photographer). (2023, May 16). [Secondary math teachers discussing standards vertical alignment.] Las Cruces, NM

Activities of the Math and Science Bureau

3-D Formative Assessment in the New Mexico Classroom

23 Educators/Facilitators
6 School Districts
1 Higher Education Institute

Strategy II-A Deeper Learning
Strategy II-B Community-Based Culturally and Linguistically Responsive Education
Action I-D-2f Growth Oriented Professional Learning

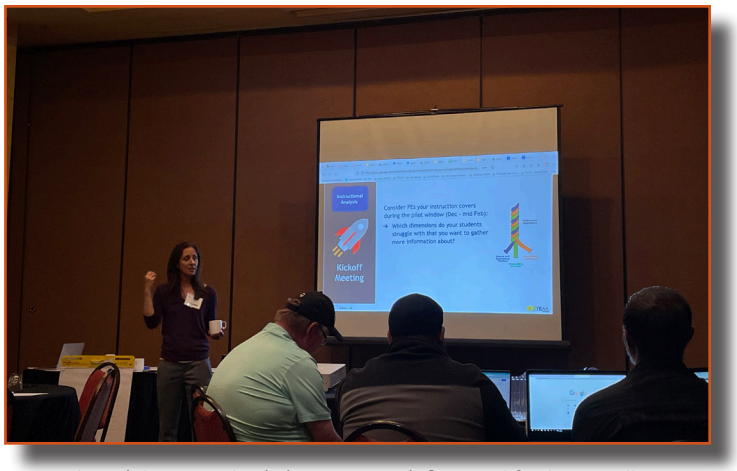
WestEd's SCALE Science offered a second year of three-dimensional formative assessment tasks. These in-person and virtual sessions incorporate discussions on evidence-based conversations while analyzing student work.

This full-year program used a combination of in-person and virtual professional learning (PL), along with asynchronous instructional modules, to build school-based and regional communities in which instructional leaders and educators:

- Develop a shared understanding of ways that the New Mexico STEM Ready! Standards and New Mexico Instructional Scope are driving changes in assessment.
- Use evidence of students' progress with multidimensional science reasoning to inform responsive decision making about instruction and programs.
- Build a deeper understanding of ways to elicit students' ideas, interests, and cultural and linguistic resources and use them as assets for instruction.
- Cultivate local and regional capacity for supporting and sustaining collaborative assessment for learning practices.

There were improvements across many of the survey items related to participants' understanding of core elements of the NM STEM Ready! Science Standards and standards-based formative assessments and how to implement them. Participants reported the greatest learning (in order) around three fundamental *foci* of the Formative Assessment professional learning:

- Features of high-quality assessment of the standards,
- Providing meaningful feedback to students about their strengths and areas for growth with each dimension of the standards, and
- How the three dimensions of the standards (SEPs, CCCs, DCIs) can be integrated in an assessment.



Krenek, C. (Photographer). (2022, Oct. 9). [WestEd facilitator Jill Wertheim leads school teams thorugh an exercise to consider multi-dimensionality of standards that students may struggle with in instruction/assessments.] Albuquerque, NM

"What these workshops have helped me with is understanding how to use assessments as a teaching tool and to embed supports for students within the assessments themselves."
- Teacher Participant

Supporting Science Sensemaking in the New Mexico Classroom

8 Educators
1 School District
1 State Charter School

Strategy II-A Deeper Learning
Strategy II-B Community-Based Culturally and Linguistically Responsive Education
Action I-D-2f Growth Oriented Professional Learning

WestEd's K–12 Alliance continued with a second year of professional learning to elementary, middle school and high school teams. This year-long program used a combination of in-person and virtual professional learning (PL), along with asynchronous instructional modules, to build school-based and regional communities in which instructional leaders and teachers:

- Have a common understanding of how the NM STEM Ready! Standards and New Mexico Instructional Scope is driving changes in classroom teaching and learning.
- Build capacity to augment science instructional materials so that instruction is coherent from the student perspective.
- Build a deeper understanding of ways to elicit students' ideas and interests and integrate cultural and linguistic resources as assets for instruction.
- Explore the role teachers, teacher leaders, and instructional materials play in supporting students' sensemaking of phenomena, and leverage the use of science notebooks, developing and using models, and discourse.
- Cultivate local and regional capacity among instructional leaders and teachers to engage in practices that expand meaningful and culturally relevant opportunities for students to learn science.

There were improvements in many items related to participants' understanding of core elements of the NM STEM Ready! Science Standards and the kinds of teaching practices needed to implement them.

