

# VISION



**“Building tomorrow’s mathematicians, engineers and scientists...today!”**

**Winter Issue, 2017**

**www.nmmesa.org**

## *NM MESA Celebrates STEM Day and MESA Day at the NM Legislature*

**Kim Scheerer**

*CI Regional Coordinator*

On January 18th, the Legislators of Santa Fe celebrated the first official STEM (science, technology, engineering and mathematics) Day at the Roundhouse! Organized and supported by the Los Alamos

deed, more than 100 MESA students from Cibola, McKinley, Rio Arriba, Sandoval, San Miguel and Santa Fe counties brought more than 1,000 letters of support for NM MESA to deliver to Representatives and Senators from all over the Land of Enchantment.

*Students heard special presentations by*



*Photo by Kim Scheerer*

**Many of the MESA students from northern and western New Mexico pose in the State Capitol Rotunda during MESA Day, January 31. Students observed and learned about the legislative process, delivered more than 1,000 letters of support to lawmakers and demonstrated the informed citizenship that is one of the primary goals of the MESA program.**

National Laboratories (LANL) Foundation, New Mexico MESA was there to share in the experience and raise our voices.

Students from Taft Middle School, Van Buren Middle School and South Valley Academy all participated by taking the Rail Runner, our local commuter train, from Albuquerque to Santa Fe! A huge THANKS to those teachers that worked to organize students and families for Rail Runner drop-off and pick-up; they include: Dewette Decker (Taft), Aleli Colon & Janice Peters (Van Buren) and Sariah Bujanda (SVA).

Using collective voices, presence and letters to let state representatives and senators know about the importance of community programs like MESA, the events of the Day went a long way in helping to secure funding for student activities, teacher support and staff positions! Schools that participated in the day got to experience a tour of the Roundhouse, the political protocol of the legislative chambers, the art of the Capitol and also took the time to deliver letters to their representatives and Governor Susana Martinez. Additional STEM supporters on the Roundhouse Rotunda during the day included the NM Museum of Natural History and Science, the Albuquerque Balloon Museum, Española YMCA Robotics, Sandia Mountain Natural History Center, several universities, community colleges and more.

STEM Day was the first of two days in which MESA students shared their voices for a democratic republic in Santa Fe. The official MESA Day at the legislature was Tuesday, January 31st and students from the North, North Central and West regions filled the roles of advocate, as well as, community and MESA representatives. In-

Public Education Department and Higher Education officials in addition to observing the legislature discuss and debate policy. Some students were even able to meet briefly with their respective legislators and

students for college majors and careers in mathematics, engineering and science.

This is in accordance with Senate Memorial Bill 10, introduced by Senator Pete Campos from District 8 encompassing Colfax, Mora, Harding and much of San Miguel County. The bill recognizes NM MESA for its contributions to science education achievement, college preparation, career guidance, field trips, academic competitions, leadership workshops, summer programs, scholarship incentives, community service and teacher professional development.

Both the Senate and House then work on appropriations that significantly contribute to NM MESA funding. The testimony of students, live in the legislative chambers or written in letters to lawmakers, is crucial for legislators to understand the continued positive impact NM MESA is making on STEM education in the Land of Enchantment.

NM MESA encourages students, teachers, parents and others to participate in the democratic process at the grass-roots level! Take the time to share your thoughts with your representatives and learn the power of speaking up... it's only when we work together that we see real change. That is a lesson that could make a big difference in the very partisan climate that is governing what Time magazine in December, 2016 described as the “Divided States of America.”



*Photo by Kim Scheerer*

**MESA students from Taft Middle School gather around Representative Sarah Maestas Barnes, whose district includes much of the Taft neighborhood. Maestas Barnes, a former MESA student who is now a wife, mom, lawyer and business owner, is a staunch supporter of the MESA program.**

voice their particular concerns.

This is the purpose of the annual MESA legislative field trip – provide students the opportunity to witness the legislative process and see state government in action. A learning experience for all involved, it is also an excellent opportunity for NM MESA to showcase its program. Attendees acted as ambassadors for NM MESA while helping NM MESA continue its mission of preparing middle and high school

## **More Diversity in NM MESA**

**Toney Begay**

*Executive Director*

We are in the midst of the 2016-2017 school year throughout the state of New Mexico. We, New Mexico Mathematics, Engineering, Science Achievement, Inc. (NM MESA) have been very busy meeting our mission, even with the additional challenges of reduced funding. We are reaching students throughout the state who may or may not be thinking about attending college and majoring in the Science, Technology, Engineering and Mathematics (STEM) fields.

Our student participants vary and reflect the diversity of our state. NM MESA has been a beacon of hope and encouragement for thousands of New Mexico students with enormous challenges and obstacles. We have succeeded throughout the years in raising student academic achievement for college preparation, graduation, scoring in the higher percentile of student testing, and producing engineering and science prototypes encapsulating the STEM learning concepts required in academic competitions.

The MESA USA National Rules Committee is diligently working on the next national competition. MESA USA will capitalize on the nation-wide MESA purchases of Arduino platform and programming equipment and supplies. The competition will be an Arduino research and engineering design utilizing that research to address an issue. We, at the national level are trying very hard to keep the expenses to a manageable level for schools and teams. We feel this new competition does that.

NM MESA and other state MESA programs are known for their diversity. We at NM MESA have the word “diversity” in our mission statement and value inclusivity as a core organizational priority. With this in mind the NM MESA staff voted to change the Loyalty Award distribution to make available the Award to all NM MESA students in our program who meet program participation requirements. We believe a student who is loyal to NM MESA and completes the required criteria should receive the benefits of our program.

Thank you to all the NM MESA Advisors and schools who are true partners in developing the generation of STEM, STEAM, or STEM-H professionals. Thank you also to our partners, donors, and supporters.



**Toney Begay**

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# US STEM Education Continues to Pale Against the World;

Rick Cole

CO Regional Coordinator

Seldom has a day gone by that another news story places NM near the bottom of some educational achievement list, socioeconomic category or jobs growth analysis. Numerous articles have also sought to explain these frustrating phenomena, especially since our neighboring states consistently fare better than the Land of Enchantment on each of those yardsticks.

However, the United States, as a whole, is also slipping in these same categories. As indicated by the latest Program for International Student Assessment (PISA), American students continue to struggle in the standings in math, reading and science performance. At the same time, the number of American children growing up in poverty has escalated sharply, particularly during the last eight years, and more Americans, particularly men ages 25-50, are not working (this includes unemployed who are seeking employment and those who are not) at any time since the Great Depression of the 1930s.

