Legislative Finance Committee
Program Evaluation Unit

Science, Technology, Engineering and Math (STEM) : Degree Production and Employment Outcomes

May 12, 2016

Report #16-05

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David Abbey
Director

May 12, 2016

Dr. Barbara Damron, Secretary
Higher Education Department
2044 Galisteo Street, Suite 4
Santa Fe, NM 87505

Dear Secretary Damron:

On behalf of the Legislative Finance Committee, I am pleased to transmit the evaluation, *Science, Technology, Engineering and Math (STEM): Degree Production and Employment Outcomes.* The evaluation analyzed the effectiveness of incentivizing STEM education and explored how higher education can leverage education and research assets to more effectively create economic opportunity for STEM graduates.

This report will be presented to the Legislative Finance Committee on May 12, 2016. An exit conference to discuss the contents of the report was conducted with the Higher Education Department on May 10, 2016.

I believe this report addresses issues the Committee asked us to review and hope New Mexico's education system will benefit from our efforts. We very much appreciate the cooperation and assistance we received from your staff.

Sincerely,

David Abbey, Director

Cc: Senator John Arthur Smith, Chairman, Legislative Finance Committee
Representative Jimmie C. Hall, Vice-Chairman, Legislative Finance Committee
Dr. Tom Clifford, Secretary, Department of Finance and Administration
Mr. Timothy Keller, State Auditor
Mr. Keith Gardner, Chief of Staff, Office of the Governor

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EXECUTIVE SUMMARY

High tech industries have created 65 percent of new jobs since the recession and their employees earn twice as much as the average worker outside the industry. However, while New Mexico is ranked 1st in high tech resources like Ph.D. scientists and federal research dollars per capita, the state is 50th in high tech employment growth since 2000, at negative 30 percent.

High tech industry growth is predicated on innovation, and science, technology, engineering, and math (STEM) education is identified nationally as the driving component of innovation in the 21st century. STEM education is incentivized in the state's higher education funding formula and the innovation cycle largely begins at New Mexico's research institutions, according to the Economic Development Department. The objective of this evaluation is to evaluate STEM degree production and innovation development at higher education institutions. It measures the effectiveness and benefit of incentivizing STEM education, examines the efforts by institutions to incorporate innovation and entrepreneurship into student learning outcomes, and examines how institutions leverage their role as drivers of innovation into economic opportunity for New Mexico.

STEM graduates working in the high tech industry in New Mexico have a median salary of $49 thousand, $8 thousand higher than any other field in any other industry.

New Mexico higher education institutions are underproducing STEM graduates for an average high tech economy. Approximately 2,600 STEM students graduate each year for 4,600 high tech job openings, estimated from Department of Workforce Solutions projections and Brookings Institute data on average high tech job growth in the U.S. The high tech industry in New Mexico hires a lower percent of STEM graduates from New Mexico institutions than expected, compared to the industry national average, and the state struggles to retain top out-of-state talent, as out-of-state STEM students who graduate from New Mexico institutions are half as likely to be employed in New Mexico.

Despite shortages of STEM workforce production, STEM graduates working in New Mexico have the highest salaries outside of the health fields. In particular, STEM graduates working in the high tech industry have a higher median salary than graduates from any other field in any other industry. While costs for educating STEM graduates are higher than for non-STEM graduates, the additional costs provide a measurable return on investment to the state.

The additional cost of STEM education is recovered by the state within 4 years of graduation from taxes on the higher salaries of STEM associate graduates.

Universities nationwide are transitioning their educational delivery, research, and administrative services to align with educating and commercializing innovation. New Mexico institutions have been commercializing intellectual property for years, but are in the nascent phases of incorporating innovation into their education models and lack a coordination of efforts. UNM and NMSU are in the bottom quartile of their peers for the percent of total research dollars that come from corporate sponsored funding. Additionally, comparing corporate funded research dollars among UNM's peer institutions shows a statistically significant difference between peers that have institutionalized the leveraging of their research strengths into corporate partnerships versus those that have not. However, there is no evidence that innovative research is being effectively utilized in New Mexico by institutions or the state as a strategic asset to foster economic investment and interest from corporations at the national or international level. The report recommends that higher education institutions leverage education and research outcomes to more effectively attract and partner with private high tech industry.