Participants reported the greatest learning around two fundamental *foci* of the Supporting Science Sensemaking professional learning:

- How to analyze instructional materials to determine whether they meet the goals of the standards, and
- How to modify or adapt instructional materials to better meet the goals of the NGSS/NM STEM Ready! Science Standards.

"[Coherent Science Instruction] gives students the opportunity to tap into their prior knoweldge and have a voice in th process of learning content. Instead of being told (lectured) they get to discover and investigate."
- Instructional Leader Participant

Chaudhary, S. (Photographer). (2022, Oct. 24). [WestEd K-12 Alliance faciltiators lead teams through an activitiy to analysis coherent instruction for students.] Albuquerque, NM

Science

National OpenSciEd High School Field Test

12 Field Test Teachers
5 School Districts
1 State Charter School

Strategy II-A Deeper Learning
Strategy II-B Community-Based Culturally and Linguistically Responsive Education
Action I-D-2f Growth Oriented Professional Learning

During the second and final year of the project, field test teachers in Biology, Chemistry and Physics implemented several new field test units each semester while teaching previous unit for coherent instruction. They provided valuable data to assist in refining the units. Units will become publicly available next school year and are determined to be of high-quality by NextGenScince, a national organization, comprised of educational experts, identifies lessons and units that best illustrate the demands of the Next Generation Science Standards (NGSS). New Mexico teacher leaders and bureau members facilitated curriculum support convenings each semester to train field test teachers in the units. The MSB continued participation on the State Steering Committee and unit advisory committees to provide input on unit development.

"Having students do more sensemaking has allowed for equity of voice and agency from the student perspective." **- Teacher Participant**

Chaudhary, S. (Photographer). (2022, Oct. 21). [NM OpenSciEd High School Field Test Teachers discuss ways to promote UDL in classrooms.] Albuquerque, NM

OpenSciEd Unit Facilitation Academies & Wrap-Around Supports

28 Educators/Facilitators
7 School Districts
7 State Charter Schools

Strategy II-A Deeper Learning
Strategy II-B Community-Based Culturally and Linguistically Responsive Education
Action I-D-2f Growth Oriented Professional Learning

The MSB partnered with the Charles A. Dana Center at the University of Texas at Austin to construct and provide 70-hours of virtual professional learning. This opportunity successfully equipped OpenSciEd facilitators to train teachers using the OpenSciEd curricular units.

These sessions achieved the following objectives:

- Familiarized facilitators with the OpenSciEd instructional models and the conceptual shifts inherent to phenomenon-based learning.
- Prepared educators for the practical aspects of planning and enacting OpenSciEd units.
- Built capacity to support teachers in enacting and modifying the OpenSciEd curriculum to support diverse learners using Universal Design for Learning principles and culturally and linguistically responsive instructional strategies.
- Applied best practices of adult learning to lead effective professional learning that fosters a collaborative culture among educators.

In addition, MSB staff provided monthly professional learning opportunities to support teachers and facilitators as they implemented the OpenSciEd middle school units. Sessions included grading, assessment systems and supporting student discourse.

Activities of the Math and Science Bureau

Computer Science Integration and Coaching Community of Practice

14 Educators
8 School Districts

Strategy II-A Deeper Learning
Strategy II-B Community-Based Culturally and Linguistically Responsive Education

The MSB hosted a virtual community of practice for rural educators looking to get support for implementing computer science in the classrooms. This virtual PLC supported discussions and brainstorming solutions to problems of practice. These teachers meet once a month after school for hour-long sessions to discuss problems of practice they face in their classrooms and receive coaching support to enhance their practice. They also learned skills to coach and mentor another teacher in computer science implementation.

Science+C

6 Educators
4 School Districts
7 State Charter Schools

Strategy II-A Deeper Learning
Action I-D-2f Growth Oriented Professional Learning

During a five-day summer teacher PL, this series enchanced:

- Teachers' ability to use, decode, and explain mechanisms that embed scientific ideas within computer models;
- Prepare teachers to use models as experimental testbeds on which to perform simulation experiments; and
- Enable teachers to modify models to test theories of how and why phenomena occur.

The PL also emphasized specific pedagogical techniques such as decoding in teams, crowdsourcing experimental data by distributing the simulation
experiments across student teams, and engaging students in collective sense-making around the experimentally-derived data.