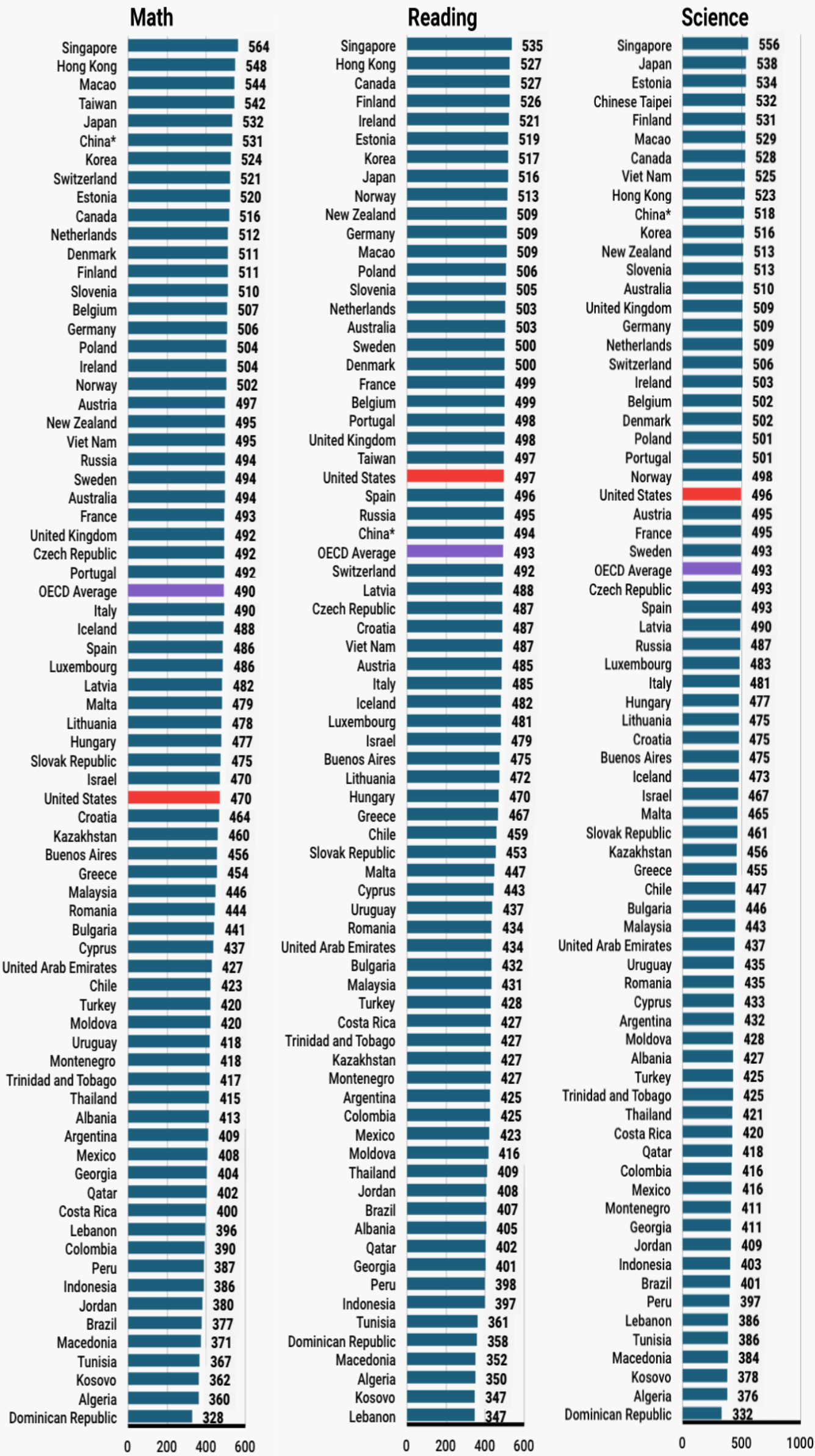
The PISA is an international exam conducted on 510,000 public school students in 65 nations every three years. It consists of uniform, standardized tests in Math, Reading and Science. When the exam was first conducted in 2000, the US was a top-20 performer in each category. The US slipped to 36th in math by 2012 and further to 41st in 2015. In reading, the US dropped to 28th in reading by 2012 but rebounded slightly to 24th by 2015. Similarly, America dropped to 28th in science in 2012 and recovered to 25th in 2015.

PISA is a comprehensive 6 ½ hour exam for 15 and 16-year olds that concentrates on the ability to solve real-world problems using math. Language arts is a mix of multiple-choice and short-answer questions that seek to evaluate student ability to construct, extend and reflect on the meaning of what they have read across a wide range of continuous and non-continuous texts. The science component examines student knowledge and skills across both life and physical sciences in a mix of multiple-choice, short-answer questions, problem-solving and analytical essays.

Numerous explanations have evolved as to why certain nations improve and why other stagnate or decline. For example, Singapore leads all categories on the test. It is a small, prosperous nation with a culture highly respectful of education, practically devoid of unemployment and poverty and culturally homogenous. Although significantly larger in population, the other top scorers – Finland, South Korea, Japan, Hong Kong, Liechtenstein, Switzerland, Estonia, New Zealand, Taiwan, New Zealand – share the attributes of a passion for educational excellence, consistent prosperity and cultural homogeneity. Worldwide, boys outscore girls slightly in math, girls significantly outscore boys in reading and the two genders match scores in science.

By contrast, the United States has mixed messages on the value of education. In a single day students will hear numerous affirming messages from teachers, family or the media about education virtues, including feel-good movies like “Stand and Deliver,” “Mr. Holland’s Opus,” and “To Sir with Love.”. At the same time, students are inundated with pop-culture put-downs of education (think songs like Pink Floyd’s “Another Brick in the Wall,” Alice Cooper’s “School’s Out” and hundreds of rap hits like Killer Mike’s “Burn” and Lupe Fiasco’s “Words I Never Said; movies like “Fast Times at Ridgemont High, Ferris Bueller’s Day Off,” and “The Breakfast Club” all show educators to be incompetent fools and education itself as something

## 2015 PISA AVERAGE SCORES



SOURCE: OECD. \*China is represented by the provinces of Beijing, Shanghai, Jiangsu, and Guangdong

Even though the United States spends far more per student on its educational programs, US student scores in math, reading and science are stagnant in the 21st century after three decades of gradual decline in the late 20th century. Conversely, many of the world’s other nations have seen scores rise dramatically while expenditures per student are only a fraction of the US education budget. Likewise, the vast majority of nations outscoring the US utilize less technology, one of the most expensive components of the American system, and yet outperform their US peers. Clearly, factors other than money and technology are essential to educational success.



# Key MESA Initiatives Integral to Reversing the Trend

tolerable at best and worthless at worst).