KEY FINDINGS AND RECOMMENDATIONS

The number of students graduating in STEM has increased each year, but at a slower rate than non-STEM. Higher education awards conferred in the STEM fields increased by 32 percent from 2009 to 2014 while the number of awards in non-STEM fields increased by 47 percent over the same time period, dropping the STEM share of all awards from 17 percent to 15 percent.

Higher education institutions are underproducing STEM graduates for an average high tech economy. An average high tech industry will open 4,600 jobs per year that require a STEM degree in New Mexico and institutions are only producing 2,600 STEM graduates per year.

Incentivizing STEM Education Pays for Itself but the State is Underproducing STEM Degrees for an average High Tech Economy

The high tech industry in New Mexico hires a lower percent of STEM graduates from New Mexico institutions than expected from the industry national average. The difference between employment of New Mexico STEM graduates versus the national average is 20 percentage points less in New Mexico's high tech industries.

Graduates that did not attend high school in New Mexico are 20 percent more likely to major in STEM and three times more likely to receive an advanced degree compared to their native New Mexico counterparts. While this may indicate that state institutions are attracting top out-of-state talent, the high tech industries in New Mexico are struggling to employ gradutes from out-of-state. Thirty-seven percent of Ph.D. STEM graduates from out-of-state are employed in New Mexico versus 65 percent for their in-state counterparts.

The median salary for STEM graduates one year after graduation is $37 thousand, second only to allied health graduates at $41 thousand. STEM graduates working specifically in the high tech industry have higher salaries, at $49 thousand, than graduates from any other field or industry.

Undergraduate STEM education brings a direct and measurable return on investment to the state. Increased wages for a graduate with an associate degree in a STEM field produce a direct return on investment over their lifetime for the general fund of $17 for every one extra dollar spent on their STEM education. Conservatively estimated, STEM bachelor graduates produce an ROI of $2, over their lifetime.

Incorporating innovation into university culture is nationally recognized as a necessary strategy for effective 21st century education and economic prosperity. Universities nationwide are transitioning their educational delivery, research, and administrative services to align with educating and commercializing innovation. Opportunities for faculty and students to engage in interdisciplinary innovation is a key component of learning outcomes in the 21st century. Best practices in innovation look to facilitate unpredictable intellectual interactions, called collisions, across academic disciplines and demographics.

Institutions are beginning to incorporate Innovation into Education and Research Outcomes but Lack a Coordination of Efforts

New Mexico institutions are engaged in the nascent phase of incorporating innovation into their education and economic development models. UNM's nascent Innovate Academy registers interested students from all majors into programs and courses taken together that are designed to promote interdisciplinary innovation and entrepreneurship. NMSU has redesigned the programmatic features of its Arrowhead Center to integrate more fully into the university's innovation cycle, including offering services to students, faculty, and businesses like technology commercialization, access to university research facilities, and business development.

There is no evidence that innovative research is being effectively utilized in New Mexico by institutions or the state as a strategic asset to foster economic investment and interest from corporations at the national or international level. UNM and NMSU are in the bottom quartile of their peers for the percent of total research dollars that come from corporate sponsorsed funding. However, comparing corporate funded research dollars among UNM's peer institutions shows a statistically significant difference between peers that have institutionalized the leveraging of their research strengths into corporate partnerships versus those that have not. None of New Mexico's higher education research universities have institutionalized corporate research partnerships. As a consequence, there is no formal process where relationships with private industry are established, coordinated, and maintained at the institutional level.

Recommendations

The Legislature:

- Consider reallocating funds for the initial implementation and development of consolidating corporate relations at the higher education research institutions, from other funds currently used for economic development that LFC analysis indicates may be ineffective or inefficient on a cost-per-job basis.