The goals were to enhance science courses with rich computational modeling and simulation while engaging students with the opportunity to learn computer science skills

Surveys and evaluations indicated, from self-reported perspectives, positive gains on:

1. Knowledge on CS and practices related to coding and building scientific models
2. Understanding of CS integration
3. Teachers' belief CS skills are important for science and students' ability to create models to figure out problems

"I think I'm more comfortable discussing coding and integrating computing into my lessons, it's just so important for the students and we just ahve no support or instruction from our schools, even though it's in the standards. That's great." **-Teacher Participant**

Outdoor Learning

Activities of the Math and Science Bureau

Wilderness First Aid Course

9 Educators
3 School Districts

Strategy II-A Deeper Learning
Strategy II-E Enrichment, Extracurricular and Outof-School-Time Programs

The MSB worked with UNM International Mountain Medicine Center to offer a hybrid course in certifying educators in the most up-to-date, evidence based and practically relevant materials. The Wilderness First Aid course is a 16- hour course that includes a combination lectures, practical skills stations, and scenario practice.

Outdoor Learning Start-Up Grants

441 Educators
10 School Districts
7,659 Students

Strategy II-A Deeper Learning
Strategy II-B Community-Based Culturally and Linguistically Responsive Education
Strategy II-C Social Emotional Learning
Strategy II-E Enrichment, Extracurricular and Outof-School-Time Programs

This RFA is designed to promote innovation in the critical area of outdoor learning by expanding access to outdoor learning and environmental education programs for New Mexico students. $300,0000 in competitive grants were available to New Mexico PreK–12 public school districts or state-chartered charter schools, to operate, expand and sustain outdoor learning programs, and regional educational cooperatives to:

- Support outdoor learning and/or environmental education professional learning that integrates instruction in science, technology, engineering, arts, mathematics, literacy, social studies or humanities.

- Develop a plan to create a new outdoor learning program, including training and supporting public schools teachers on outdoor learning protocols and best practices and developing an outdoor learning space/outdoor classroom on school grounds.

During the 2022–2023 academic year, NMPED Outdoor Learning Initiative granted funds to the following districts and schools:

- Alamogordo Public Schools
- Albuquerque Public Schools (3rd grade, Los Padillas Wildlife Sanctuary)
- Aztec Municipal Schools
- Las Cruces Public Schools
- Monte Del Sol Charter School
- Native American Community Academy
- Rio Gallinas School for Ecology and the Arts
- Vista Grande High School

During the 2022-2023 academic year, 7,659 students were served and 441 educators were served under the Outdoor Learning Initiative Start Up Grant. As a whole, the cohort of grant recipients from the 2022-2023 academic year participated in a Community of Practice, and completed a Wilderness First Aid certification.

Under the Outdoor Learning Initiative Start Up Grant, all third grade students within Albuquerque Public Schools (APS) participated in the third grade field program entitled Community, Place, and Habitat at the Los Padillas Wildlife Sanctuary (LPWS) on the campus of Los Padillas Elementary School. Aztec High School implemented Project Bike Tech which is a class that is based on the engineering of bikes. Along with the bike class, they created access to biking for all kids at the school by building a pump track on campus and creating internships for students at the local bike shop. They hired Bike Coaches from NICA (National Interscholastic Cycling Association) As a result, 20 students from Aztec High School joined the NICA Bike Team.

In Alamogordo, district and campus leadership increased opportunities and frequency of student outdoor learning and professional development by 100%. In Las Cruces, the district started the Schoolyard Field Trip program, a collaboration between the Las Cruces Public Schools and the Asombro Institute for Science Education. It provides teachers with the training, tools, and activities to engage their students in learning in the schoolyard, thus giving 249 students access to the academic and socio-emotional benefits of outdoor learning. The Outdoor Learning Initiative Start Up Grant helped Mountain Mahogany Community School in Albuquerque to invest in upgrades to the facility and to provide professional development to teachers. Mountain Mahogany added gardening for all students in the 2023-2024 academic year and supports their ongoing collaboration with Cottonwood Gulch to implement longer outdoor expeditions for all students at their school.

Monte Del Sol Charter School expanded outdoor educational projects with the science of sustainable food gardens by adding a greenhouse, increasing garden beds, making a worm composting area, amending soil, and developing indoor grow technology through hydroponics, mushrooms, and grow tents in the classroom.

The Native American Community Academy (NACA) emphasized experiential outdoor learning to help students reconnect with the land and develop deep knowledge of Indigenous approaches. NACA also provided ongoing intentional professional development opportunities and support for classroom teachers to effectively integrate and use outdoor experiential learning approaches across all coursework.