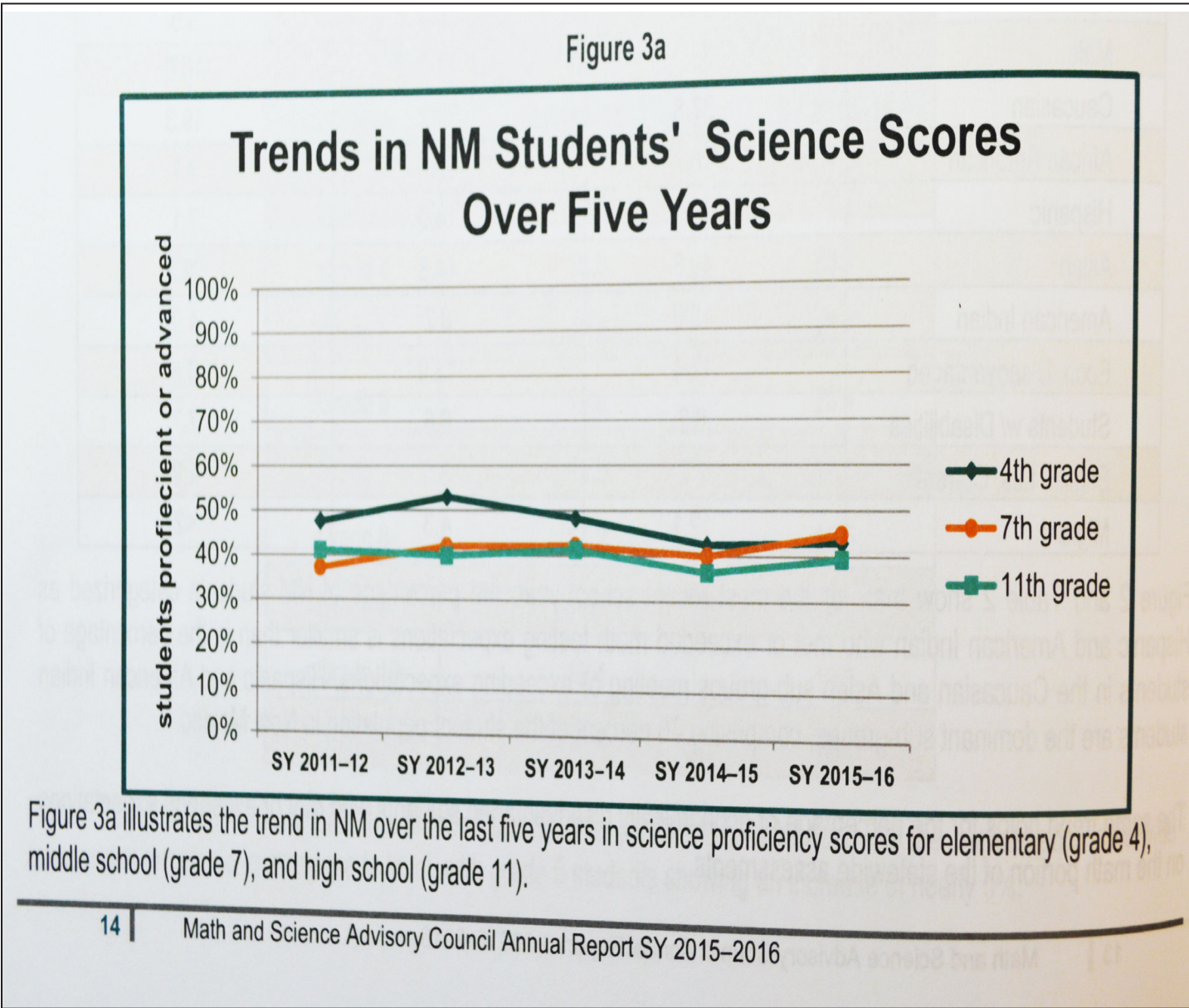
In addition, the United States is the most racially, ethnically and culturally diverse nation on the planet with nearly as much disparity in wealth. Trying to effectively teach students that come from such varied backgrounds is as challenging as it is complex. Add to that the fact that the US leads the world in divorce and nearly leads the world in children born out of wedlock and child abuse and one has a social cauldron boiling with issues that force the nation to spend more on social workers, nurses and security than other nations spend on their entire educational systems.

Abby Jackson and Andy Kiersz of The Business Insider wrote an article December 6, 2016 pointing out that the 2015 PISA results again raise questions in industry and commerce about the global competitiveness of the US educational system. The result was described as “a picture of educational stagnation” by then US Education Secretary Arne Duncan who said the result was not compatible with the American goal of having the world's best educated workers. Randi Weingarten of the American Federation of Teachers stated that an over-emphasis on standardized tests contributed to the lack of improvement in education performance. Dennis Van Roekel of the National Education Association said a failure to address poverty among students had hampered progress. Synthesizing diverse perspectives on the issue are part of the challenge of increasing student scores.

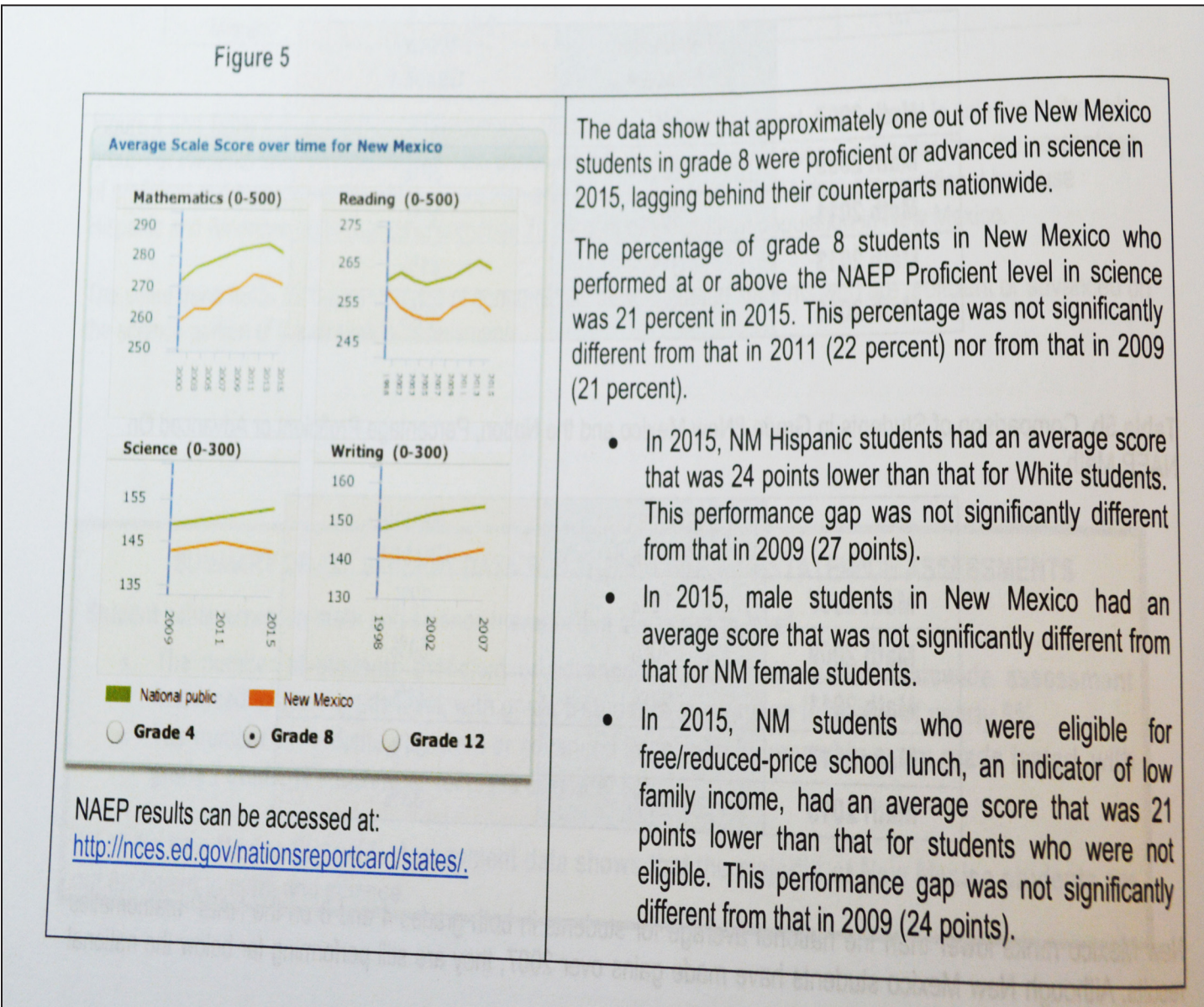
David Tow, an English teacher at Terra Linda High School, notes that there are lessons to be learned from Finland: 1) An emphasis on competence, 2) teacher-student relationship is to foster global thinking, problem solving and developing independence, 3) local autonomy in school districts to best meet the needs of resident students, 4) use school facilities for academic learning beyond regular school hours, 5) practice minimalism and thus avoid dependence on high-cost instructional materials/equipment and develop skill-based outcomes instead, 5) foster student inquiry.

Likewise, New Zealand Minister of Education Hekia Parata recently revealed to Education Weekly that her nation developed a curriculum framework of very rigorous standards to be independently addressed by each school district so as to best match individual learning styles with strategies that would maximize mastery of select concepts and skills. Teachers in diverse districts then collaborate regularly to build uniformity in achievement across the nation. As a result, New Zealand has consistently raised its scores in each subsequent PISA.