Institutions of Higher Education:

- Continue to incorporate innovation into their education models, using nationally developed best practices for doing so. Innovation should be implemented through the strategic plan and mission of the institution, primarily for the purpose of improved student learning outcomes.

- Consolidate and coordinate all corporate relations under one office, including the following corporate interactions with the institution:
    - Corporate Sponsored Research
    - Use of University Laboratories and Equipment
    - Access to Student Talent
    - Philanthropic Investment
    - Workforce Development
    - Technical and Scientific Services
    - Technology Transfer and Licensing
    - Corporate Partnerships
    - Infrastructure Development and Relocation Opportunities

- Work with HED and WSD to seek feedback from the high tech industry in New Mexico to better understand if a greater proportion of the industry's STEM hires come from out-of-state, and if so, why.

- Continue to normalize degree requirements to 60 credits for associate degrees and 120 credits for bachelor degrees in order to reduce the cost of STEM education and time to completion.

The Higher Education Department:

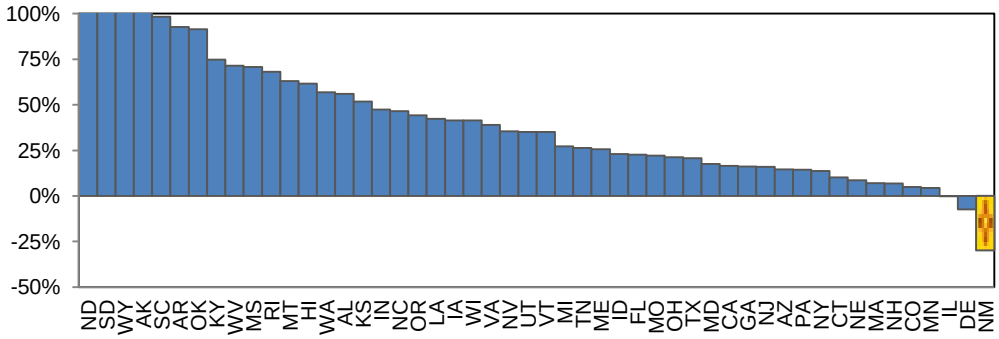
- Evaluate the possibility of further incentivizing STEM education in the funding formula, considering the measurable rate of return on the investment.

New Mexico Ranks 1st in per Capita Ph.D. Scientists and Engineers and Federal R&D Monies, but 50th in High Tech Job Growth

Nation. Graduates in the science, technology, engineering, and math (STEM) fields rank among the highest in earnings and employment rates. High tech jobs utilizing the skills of STEM graduates are in growth industries and have a large multiplier effect on the economy. A 2015 report by the Brookings Institute notes that high tech industries have created 65 percent of new jobs since the Great Recession. The high tech industry is defined by the Brookings Institute as having research and development (R&D) spending per worker in the 80th percentile of all industries, as well as a greater than 21 percent share of their workforce with a high degree of STEM knowledge. Nationally, inflation adjusted earnings grew 63 percent since 1975 in high tech industries, compared to 17 percent outside the sector, and 2.2 domestic jobs are created for every new high tech job (0.8 locally and 1.4 outside the region). In recognition of the benefits of high tech jobs, New Mexico incentivizes STEM degree production in higher education funding and focuses economic development preferentially in the high tech sector.

New Mexico. According to U.S. Census data, employment in the high tech industry has increased 22 percent nationwide since 2000, while New Mexico high tech employment has declined 30 percent, from 25 thousand to 18 thousand workers, 23 percentage points lower than any other state as shown in Chart 1. In particular, the Albuquerque metropolitan area ranked 99th out of the 100 largest metropolitan areas in high tech job growth from 2010 to 2013, according to the Brookings Institute. These low rankings come in spite of New Mexico ranking 1st nationally in per capita Ph.D. scientists and engineers and 6th in science and engineering graduate students according to *Innovation and Technology in the 21st Century*, a report by the New Mexico Economic Development Department (EDD). New Mexico ranks 2nd in federal R&D spending as a percent of GDP, at $3.5 billion according to the National Science Foundation, with the vast majority of research monies going to the three higher education research institutions and the three national laboratories.