Rio Gallinas School hired a garden/outdoor learning specialist and purchased materials necessary to repair a current grow dome off the current campus that was out of commission and create a new garden/outdoor learning space on the current campus. They hired a local farmer and educator to get the new garden space up and running with five raised beds that were built, filled, and planted with the students. They purchased soil, plants, watering cans, and hoses to help maintain the space. They also purchased a new greenhouse and refurbished a growdome to use and maintain. Soil, plants, watering cans, and hoses were purchased to help maintain the space. A new greenhouse was purchased that will be put on the current campus this summer and materials were purchased to begin refurbishing the growdome on a prior campus that we still plan to use and maintain.

Grantees expressed satisfaction with the growth and development of their programs during the 2022–2023 academic year with the support of the Outdoor Learning Initiative.

STEM Activities

Activities of the Math and Science Bureau

UNM Research Opportunities for Science Educators (ROSE)

20 High School Educators
14 School Districts

The MSB and UNM professors collaborated to continue Year 3 of this program to improve the quality of science education in NM. This program enabled twenty science middle and high school science educators to refresh their knowledge and develop new skills while engaging in scientific research. Each educator worked in a lab for five weeks alongside UNM faculty engaged in research. At the program's end, each educator prepared a short presentation on the objectives of their project, research results, and accomplishments and highlighted tools and techniques used throughout the program. In addition, the educators took away tools and techniques to use back in the classroom.

NM Governor's STEM Challenge and Showcase

52 High School Educators
Over 300 High School Students
15 School Districts
10 State Charter Schools

The PED worked with New Mexico State University, New Mexico Department of Workforce Solutions and Los Alamos National Laboratory Foundation to continue the 2023 STEM Challenge. Students in NM high school STEM classes are invited to imagine, design and develop a project model to address the following question: *Imagine NM as a state known for sustainable and green manufacturing. What innovations or developments could be produced to foster our schools, jobs and communities?* High school teams displayed and presented their projects at the NM Governor's STEM Showcase on December 3 in Las Cruces.

Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST)

The Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) are the highest honors the United States government bestowed specifically for K–12 STEM and/or Computer Science teaching.

The MSB offered support for educators applying for the PAEMST awards, including mentors and guidance documents.

The state selection committee selected several math and science state finalists for the K–6 cycle:

7–12 Math State Finalists:

- Kimberly Connell (Albuquerque Public Schools)

7–12 Science State Finalists:

- Debbie Grothaus (Los Alamos Public Schools)
- Amanda Kraft (New Mexico International School)
- Christopher Speck (Albuquerque Public Schools)

These state finalists represent the most outstanding teachers NM has to offer and serve as both a model and an inspiration to students and fellow teachers, inspire their communities, and leaders in improving STEM/Computer Science education.

ECEP Alliance

New Mexico was accepted into the latest cohort, joining teams from 29 other states. This cross-state collaborative network looks to broaden and expand computer science education in New Mexico through

development and advocacy to change some of the systemic barriers that have led to a discrepancy in students participating in Computer Science. As part of ECEP, New Mexico is in the process of forming a core team of various individuals from across the state committed to the mission of bringing Computer Science to all students across the state.

Justice Outside Fellowships

The Outdoor Learning Specialists both work with Justice Outside, which helps support outdoor leaders. Their work helps advocate for racial justice and equity in the outdoor and environmental movements, equity and justice in philanthropy, and funding for Black, Indigenous, and Communities of Color on the frontlines of climate change. Justice Outside uplifts the voices of Black, Indigenous, and People of Color around racial equity, the outdoors, and climate justice and works in solidarity with other advocacy organizations to pool our power for policy change.

Therese Baca-Radler, Ph.D., is participating in the Rising Leaders Fellowship. This fellowship consists of outdoor educators and leaders from different states focused on creating access for all to outdoor education.

Vanessa Barela is a part of the Network for Network Leaders. This network focused on ways of learning and connecting with the outdoors.

LaunchYears Initiative

The University of Texas at Austin
Charles A. Dana Center

The Launch Years Initiative supports the scaling of mathematics pathways from high school through postsecondary education and into the workplace, aligned to students' goals and aspirations. New Mexico will begin their work with the Launch Years Initiative by focusing on the design and implementation of postsecondary mathematics pathways. The state will be convening a task force of leaders and experts in the second half of 2023. This connects the work being done by the Re-envisioning Math Pathways Working Group.

Council of State Science Supervisors (CSSS)

CSSS encouraged MSB staff to continue to grow professionally by learning and collaborating with other state science content and assessment leaders across the nation.

Council of Chief State School Officers (CCSSO) HQIM Initiative

The MSB has collaborated with the Instructional Materials Bureau and other PED leadership in the implementation of the CCSSO HQIM initiative. Its mission is to encourage the use of HQIM during instruction for the purpose of improving student instructional outcomes.