The MESA model utilizes the philosophies listed in both Finland and New Zealand. MESA emphasizes excellence in mastering competence in select concepts and skills. It teaches students to think globally in problem solving as they become independent, critical and yet collaborative thinkers. Advisors have MESA guidelines but also have the autonomy to determine how best to meet the learning styles of their respective students. School facilities are routinely used beyond the regular school day for MESA functions; indeed, some of the most fruitful learning comes during extended project-based sessions outside of class. And although MESA emphasizes the use of technology to keep pace with a changing society, the focus is on utilizing only materials and equipment essential to learn concepts and develop skills. Data already indicates MESA students outperform their peers in accordance with the above strategies. Thus, MESA strategies, although not a cure-all, could be an integral component of raising US STEM and PISA performance.



The chart above indicates that New Mexico student proficiency in science is statistically flat over the past five years. This is in spite of a 10% increase in the state education budget and the highest ratio of computers/student in state history. The chart below indicates that eighth grade NM students are performing at essentially the same level in science between 2009 and 2015. Meanwhile, the national average for eighth graders rose by seven points, about four percent. Also of significance is that NM 8th-grade male and female students perform essentially the same while Hispanic students lagged 24 points behind their White counterparts. Additional demographic data not included in the explanation indicates that this disparity is pronounced among first and second-generation Hispanic immigrants while those who have been in the US for three generations or longer differ from White students by less than five points. The most significant factor affecting NM student science scores is poverty. The chart notes that those who are eligible for free/reduced lunches score more than 20 points lower than those not eligible. What the chart does not reveal is that the number of students in NM on free/reduced lunches during the past six years nearly doubled resulting in a larger cohort of the test-takers struggling with distractions associated with poverty - broken families, child abuse, malnutrition, lack of educational support. NM ranks 50 of 51 (compared to other states and the District of Columbia) in child well being (quality of family/home life) and this deficiency is the number-one correlation with educational performance according to more than three decades of cumulative research by the Family Research Council.





# Meet Aspiring Engineer Clarizza Morales Chacon - Atrisco Heritage Academy MESA President and 2017 Selfless Senior

## Salvatore Treppiedi

Atrisco Heritage High School

Being nominated for Selfless Senior is an honor onto itself; however, being nominated by THREE teachers at the largest high school in Albuquerque is special. Clarizza Morales-Chacon, Co-President of Atrisco Heritage Academy High School MESA, is a worthy recipient who was recognized by three teachers from among more than 500 seniors for her outstanding contributions to her school, her community and the world around her.

Selfless Senior is an award that Albuquerque Public Schools bestows upon one senior from each high school who is outstanding in service to fellow students, the school, family and community. It must also be obvious that the service is linked to leadership and inspires others to lead through service.

"There are a lot of people out there that do community service," says Ms. Morales Chacon, who says she was both excited and emotional upon hearing the news. "For me to be the Selfless Senior is like a great representation of other students that do community service and help their community. It's an honor for me to represent our school community and all my peers who make a difference in not just the school but also the community itself."

Following is a sampling of comments made by her nominators:

"Clarizza demonstrates the quiet form of leadership that helps the overall organization without having to claim the spotlight," said math teacher Dr. Joseph Jung. "When she sees that something needs attention, it just magically happens without a lot of noise or attention."

Ms. Joan Leyba, chemistry teacher, explains, "It became evident very quickly that Clarissa was an exceptional young lady. Her notes were impeccable, lab reports were written with such detail, calculations were completed step by step and her conclusions were written with precision. Objectives were stated, results were well supported with data and her analysis connected her results and the purpose of the lab directly with concepts covered in class."

Finally, Ms. Diane Russell, wrote about one of Clarizza's many volunteer endeavors: "Clarizza was instrumental in our family center receiving a 4,000 grant for a food pantry from the UNM Medical School Office of Diversity. She helped write the grant and is looking forward to painting, building the shelves, and help stocking it through the Road Runner Food bank."

Included among Clarizza's many accomplishments and endeavors are:

- member of Upward Bound UNM;
- currently ranked in the top 25 of her class;
- attended a symposium at Duke University for Minority Women in Science where she attended seminars on science careers;
- has been with the MESA/Dream-Makers program for the last four years. This year, she served as Co-President. She has put in many hour beyond what is required to help the team get ready for yearly competitions by creating race cars, prosthetic arms or the Science Bowl competition in our MESA/Dream Makers club;
- chosen to be in The Health Careers Academy program through the UNM-

Medical School;

- president of the National Spanish Honor Society and a member of the National Honor Society at Atrisco;
- participating in an internship at the UNM School of Dentistry;
- an usher at her church, and helps with many of the events at the church;
- attends events with Jaguars for Positive Change including visits senior living facilities where she helps the elderly;
- first responder for the American Red Cross where she is certified in first aid, CPR & the AED.

"I had the honor of visiting with Clarissa Morales this week to congratulate her as our recipient of the APS Selfless Senior Award," explains interim principal Irene Cisneros. "She is an amazing young lady who 'loves to help anyone'. Her internal instincts to be of service are special. Her big ideas and bright smile lit up my office as they light up the classroom and I can see why she was nominated and selected."

Ms. Morales Chacon joins an impressive list of Jaguars who have been honored with Selfless Seniors awards. She understands both importance and the prestige that comes with joining such an inspiring group.

"All the past winners are great leaders in the community, but I didn't think that I could be seen as a leader as well," explained Clarizza. "I want to inspire others to continue to be their best and helping to make change. That's what being Selfless Senior means: you do something for someone else and impact someone's life and you don't have to let people know about it."

Clarizza's heart for service, combined with her outstanding performance with MESA and a stellar academic record were instrumental in her selection to attend the NM MESA Senior Incentive Field Trip (SIFT) to San Diego, California in April. Ms. Morales-Chacon is one of seven seniors from the Central Outer Region and one of just 24 students from more than 500 seniors across the state to be selected.

Finally Ms. Morales Chacon understands the importance of building relationships and how that has helped reach the place she is in today. Those relationships include the three teachers (Dr. Jung, Ms. Leyba, Ms. Russell) who nominated her.

"I'm very grateful and thankful for the relationship that I have created with each of them. I want to thank them for believing

in me and supporting me. My high school and middle career have not been very easy, and if it wasn't for the support of my teachers and counselors and the people in my family who support me and believe in me, I wouldn't be here right now."

CO Regional Coordinator Rick Cole observed that Clarizza is often the one who supports those around her.

"Having watched Clarizza participate and compete in MESA for three years, she is often the go-to woman," noted Cole. "She tends to be the leader, not because

she brashly asserts herself, but because she leads by example and others follow.

"The more I get to know her, the more I appreciate how she leads by service in so many venues. She has a bright future ahead of her because she has such a humble disposition among others while she is also making their lives better. This is true in the classroom, and it is also true in her family and the community."

All the APS Foundation Selfless Senior recipients will be honored at a ceremony to be held in April.



Photos courtesy of AHAHS (above) and Rick Cole (below)

(Above) Clarizza Morales-Chacon poses beneath an inspirational poster after being selected as the AHAHS Selfless Senior for 2017. (Below) Clarizza and her teammates Sonia Macias, Biridiana Marquez and Esther Melgar hug in between contests at the 2016 MESA Day. The foursome are competing again this year.