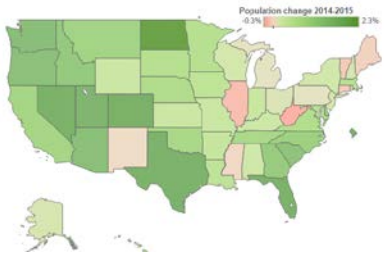
Chart 1. Change in High Tech Industry Jobs 2000 to 2012



Source: US Census

New Mexico is one of six states, and the only state in the southwest, to lose population in 2015, while Texas, Arizona, and Colorado were among the highest in population growth. A search for jobs and affordable housing were the reasons for two-thirds of the long-distance moves over the year, according to Pew Research. With the high tech industry having the highest job growth sector in the country, according to Brookings Institute, it also has the highest impact on employment opportunity and therefore the ability to stem a net out-migration trend that is fueled by lack of economic opportunity.

2015 Migration Patterns



Source: Governing Magazine

State Policies. The New Mexico Legislature has enacted several policies in statute in an effort to promote high tech economic development. For example, the Legislature has promoted commercialization and development through the Research Park Act, collaboration through the Technology Research Collaborative, investment through the Angel Investment Tax Credit, workforce development through the Job Training Incentive Program, and industry relocation through the Local Economic Development Act. Table 1 shows current, annual tax expenditures enacted in statute that have a direct financial impact on the high tech industry. The average annual tax expenditure was calculated from the five year trend presented in the New Mexico Taxation and Revenue Department's 2015 Tax Expenditure Report. In total, the Legislature has enacted 33 laws containing $242 million in annual tax expenditures incentivizing high tech economic development.