Collaboration with the Assessment Bureau

MSB staff collaborated with the Assessment Bureau by providing content expertise during the vetting process of the NM-MSSA mathematics and NM-ASR, and supporting item and bias and sensitivity educator reviews.

Collaboration with the Instructional Materials Bureau

The MSB and Instructional Materials Bureaus are collaborating to plan for the next instructional materials review for science. Nine educators were selected to participate as Science Content Experts from spring of 2023 through summer of 2024. The Science Content Experts will identify the critical science content criteria aligned to the New Mexico STEM Ready! Science Standards in creating a instructional materials rubric. Science reviewers will use the developed high quality instructional materials science rubric during the Science Summer Review Institute happening June 10-21, 2024. We encourage all MSAC members to spread the word when reviewer applications open in the Fall 2023 and share this message with stakeholder groups.

Curriculum and Instruction Convenings Fall and Spring

During the fall convening, MSB staff offered several sessions focused on using the NMIS Science 1.0 to support science education, supporting educators planning for math acceleration with just-in-time supports and boosting student engagement through the Science and Engineering and Math Practices.

During the spring convening, the MSB staff offered sessions highlighting the ongoing professional learning series and components of the NM Computer Science Strategic Plan.

Spring Budget Conferences

MSB staff presented in front of school, district and state-charter school leaders and business managers ways to support their staff's needs for high-quality STEM professional learning within tight budgets. The bureau shared upcoming professional learning for SY2023–24 and opportunities for utilizing district and awarded funds to bring them high-quality, customized professional learning.

Advancing Coherent and Equitable Systems of Science Education (ACESSE) 50+

This project brings together educational re-search and practitioner partners to promote equity and coherence in science education. Current ACESSE work focuses on developing professional learning resources to support diverse equity learning pathways. Each of these projects, while being a center of focus for work, will also be intersectional with other projects, working towards equitable science and engineering learning as outlined in *A Framework for K-12 Science Education.*

Network of Educators Across the United States (NEXUS) for Science Education Leadership

The MSB, alongside Massachusetts, Oklahoma and Washington State, participated in a multi-year collaborative opportunity to provide science education leaders an opportunity to network across states and share ideas and strategies while also providing individualized support and assistance to each state. This project entered into Phase Two with the continued participation of Albuquerque Public Schools to increase the shared understanding of the critical actions leadership teams and systems drivers take in leading effective science curriculum implementation.

Appendix A: Statutory Requirements

This section describes the laws and rules that apply to the Mathematics and Science Education Act in relevant part as follows:

22-15E-1. Short title.
This act [Chapter 22, Article 15E NMSA 1978] may be cited as the "Mathematics and Science Education Act".
History: Laws 2007, ch. 44, § 1; 2007, ch. 239, § 1.

22-15E-2. Definitions.
As used in the Mathematics and Science Education Act:

A. "bureau" means the mathematics and science bureau;
B. "chief" means the chief of the bureau; and
C. "council" means the mathematics and science advisory council.

22-15E-3. Bureau created; duties.
History: Laws 2007, ch. 44, § 2; 2007, ch. 239, § 2.

A. The "mathematics and science bureau» is created in the department. The secretary shall appoint the chief as provided in the Public Education Department Act [9-24-1 NMSA 1978].
B. The bureau shall:
   1. administer the provisions of the Mathematics and Science Education Act;
   2. provide staff support for and coordinate the activities of the council;
   3. work with the council to develop a statewide strategic plan for mathematics and science education in the public schools and coordinate education activities with other state agencies, the federal government, business consortia and public or private organizations or other persons;
   4. ensure that school districts' plans include goals for improving mathematics and science education aligned to the department›s strategic plan;
   5. recommend funding mechanisms that support the improvement of mathematics and science education in the state, including web-based mathematics and science curricula, mentoring and web-based homework assistance;
   6. promote partnerships among public schools, higher education institutions, government, business and educational and community organizations to improve the mathematics and science education in the state;
   7. develop and evaluate curricula, instructional programs and professional development programs in mathematics and science aligned with state academic content and performance standards; and assess the outcomes of efforts to improve mathematics and science education using existing data.

History: Laws 2007, ch. 44, § 3; 2007, ch. 239, § 3.

22-15E-4. Mathematics and science advisory council; created; members; terms; vacancies.