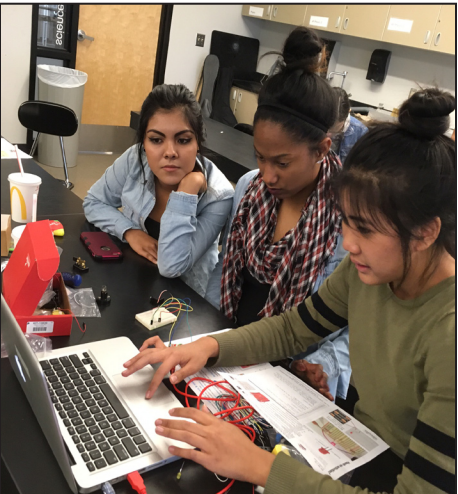






Article and photos by Kim Scheerer

## Central Inner keeps active in and out of the community



(Top) MESA students from Manzano, South Valley and East Mountain High Schools get funky at the Carlsbad Caverns Visitor Center; (above) Students at Del Norte High School collaborate on coding; (below) Students from East Mountain and NexGen Academy High Schools leap for joy on a picture perfect day at Cochiti Lake.

The urban appeal of opportunity lingers over the Central Inner region of NM MESA! With most of our schools located within a 20 minute drive of most places in the Albuquerque Metro Area... we seem to get around. Our community STEM-ventures include:

- East Mountain High School and NexGen Academy took to the land. Both schools visited, hiked, climbed, lunched, learned and skipped rocks at Kashe-Katuwe/Tent Rocks National Monument; part of the Bureau of Land Management (BLM). Students traveled north to experience the beauty that the flanks of the Jemez Caldera and Cochiti tribal culture present!
- Manzano High School, South Valley Academy and East Mountain High School students traveled to Carlsbad Caverns in the southwest part of the state. Manzano's MESA leadership team led the adventure with organization and logistics. We traveled in late November to experience the wonders of the caverns deep within the

earth without experiencing the scorching sun of summer outside the cave. Special THANKS to Mr. Duran who makes things happen!

- Amy Biehl and Del Norte High School's both demonstrated their love of electricity & coding by participating in campus workshops that overviewed series circuits, breadboards, LED's and servo coding. Students were successful with teamwork and technology!
- Raytheon, the big fancy company, worked with Van Buren Middle School students to mentor 4th and 5th graders at nearby Emerson Elementary. MESA students, grades 6-8th, worked as Technology mentors while learning about circuits and building LED hearts with Raytheon staff.
- This January, Van Buren Middle School, also took two teams to the Future Cities Competition at the UNM School of Architecture and Planning. Highlights included a chat session with the School's Dean, Geraldine Frobes!

- Valley High School MESA got their STEAM (science, technology, engineering, art and mathematics) on by visiting both the NM Museum of Natural History & Science and the Albuquerque Museum of Art & History in beautiful Old Town. Highlights included the large scale satellite photo on the museum floor where students found their homes and school and acquiring some of Mr. Goodrich's vast knowledge of dinosaurs!
- As we move towards Spring, the Central Inner region will look to capitalize on additional STEM-venture opportunities. Our partnerships with the BLM, Raytheon, local Museums, National Parks and UNM work to help show our students the many possible pathways into the world of STEM – government service, academia, industry and non-profit agencies. By the way, job opportunities in NM are most plentiful in the order just listed; more people work for the government in the Land of Enchantment proportionally than any other state.





# Do I have enough Math courses?

**Shawndeana Smith**  
*West Regional Coordinator*

There are plenty of things to remember when getting prepared for the future, which also includes getting accepted to a College or University. We at NM MESA make it our utmost priority to make sure students are prepared as possible. So we have put together a little write-up for guidance. So you may be wondering many things about your admissions requirements to the college of your choice. You are probably wondering, “What math classes do I need to get into college?” Here you go:

The University of New Mexico requires four years/units of high school math. These classes may include Algebra I, Geometry, Algebra II, and Trigonometry. Pre-Calculus, Calculus and Statistics are also accepted and are considered college preparatory courses. Take as high a level of math as possible in finishing high school.

As for the New Mexico State University, the four years/units of high school math are required as well. Accepted math courses range from Algebra I to Geometry to Calculus, if offered.

Finally, NM Tech University requires four years/units of high school math as well. However, since its focuses on degree programs that require advanced math courses, the university does highly recommend that all of their incoming freshmen complete a pre-calculus or calculus course in high school.

It is very important to know whether or not you are on the right track to getting accepted to your preferred university. Below are the phone numbers to the admissions office to the schools above in case you have any more questions.

UNM – (505) 277-0111  
NMSU - (575) 646-3121  
NM Tech – (575) 835-5424

# West Region is STEM Motivated!

**Shawndeana Smith**  
*West Regional Coordinator*

As the middle of the school year passes us by, the West Region schools are gearing up for a busy spring semester. There is an array of activities happening this spring for them. Seniors are also completing their courses and anticipating their graduations and those selected to attend the MESA Senior Incentive Field Trip are patiently awaiting their departure.

The West Region students ended their 2016 year with many activities conducted at their school sites and with various organizations. Students all took part in canned food drives, coat drives and the ever so popular children’s toy drives. There were plenty of festive fundraising opportunities organized at each school as well.

Now the West Region schools are gearing up for our annual MESA Day Competition on the UNM Campus set for two days in March. Students and advisors will likely be using their time over the next two months to complete their arms, technical papers, and presentations. There will also

be many hands-on workshops and activities to assist them with gaining the skills and knowledge for their projects as well as for future studies and even careers.

Many schools will also be engaging in STEM field trips to various locations in the northwest. Students will be visiting museums and universities to learn more about opportunities available to them. The West Region also hosted a STEM Day at San Juan College.

On February 16th, STEM Day at San Juan College involved all middle schools and high schools in the West Region. San Juan College organized tours to their Math, Science and Technology Departments along with a tour of their famous Planetarium. Schools also took part in a mini-competition for their completed prosthetic arms. This was a good opportunity for them to see firsthand what the MESA Day competition will be like.

As usual, it was a fun, jam-packed semester for all MESA Day students and it is certain that these opportunities are all beneficial to their educational endeavors



Photo by Nick Kunz

Students bask in the sunshine illuminating the colorful Rio Mora National Wildlife Refuge during a multi-day exploration and study of a NM icon of natural beauty.

# NC Region explores wild and urban parks

**Nicholas Kunz**  
*NC Regional Coordinator*

Students in MESA’s North Central Region have participated in a number of exciting events this year. In early September, an inaugural regional event called the North Central Region Community Kickoff was held at Rio Mora National Wildlife Preserve in Northern New Mexico. This event was the first of its kind in NM MESA’s long history of facilitating meaningful student learning, and was designed as an intensive few days of workshops and fun to generate enthusiasm for the year among MESA students.

Students spent the two days at Rio Mora National Wildlife Refuge immersed in exploration and investigation. They participated in teambuilding games and experienced workshops and exploration with the Nature Conservancy and the Denver Zoo. They had free time to relax in nature and socialize with students from different schools, and camped under the late summer New Mexico sky. Additionally, they visited Fort Union National Monument, heard a lecture by U.S. Fish and Wildlife

Service, and hiked to nearby petroglyphs while learning regional plant and animal ecology along the way. Finally, they contributed to the future of the refuge by participating in a service learning project to prevent erosion.

In late October, select schools also participated in the NC STEAM Day at Santa Fe’s Railyard Park and SITE Santa Fe. Students started off the day with an inspiring tour of the Railyard Park, learning about its advanced and modern design and carefully planned sustainability features. They also participated in a number of workshops demonstrating properties of soil types, identification, and pH measurement, while simultaneously connecting the concepts to composting, and ultimately the use of compost in agriculture. The service learning project for the day involved collection of late fall organic matter to add to the park’s composting program. After lunch, students learned about Artistic and Curatorial Innovation, while receiving a tour at SITE Santa Fe, a contemporary art museum, in the midst of its Biennial series, titled SITE-lines.