Table 1. High Tech Industry Tax Incentives

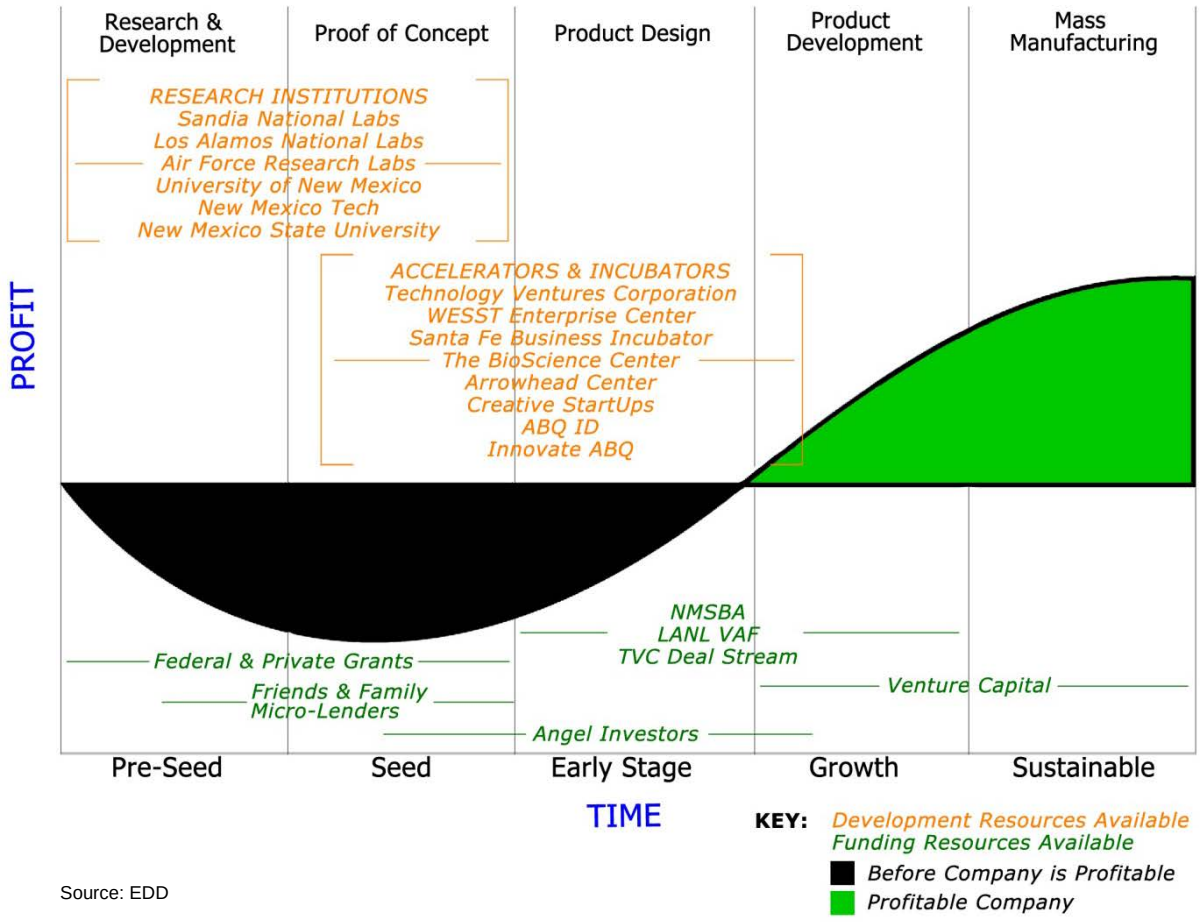
Credits and Deductions	Average Tax Expenditure (in millions)
Advanced Energy	$5.50
Aircraft Sales or Services	$0.10
Alternative Energy Product Manufacturers	$0.05
Angel Investment	$0.40
Apportionment Election of CIT	$3.00
Coal Exemption	$25.00
Electric Transmission and Storage Facilities	$0.01
Electricity Conversion/Exchange	$0.00
Fuel for Space Vehicles Exemption	$0.00
Geothermal Ground-Coupled Heat Pump	$0.60
DOD Directed Energy and Satellites	$0.00
High-Wage Jobs	$70.00
Hosting World Wide Web Sites	$0.40
Investment	$10.00
Jet Fuel Fifty-Five Percent	$7.00
Laboratory Partnership with Small Business	$5.00
Locomotive Engine Fuel	$20.00
Molybdenum, Potash, and Timber Rate Differentials	$4.00
Renewable Energy Production	$12.00
Tractors, Aircraft, and Motor Vehicles	$9.00
Sale of Software Development Services	$3.00
Solar Energy Systems	$2.00
Solar Market Development	$3.00
Spaceport-Related Activities	$0.10
Sustainable Building	$3.00
Technology Jobs and Research and Development	$9.00
Test Article	$0.00
Uranium Hexafluoride and Uranium Enrichment	$50.00
Venture Capital Investment	$0.00
Wind and Solar Generation Equipment	$0.00
Total	**$242.00**

Source: TRD

In addition to statute, the executive has several policies focusing on high tech industry growth and workforce needs. For instance, EDD focuses largely on economic development of high tech industry and the Higher Education Department incentivizes STEM education in the instruction and general funding formula. The majority of key industries targeted by EDD are in high tech areas because of New Mexico's "rich environment for technology commercialization via 3 national laboratories, 3 renowned research universities, and many nonprofit research institutions," according to the department. In FY15, New Mexico spent 13.5 percent of higher education performance funding, or $5.6 million, on STEM and health outcomes and produced 3,625 STEM and health degrees, generating an average of $1,550 per degree.