A. The "mathematics and science advisory council» is created, composed of twelve members. Members of the council shall be appointed by the secretary for staggered terms of four years; provided that for the initial appointments, four members shall be appointed for two years, four members shall be appointed for three years and four members shall be appointed for four years. Members shall serve until their successors have been appointed and qualified. A vacancy shall be filled by appointment by the secretary for the unexpired term.
B. Using a statewide application process, the secretary shall appoint members from throughout the state so as to ensure representation of the state's demographics, including geographic distribution, gender and ethnic diversity and as follows:
   1. four members from public schools, including at least two mathematics and science teachers and a school district administrator with experience in mathematics and science curricula;
   2. three members from public post-secondary educational institutions with expertise in mathematics

or science education;

3. four members from the private sector, including the national laboratories, museums and science- and engineering-based businesses; and
4. one member who represents the New Mexico partnership for mathematics and science education.

C. Members of the council shall elect a chair from among the membership. The council shall meet at the call of the chair not less than quarterly.

D. Members of the council are entitled to receive per diem and mileage pursuant to the provisions of the Per Diem and Mileage Act [10-8-1 NMSA 1978] but shall receive no other compensation, perquisite or allowance.

History: Laws 2007, ch. 44, § 4; 2007, ch. 239, § 4

22-15E-5. Council duties.

The council shall:

A. advise the bureau on implementation of the bureau's duties pursuant to the Mathematics and Science Education Act;

B. make recommendations to the bureau and the department regarding the statewide strategic plan for improving mathematics and science education and advise on its implementation and incorporation into the department's five-year strategic plan for public elementary and secondary education in the state;

C. advise the bureau, the department and the legislature regarding appropriations for mathematics and science education, administration, resources and services, including programs for public school students and staff;

D. work with the bureau to determine the need for improvement in mathematics and science achievement of public school students and make recommendations to the department on how to meet these needs; and

E. produce an annual report on public elementary and secondary mathematics and science student achievement to be submitted to the department, the governor and the legislature no later than November 30 of each year.

History: Laws 2007, ch. 44, § 5; 2007, ch. 239, § 5.

22-15E-6. Mathematics and science proficiency fund; created; purpose; annual reports.

A. The "mathematics and science proficiency fund" is created as a non-reverting fund in the state treasury. The fund consists of appropriations, gifts, grants, donations and income from investment of the fund. Disbursements from the fund shall be made by warrant of the secretary of finance and administration pursuant to vouchers signed by the secretary of public education or the secretary's authorized representative.

B. The fund shall be administered by the department, and money in the fund is appropriated to the department to provide awards to public schools, school districts, public post-secondary educational institutions and persons that implement innovative, research-based mathematics and science curricula and professional development programs. The department shall promulgate rules for the application and award of money from the fund, including criteria to evaluate innovative, research-based mathematics and science programs and professional development programs.

C. Each award recipient shall provide an annual report to the bureau that includes a detailed budget report, a description of the services provided and documented evidence of the stated outcomes of the program funded by the mathematics and science proficiency fund and that provides other information requested by the bureau.

History: Laws 2007, ch. 44, § 6; 2007, ch. 239, § 6.

Appendix B: MSAC Rationale for Critical Issues

Math Action Recommendations

Math education is critical for student success. Research shows that there is a predictive link between students' early mathematics skills and later reading outcomes[1]. Engaging students in meaningful authentic math experiences early in their formal learning career by fostering a positive math identity and strong conceptual understanding of early numeracy skills helps lead to students' future mathematical success.

Educators must be empowered to recognize their own math understanding, which will give them an opportunity to intervene early in a child's mathematical education to break the cycle of math anxiety, avoidance, and low achievement. In order to achieve this, teachers need to be given the opportunities to enhance their math teaching and learning at the same rate as other focus areas.

New Mexico is ranked 50th on the National Assessment of Educational Progress (NAEP) assessment in mathematics at grades 4th and 8th[2]. 75% of students in NM are not proficient in math 3rd-8th and 11th grade on the 2021 NM-MSSA[3]. These data show that current practices to prepare students for higher math learning is not working for students in NM. "Ensure ALL teachers (who teach math) in NM have access to ongoing job embedded collaborative professional learning that grows and deepens their professional (mathematics) teaching practices (Tyson 2023)[4]." An early numeracy initiative similar to the “Structured Literacy” mandate is imperative to address these needs.

The US Department of Education holds high quality STEM education as the key to 21st century career readiness and global competitiveness[5]. In the current scope of work, many elementary teachers have a focus on literacy and ELA, and have had many opportunities to focus on literacy. As of September 1, 2023, only 44 educators have the elementary math specialist endorsement in New Mexico[6]. Incentivisation of math education would encourage more elementary teachers to become math focused.