# MESA Christmas Celebration is Festive – Great People, Great Food, Great Fun!

**Helena Kirkwood**  
*NM MESA Bookkeeper*

For Christmas 2016, the New Mexico MESA staff, families, and especially children, enjoyed an awesome gathering at the Chama River Brewing Company. They had a wonderful, rather private, party space and an excellent menu.

The 3 course menu included a delicious assortment of appetizers and entrees

- Three Course Dinner Menu
- Appetizer (2 of each)
  - Hummus with Flatbreads and Vegetables
  - Chicken Satays
  - Cornmeal Crusted Calamari
  - Truffled Bleu Cheese Fries

- Entrée choices (plus one vegetarian option on the night of):
- 8 oz. Prime Rib-slow roasted with buttermilk mashed potatoes, mixed vegetables, au jus and creamy horseradish
  - Orecchiette and Sausage – Orecchiette and Italian spicy and sweet sausage, sautéed fresh rosemary, tomato and cream
  - Grilled American Kobe Meatloaf - served with buttermilk mashed potatoes, mixed vegetables, smoked tomato butter and crispy onions
  - Beer Battered Fish & Chips -Atlantic cod in Class VI Lager batter with

- hand-cut fries & Napa slaw
- San Ysidro Grilled Salmon - with green chile cheddar hominy, green beans, avocado cream, and pea spouts
- Kim Scheerer did and tremendous job of coordinating with the restaurant so that all were pleased with their choices.
- Rick Cole and Shawndeana Smith selected and purchased gifts for all the children. The kids looked sparkly eyed and happy with their gifts and there were lots of oohs and aahs as they went up to receive their gifts. Great choices, they looked to be specific gifts for each child and definitely age appropriate.
- We really missed Terry Ramirez and her

family (the weather was not cooperating so Terry chose to drive back home to El Paso as the forecast was for ice and snow). Also sadly missed, Betty Chancey and Sonny, another loss to us due to the inclement weather and long drive back to Roswell.

I’m sure we spent at least 2 or 3 hours eating and chatting and then we started table-hopping to have more fun and conversations with others. The dessert was chocolate fondue, definitely conducive to table hopping and sharing as well as delicious.

The party broke up about 9 pm with satisfied and sated MESA staff heading home for the weekend after a busy all-day-long staff meeting culminating in our terrific Christmas Party 2016.



Photos by Rick Cole (left) Blake Smith is excited to hold a new toy; (center) Kimi Allen Scheerer dips fondue with the Kunz girls and RaLee Smith while Nick Kunz ponders how late his girls will be sugar-hyper that evening; (right) Paloma Kunz grins as she prepares to dig into a perfect bowl of macaroni and cheese.





North and North Central Regions  
Demonstrate Leadership  
in Epic“Exploration of Prosthetics Leadership Summit”

Nicholas Kunz  
NC Regional Coordinator

Students in NM MESA’s North and North Central Regions journeyed to New Mexico Highlands University in Las Vegas, NM on Monday, November 14, 2016 for a collaborative day packed full of excitement and experience known as the Leadership Summit. The day was an exploration of PROSTHETICS. How are they created? What careers are available in related fields? How can MESA students help create opportunities and accommodations for people across the world in need of prosthetic limbs? Attendees also learned about other interesting careers relating to STEM fields, rounding out their day and inspiring them to become leaders in their schools and communities. Attending MESA programs hailed from Mora Middle and High Schools, Robertson High School, Bernalillo High School, West Las Vegas Middle and High Schools, Santa Rosa Middle and High Schools, Espanola Valley High School, Anton Chico Middle School, Carlos F. Vigil Middle School, Memorial Middle School, and Santo Domingo Middle School. Students rotated among an inspiring variety of hands-on workshops. Dr. Elizabeth Dirk and her colleagues from UNM Biomedical Engineering and UNM

Orthopedics department, presented a fascinating workshop exploring the production of prosthetics, entitled Engineering the Human Body. Altiora Media ‘s workshop on drones (Aerial Media Company), one of the favorites of the day, explored current drone technology, including hardware and software, and provided students the opportunity to fly a drone high above the Student Center at NMHU. Among the other popular sessions were NM Highlands University’s Nanoscience professors and students, Laser technology from Francisco Apodaca, STEM Director at Luna Community College, and MESA’s own Alejandra Carmona who presented Prosthetics Party! The Prosthetics Party gave students the opportunity to explore simple designs and technology relating to prosthetic limbs while simultaneously providing a fun and engaging environment for collaboration. NM MESA values leadership and with that come other components such as community service. As part of this leadership, NM MESA partnered with LIMBS International to give back to a person in needing a prosthetic limb. At the event, each school donated funds and individually fundraised to be able to provide a prosthetic leg to someone.



NM MESA Changes Lives of 22 Amputees!

Terry Ramirez  
SW Regional Coordinator

As part of New Mexico MESA, students get to participate in service learning. This year New Mexico partnered with LIMBS International to raise funds for amputees. The funds would give an amputee in a third- world country a prosthetic leg. New Mexico MESA rose up to the challenge and was able to raise enough funds by selling socks to change the lives of 22 amputees! Trevor Bergman, Executive Director at the time said, “New Mexico MESA is amazing and is leading the way in philanthropy by using STEM as an opportunity to make the world a better place.” Students sold socks through ‘SOCKTOBER’ and for every 75 packs sold a prosthetic leg could be purchased. The students also received a pair of warm socks for ev-

ery pack sold for their local homeless shelter and this year students in New Mexico donated over 1,600 socks to local shelters throughout the state! This initiative helped at the local and global level. We had great participation from all over the state, especially North, Central Outer, Southeast and Southwest. CC Snell Middle School in Bayard, NM raised enough funds to change 4 peoples’ lives- the most for any one school! GREAT JOB CC Snell!!! We at NM MESA are very proud of all the students and Advisors for participating in our statewide service learning opportunity. Mr. Bergman has seen how much we value service learning and has developed wehelptoo.com, where students can help raise funds for the charity of their choice and continue to help locally and globally.

SE Region Plans “Sumo;” Thanks Sponsors

Betty Chancey  
SE Regional Coordinator

Like all MESA schools, the Southeast Region MESA programs have been working hard to finalize their Prosthetic Arms, Technical Papers, Posters, Oral Presentations, Budget and Receipt reports in preparation for MESA Day. In addition to working on MESA Day events, three MESA programs in Carlsbad, NM have planned, organized and set in motion the creation of a new Robotics competition for participation by Southeast Region high schools and middle schools. Hopefully, the event will expand and be open to other regions in the next year or so. “SUMO On the Pecos” will require teams to build a robot designed to push another robot out of a circle. The first robot to push its competitor over the boundary of the circle wins that round. Robots cannot be designed to damage other robots. This event is open to both High Schools and Middle Schools. A Play Day is being offered on Saturday Feb 25th . Teams may bring their robots and practice with other teams in preparation for the actual competition which will be held on Saturday, April 8, 2017. Awards will be given.

gion would like to sincerely thank the following agencies for their continued support of the Southeast Region MESA programs: Devon Energy donated \$20,000 for the Devon Achievement Award for a MESA senior graduating from a MESA program in Eddy or Lea Counties and planning to pursue an engineering degree. This is the 3rd year of this prestigious award. The student recipient will be selected by April 1st and will receive \$2500 per semester for eight semesters if required academic progress is maintained. Information on submission of applications will be distributed this week and posted on our web site. Navajo Refinery – Holly Frontier Corp recently donated six new Lego Educations Robotics kits to the Artesia High School MESA program. Xcel Energy donated \$750 to Berrendo Middle School for the purchase of Robots. These donations made it possible for these two schools to participate in the new SUMO on the Pecos competition and possibly RoboRave. “Thank You” Devon Energy, Navajo Refinery – Holly Frontier Corp and XCEL Energy for your continued support of the Southeast Region MESA programs. You are greatly appreciated!

MESA participants in the Southeast Re-



Students gaze skyward as they launch and watch drones fly over the New Mexico Highlands University Student Center during the NC-NO Leadership Summit.

2017 SIFT is bound  
for San Diego, Sun and Surf!

Anita Gonzales, State Events Coordinator

The Senior Incentive Field Trip for this year has been scheduled for April 5-8, 2017 to San Diego, California. 24 seniors and 4 advisor chaperones from the NM MESA Programs statewide have been selected to participate. This year’s trip will include visits to the San Diego Zoo, SeaWorld San Diego, Balboa Park, Torrey Pines State Natural Reserve, the Fleet Science Center, and more. Students will participate in educational hands on programs at all locations including SEACAMP San Diego and local industry and college locations. Congratulations to all attendees selected to participate:

Region	First Name	Last Name	School
Central Outer	Clarizza	Morales-Chacon	Atrisco Heritage Academy
Central Outer	Christopher	Gallegos	Atrisco Heritage Academy
Central Outer	Caitlin	Baca	Belen High School
Central Outer	Felicia	Baca-Griego	Belen High School
Central Outer	Mekiel	Olguin	Belen High School
West	Randy	DeGroat	Crownpoint High School
West	Oscar	White	Crownpoint High School
Southwest	Iliana	Viscarra	Las Cruces High School
Southwest	Jonathan	Baca	Las Cruces High School
Central Inner	Casey	Haynes	Manzano High School
Southwest	Lachlan	Boyd	Mayfield High School
North	Alejandro	Montoya	Mora High School
North	Jack	Rains	Mora High School
North	Warren	Roybal	Mora High School
West	Nizhoni	Tallas	Navajo Preparatory School
Southeast	Alejandro	Olvera	Roswell High School
Southeast	Sydney	Annala	Ruidoso High School
Southeast	Sidney	Davis	Ruidoso High School
Southeast	Chloe	Elliott	Ruidoso High School
Central Inner	Liberty	Sanborn	Valley High School
Central Inner	Julia	Whitten	Valley High School
North	RayVen	Gonzales	West Las Vegas High School
Central Outer	Rocio	Amaya	West Mesa High School
Central Outer	Guadalupe	Moreno	West Mesa High School
ADVISOR	Michael	Boyle	Robertson High School
ADVISOR	Sariah	Bujanda	South Valley Academy
ADVISOR	Kaelin	Redmond	Mayfield High School
ADVISOR	Chelsey	Servantes	Belen High School



Photos courtesy of San Diego Chamber of Commerce

NM MESA students who earned the option to participate in SIFT will visit, explore and learn in a variety of venues in San Diego, deemed the city with the best overall climate of any city in the contiguous United States. Students will be outdoors conducting marine biology studies in the Pacific Ocean as well as exploring wildlife and nature in Torrey Pines State Park, Sea World and the San Diego Zoo.



# 2017 MESA Day Event is MESA USA Qualifier Extraordinaire

**Anita Gonzales**

*State Events Coordinator*

Attention MESA participants: Middle School MESA Day is Friday, March 17, 2017 at the University of New Mexico and High School MESA Day is Saturday, March 18 at the University of New Mexico

The NM MESA, Inc., Annual State-wide Math and Science MESA Day is designed to encourage the concept of problem solving through teamwork. It salutes NM MESA students for their commitment to academic excellence and reinforces the NM MESA mission of preparing students from historically underrepresented ethnic groups for college majors and careers in math, engineering and science.

This year we will be inviting all of our school programs to participate. We have split our event into a high school and middle school event and are anticipating approximately 400-600 attendees at each. Our entire event will consist of the multiple portions of the Prosthetic Arm Engineering Design Challenge. Some will be graded on site, and some will need to be judged prior to the competition.

MESA Day will be the qualifying event for the National MESA USA Competition. The Prosthetic Arm Challenge 2.1 involves the development of a low-cost prosthetic device with integrated computer science components to complete a set of predefined tasks. Teams will compete in the three components below:

Performance – Teams will research, design, build, test and compete using a prosthesis designed to complete the following tasks:

- Distance Accuracy Task: greatest distance and accuracy achieved by throwing bean bags into the Target Zone in the fastest time. (Middle School and High School)
- Object Relocation Task: fastest time achieved by placing objects into and removing objects from the specified container. (Middle School and High School)
- Dexterity Task: greatest number of bolts and nuts correctly placed and secured onto the testing device in the fastest

## NM Tech Field Trip Reveals “Value” of Tech Education

**Rick Cole**

*CO Regional Coordinator*

The success of NM Tech is no longer a secret. The world renowned university, formally titled The New Mexico Institute of Mining and Technology, has long had a reputation for stellar academics as its graduates have transformed scientific research, engineering and even entrepreneurship. And yet it is not only the least costly of New Mexico's four-year liberal arts universities, it is one of the least expensive universities in the nation.

As a result, NM Tech has been selected as the “best” university in the nation for “educational value” by the Princeton Review on several occasions and consistently ranks among the top 15 colleges in the nation for value (tuition paid vs. education received and resulting salaries earned). This consistent performance has attracted students from all 50 states and more than 40 foreign nations to earn undergraduate and graduate degrees. Indeed, NM Tech ranks among the top 15 universities in the nation whose undergraduate students go on to earn doctorates. And the university is in the top five in the nation for the ratio of graduate students to undergraduate students.

New Mexico MESA has partnered with NM Tech for more than three decades to give MESA students a tour of the facilities, introductions to faculty and students and



*Photo by Rick Cole*

**Cibola sophomore Bailey Dodson practices during last year's MESA Day as teammate Patrick Busey watches. Dodson, now a junior and President of the Cibola HS MESA Club, is back in action to defend her all-around MESA Day state championship award last year as well as compete for MESA USA honors.**

experiences in the institution's classrooms, laboratories and student services buildings. November 16 was the date that nearly 100 students from the Central Inner and Central Outer regions toured NM Tech this school year.

Students saw first-hand the more than \$20 million that has been spent over the past decade on building new facilities and upgrading iconic structures. Students were introduced to the college in one of the many conference rooms in the Fidel Student Union Building, a state-of-the-art venue which won several awards for its innovative design. The introduction to Tech included an overview of admissions procedures, financial aid options and an overview of its numerous trend-setting engineering and technology degree programs.

Students even witnessed how NM Tech been instrumental in changing the way the U.S. government conducts homeland security, resulting in the termination of scores of terrorist intrusions and plots in America before they could be conducted. The college's research on explosives engineering and numerous innovations on counter-terrorism have also benefited state and city police departments around the nation in fighting crime. Many of these innovations have been highlighted routinely on such TV programs as Mythbusters, National Geographic Explorer, BBC Horizons and PBS Nova.

This is in addition to the world-renowned research and discoveries made in astronomy at the Very Large Array, meteorology at the Langmuir Laboratory on Magdalena Ridge, climate change at the NM Tech Research Station in Antarctica, tobacco and drug addiction in biochemistry, advanced coding in computer engineering and numerous patents in mechanical, electrical, civil and environmental engineering. Truly, hundreds of articles could be written on all that has been discovered and achieved scientifically on the campus let alone by its graduates in industry and government research around the world.

Professors in mechanical and environmental engineering introduced students to some of the concepts they could learn in these programs if they chose NM Tech. Actual electrical engineering students demonstrated projects they completed which enable them to master the concepts of circuitry and power to solve some of the vexing problems facing manufacturing industries and transportation.