Math anxiety is pervasive and contributes to low math achievement and avoidance of STEM career paths. The first step in taking math anxiety out of math instruction is self-diagnosis[7]. Providing teachers with high quality professional learning that supports students and teachers' Math Identity will ensure awareness of this stigma of math.

Traditional math options, especially for minority and underserved students, is a barrier to equitable outcomes for students[8]. Diversifying course offerings beyond the typical calculus pipeline (an algebra-focused secondary math sequence leading to precalculus and calculus) allows students to have more autonomy and ownership of their own high school education. The implementation of a deeper focus in areas like quantitative reasoning, mathematical modeling, computer science, statistics, and data science coursework leads directly to college or career pathways[9]. With expanding mathematics options we must continue to provide rigor through the Common Core State Standards in Mathematics. It is imperative to provide students with many opportunities to thrive. If our goal is to empower students to recognize their potential, we must provide them with opportunities to own their success and engage them in quality, rigorous mathematics experiences that prepare

1. Dieuwer ten Braak, D., Lenes, R., Purpura, D., et al. (2022). Why do early mathematics skills predict later mathematics and reading achievement? The role of executive function. Journal of Experimental Child Psychology 214 105306.
2 https://www.nationsreportcard.gov/profiles/stateprofile?chort=2&sub=MAT&sj=AL&sfj=NP&st=MN&year=2013R3
3 https://webnew.ped.state.nm.us/bureaus/accountability/achievement-data/
4 Tyson, K., presentation to the LESC August 2023. https://www.nmlegis.gov/handouts/ALESC%20072623%20Item%204%20.3%20-%20LANL%20Fostering%20the%20Mathmatician%20in%20every%20student%20in%20NM%20Presentation.pdf
5 https://www.ed.gov/stem
6 Gaudet, T. September 2023, https://www.nmlegis.gov/handouts/ALESC%20092023%20Item%2012%20.3%20-%20Math%20and%20Science%20Advisory%20Council%20Presentation.pdf
7 Shields, D. (2007) Taking math anxiety out of math instruction. NADE Digest 3 (1) Spring
8 The Case for Math Pathways, The Charles A. Dana Center https://dcmathpathways.org/sites/default/files/resources/2019-03/CaseforMathPathways_20190313.pdf
9 Steele, M., (2022) The Launch years leadership network: Supporting Mathematics Modernization in High School and Early College. AMTE

them for college and/or career.

In order to provide our students what they need to succeed, we have identified areas where we can strengthen the mathematics experiences of both teacher and student. It is clear that we need to improve existing structures to build a stronger New Mexico. In House Executive Message number 21, Michelle Lujan Grisham stated, "we must do everything in our power to provide our students with the tools they need to succeed[10]." Addressing the critical issues the MSAC has proposed will prepare and educate our students for 21st Century skills by providing the tools and mathematical foundational knowledge our students need to succeed in their future college and career endeavors.

Science Action Recommendations

The quality of instruction and the amount of time young children spend engaging with science in the first four years of formal education are reliable predictors of long-term student outcomes in science education. These early years are when learners begin to construct their positive STEM identity or negative beliefs about their ability to engage in math, science, and other STEM subjects. It is imperative that teachers in New Mexico elementary schools provide at least five hours a week of high-quality, inquiry-based science instruction, as recommended by the National Science Teachers Association[11] [12] [13]. Building an affinity toward learning STEM in the early years and leveraging students' backgrounds increases the likelihood of authoring Science-Literate Identities in secondary school[14].

We must ensure that elementary teachers are well prepared to teach science by creating, funding, and implementing an Elementary Science Specialist (ESS) endorsement [15] [16]. This will allow teachers to pursue additional education and become specialists in the field, similar to the Elementary Math Specialist that was developed in the late 2010s.

New Mexico has a strong museum system and nonprofit network with rich scientific collections and resources that are often underutilized or inequitably accessed by schools and districts. The MSAC recommends that students and teachers be provided with increased access to STEM resources and hands-on learning opportunities by fostering formal relationships between Informal Science Education (ISE) organizations and the PED. First steps should include encouraging the PED and Department of Cultural Affairs (DCA) to meet and find common goals and interests, ensuring there is equal access to resources and activities across the State and engaging with the STEM Ecosystems around the State. To ensure that NM STEM Ready! Standards are met and to align ISE programs with State Standards, the MSAC recommends providing informal science educators with access to the PED's professional learning opportunities[17] [18].