For those who are intrigued by rocks, and even those who are not, the Rock and Mineral Museum in the NM Bureau of Geology building offered the state's most comprehensive collection of minerals. Los Lunas High School Advisor John Davies noted that “I could spend all day in the museum – what a magnificent and stunning collection!”

time. (High School Only)

- Design efficiency: greatest ratio of device performance to device weight plus receipt submittal and documentation. (Middle School and High School)

Technical Paper – Teams will submit a technical paper which examines all aspects of their design process, all major design choices and related STEM concepts.

Academic Poster and Oral Presentation - Teams will present academic posters to a panel of judges and will then respond to judges' questions. The posters should include items such as data (e.g., charts, tables and graphs), photographs, drawings, other ideas, and any necessary written explanations which help to explain their final design's features and quality, including incorporation of Arduino programming and components.

New Mexico MESA is the defending national champion in both the high school and middle school division as Deming High School and Red Mountain Middle School won those titles respectively in the summer of 2016. Competition will be more intense than ever as this will be the largest MESA USA event ever staged in New Mexico. This year's winners will get to compete in Philadelphia, Pennsylvania the third week of June for the 2017 national championship.

Prizes will be given to the first, second and third place winner in each category of competition as well as to the overall winners. The general public is invited to spectate at both the performance competition and oral presentations, although seating is limited in the presentation rooms. Parking is readily available on the UNM campus for the event as MESA Day takes place during UNM's spring break.

We are looking for over 60 judges and volunteers at each of our events, in addition to 75-100 volunteers prior to the event. Judges and volunteers do not need to have technical expertise or previous knowledge as all of our volunteers will be trained on events. If you are interested in volunteering, please visit our volunteer page at: <http://www.nmmesa.org/event/mesa-day-2017-volunteer-information/>.

“I was amazed at Tech's degree programs,” explained West Mesa High School senior Guadalupe Moreno, who as President of the WMHS MESA Club, led a contingent of Mustang students on the MESA tour. “Students do so much at Tech. It would be a great place to learn for those who want to be engineers.”

“NM Tech was already on my radar as a great school,” added Troy Denton of Valencia High School. “But after seeing the campus and getting to watch what students do, it is no wonder the school is considered one of the best.”

“I am very excited that our MESA students got to tour NM Tech,” added Belen High School MESA Advisor Chelsey Servantes. “Students not only got to see what a great school it is academically, but that it also has good food, good dorms and lots to do on campus to make the college experience as fun as it is worthwhile.”

Food was the final experience for students on the tour as they ate lunch in the cafeteria in the Fidel Student Center. Students were able to choose from a wide variety of entrees as well as side-dishes, salads and desserts. “I could come to NM Tech just for the food,” joked Clarizza Morales of Atrisco **Heritage Academy**.

Every year, NM Tech ranks as one of the top choices for NM MESA seniors in choosing a college education. It is no doubt that the tour will yield new frosh.





Photos by Rick Cole

(left) CO middle school students race to place a frog in a tic-tac-toe diagram where the first player to arrive can rearrange the pieces as teammates must be aware of an ever-changing game scenario; (right) Valencia middle school students explain the science of composting with worms before providing each school with their own worm kit.

# Central Outer Region is STEMendous!

**Rick Cole**  
*CO Regional Coordinator*

Although there have been a few cold spells in central New Mexico this winter, the overall temperatures have been warmer than normal. Could it be that the “hot” performances of Central Outer regional students in NM MESA have been changing the climate? They are certainly changing the climate of learning STEM in the Land of Enchantment.

CO students have done STEM research at the Very Large Array, the world’s largest radio astronomy telescope. They have also toured NM Tech, New Mexico State University and competed in the New Mexico Brain Bee and a regional engineering challenge at Los Lunas High School. This supplements the three dozen prosthetic arms that are being prepared for MESA Day, numerous workshops on a wide variety of topics (including wildlife biology, tower building, edible cars, game design, code writing, etc.).

Nearly 50 CO students participated in the annual NM MESA Field Trip to NM Tech November 16. Students were able to visit classrooms, laboratories, the gymnasium, dormitories, conference rooms, the state mineral museum and the Fidel Student Center cafeteria, where they ate

a delightful lunch featuring more than a dozen entrees. Students saw firsthand how a STEM education at NM Tech is rigorous but fun, inexpensive but with the highest average starting salaries and long-term salaries of its graduates in comparison to any other NM college. Indeed, NM Tech ranks among the top 15 universities in the nation in job placement and salaries.

Advisors in the region learned new strategies and practical methods to prepare students for 21st-century high tech jobs at a workshop presented in conjunction with the December Regional Advisors Meeting at the University of New Mexico Valencia Campus. STEM Career Specialist Sarah Clawson of the UNM-VC reviewed how jobs are changing, what careers are evolving and which strategies teachers should employ to prepare middle school and high school students for an increasingly technical society. This was especially pertinent in light of the fact that 30% of today’s jobs did not exist 30 years ago and 50% of the jobs predicted to be available in 2047 do not exist today.

Besides learning STEM concepts, CO students have been learning and practicing leadership. The 2017 Middle School Leadership Summit was conducted at the UNM-VC January 27. A total of 77 Students not

only learned how to lead meetings, teach others and organize activities, they also demonstrated leadership in the science behind recycling, planning for future careers, problem solving and the long-term implications of STEM-based legislation by local and state government. Students were even able to tour the campus and see why the UNM – VC is the largest satellite campus in both enrollment and facilities of all UNM branch institutions.

CO students also set the pace in student selection for the annual NM MESA Senior Incentive Field Trip. Although the CO is only one of seven regions in the state, it has seven of the 24 students selected to participate in the SIFT. This is nearly 1/3 of all attendees or roughly twice as many as its natural allotment. This select group includes Caitlin Baca, Felicia Baca-Griego and Mekiel Olguin of Belen High School, Clarriza Moralez-Chacon and Christopher Gallegos of Atrisco Heritage Academy and Rocio Amaya and Guadalupe Moreno of West Mesa HS. These students will be joined by Belen MESA Advisor Chelsey Servantes and 17 other students and three other advisors from around the state to engage in a series of engaging and fun STEM activities in and around San Diego, California during the first week of April.

Community Service has also been a big part of CO endeavors in the winter. Besides numerous food and clothing drives for the less fortunate, CO students also ministered to those in hospitals and nursing homes, enhanced the environment at the Valle del Oro National Wildlife Refuge, cleaned school grounds and community centers, spread Christmas cheer and even sold enough socks through the SOCKTOBER fundraiser of LIMBS International to purchase four artificial limbs for real amputees who needed them. These efforts were supplemented by the writing of 280+ letters to state legislators in conjunction with the January 31 MESA Day at the NM State Legislature.

“You know, we’re all busy,” explained Los Lunas High School MESA senior Owen McCaffrey. “But no matter how busy we get, it is always good and always fun to be involved in MESA. I am so glad that I have had the opportunity to be active in MESA. I’ve learned so much and had so much fun. It kind of makes the craziness of high school tolerable because everything in MESA has a purpose and helps give me direction for the future.”

That is one insightful quote on how the CO Region has been STEMendous through the winter season.



Photos by Rick Cole

(left) Jose Velasquez of Valencia High School showcases his prosthetic arm his team built with a 3-D printer; (center) Taylor Wright of Belen Middle School submerges his “spud in a sub” to see if his potato compartment is truly water-proof; (right) Tito Martinez & Kevin Armijo of Valencia HS, aka “Baked Beans,” showcase first-place ribbons after winning the VC MESA Challenge.



## VISION

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