In addition, the PED should continue to provide professional learning oppoetunities to help K–12 teachers implement NM STEM Ready! Standards that align with the requirements set forth in the Martinez-Yazzie consolidated lawsuit (8). They should continue to offer culturally relevant, place-based professional learning to help K–12 teachers and administrators implement interdisciplinary science investigations that utilize local phenomena, project-based learning, and engineering exercises aligned to the NM STEM Ready! Standards. To ensure that there are teams of teachers and administrators who can support one another in this work, we recommend that the PED continue to follow the cohort model, which has been proven to maximize implementation of professional learning [19] [20].

Outdoor Learning Action Recommendations

10 https://www.nmlegis.gov/Sessions/23%20Regular/ExecMessages/house/HB0126GovMsg.pdf
11 https://www.nsta.org/nstas-official-positions/elementary-school-science
12 https://www.sciencedaily.com/releases/2020/12/201203133918.htm
13 https://nap.nationalacademies.org/download/26215
14 Oemig, P. A. (2023). Re-imagining science education for English language learners (ELLs) through integrated STEM and multicultural education (pp. 195-206). In A. Esmail, A. Duhon-Ross, J. Blakely & B. Hamann (Eds.), Social justice perspectives on English language learners. Lanham: Hamilton Books.Oemig, P. A. (2021) Science-Literate Identities Among ENLACE Students, Journal of Latinos and Education, DOI: https://doi.org/10.1080/15348431.2021.2013228
15 http://static.nsta.org/pdfs/2020NSTAStandards1-6.pdf
16 https://files.eric.ed.gov/fulltext/EJ1110245.pdf
17 https://nap.nationalacademies.org/catalog/26152/call-to-action-for-science-education-building-opportunity-for-the
18 https://nap.nationalacademies.org/read/21836/chapter/10#179
19 https://www.nasa.gov/sites/default/files/atoms/files/nasa-strategy-for-stem-2020-23-508.pdf
20 https://eric.ed.gov/?id=EJ852017

Research indicates that outdoor learning spaces benefit students in a number of important ways. These include increasing academic achievement, lowering stress levels, creating opportunities to practice collaboration and problem solving skills, engaging in culturally relevant education, and helping students feel motivated and enthusiastic about learning and school [21].

Computer Science Action Recommendations

Computer Science not only continues to be an important area of growth for the state of New Mexico, growing concerns around cybersecurity and the expansion of artificial intelligence require a diverse workforce with foundational skills in Computer Science.

21 Nicole M . Arduino, Alison W. Bowers, Noelle Wyman Roth & Nicole Holthuis (2018) Environmental education and K-12 students outcomes: A review and analysis of research, The Journal of Environmental Education, 49:1, 1-17, DOI:10.1080/00958964.2017.1366155. https://www.tandfonline.com/doi/pdf/10.1080/00958964.2017.1366155

Appendix C: Glossary and Acronyms

ACESSE	Advancing Coherent and Equitable Systems of Science Education	**MSAC**	Math and Science Advisory Council
ASSM	Association of State Supervisors of Mathematics	**MSB**	Math and Science Bureau of the Public Education Department
AP	Advanced Placement	**NAEP**	National Assessment of Educational Progress
CCSS-M	Common Core State Standards for Mathematics	**NGSS**	Next Generation Science Standards
CLRI	Culturally and Linguistically Responsive Instruction	**NM**	New Mexico
CS	Computer Science	**NMIS**	New Mexico Instructional Scope
CSSS	Council of State Science Supervisors	**NMIS-M**	New Mexico Instructional Scope Mathematics
CSTA	Computer Science Teacher Association	**NMIS-S**	New Mexico Instructional Scope Science
COVID-19	2019 Novel Coronavirus	**NMSU**	New Mexico State University
CCSSO	Council of Chief State School Officers	**PAEMST**	Presidential Award for Excellence in Mathematics and Science Teaching
DWS	Department of Workforce Solutions	**PED**	New Mexico Public Education Department
EMS	Elementary Math Specialist	**PLC**	Professional learning community
HED	Higher Education Department	**SAT**	Scholastics Aptitude Test
HQIM	High-Quality Instructional Materials	**STARS**	Student Teacher Accountability Reporting System (STARS) catalogs all approved courses and standard data set.
LANL-F	Los Alamos National Laboratory Foundation	**STEM**	Science, technology, engineering, and mathematics
LEA	Local Education Agency	**SY**	School year
LESC	Legislative Education Study Committee	**TNTP**	The New Teacher Project
LMS	Learning Management System	**UNM**	University of New Mexico

NM PED

Math & Science Bureau

MATH and SCIENCE ADVISORY COUNCIL

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