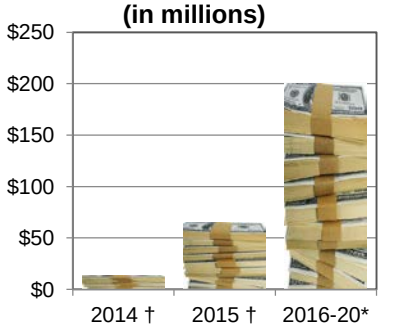
Innovation. While economic development in New Mexico has several important components that focus on starting new companies, expanding existing companies, or relocating out-of-state companies at institutional, municipal, regional, and statewide levels, the scope of this evaluation is focused on efforts by higher education institutions to promote economic opportunity through education and innovation. Innovation creates economic opportunity by bringing new ideas to the marketplace, typically brought about through a cycle of identifying problems, proposing and developing solutions, and testing and marketing results. A 2015 evaluation commissioned by EDD on state-funded innovation programs refers to Chart 2 as a representation of the innovation cycle in New Mexico.

Chart 2. Innovation Cycle in New Mexico



Source: EDD

Annual VC Investment in NM (in millions)



Source: †Consumer Technology Association
*Innovate New Mexico

According to the 2016 Innovation Scorecard from the Consumer Technology Association, New Mexico ranks 35th in tax friendliness, 38th in entrepreneurial activity, 44th in internet speed, 41st in high tech workforce per capita, 37th in venture capital dollars invested per capita, and 45th in STEM degrees awarded per capita. The report does note that venture capital investment in New Mexico quintupled from 2014 to 2015 but uses an average that doesn't fully include the increase in the rankings. Incorporating the increase, New Mexico would rank in the top 25 of states for venture capitalism in 2015 at $32 per capita, or a portfolio of $64 million.

Venture capital funding is currently above average and significantly increasing in New Mexico. According to a presentation by Sun Mountain Capital at the inaugural Innovate New Mexico Technology Showcase in April 2016, there will be a combined $1 billion in venture capital investment available in New Mexico over the next five years because of $40 million per year in venture capital matching funds expected to be made available by the State Investment Council combined with a private investment multiplier of three to five times the matching funds. Additionally, $20 million in matching seed money will be made available through the EDD Office of Science and Technology, called the New Mexico Catalyst Fund. In the last year, $300 thousand in funding to commercialize technology developed by New Mexico's national laboratories and research institutions was awarded through the Technology Research Collaborative; $300 thousand was awarded to entrepreneurial activities from the non-profit Kauffman Foundation; $144 thousand was awarded to developing high tech businesses by the Los Alamos Venture Acceleration Fund; and STC.UNM, the University of New Mexico's (UNM) tech-transfer and economic-development organization, became an associate partner of Osage University Partners, a venture capital firm that raised over $215 million for investments in 2015 by partnering over 70 academic institutions with 40 venture capitalists nationwide.

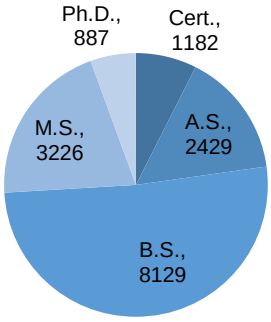
Evaluation Purpose. STEM education is identified by many organizations as a driving component of 21st century innovation (c.f. *National Action Plan*, 2007, National Science Foundation; *STEM Proficiency: A key Driver of Innovation*, 2014, U.S. News and World Report). STEM education is incentivized in New Mexico through the higher education instruction and general funding formula, and the innovation cycle in New Mexico begins at the research institutions, as mentioned above. Therefore, this report evaluates STEM degree production and innovation development at higher education institutions. It measures the effectiveness and benefits of incentivizing STEM education, examines the efforts by institutions to incorporate innovation and entrepreneurship into student learning outcomes, and examines how institutions leverage their role as drivers of innovation into economic opportunity for New Mexico.

Incentivizing STEM Education Pays for Itself but the State is Underproducing STEM Degrees for an Average High Tech Economy

The total number of New Mexico students graduating in STEM each year has increased, but at a slower rate than non-STEM.

The analysis in this chapter relies almost exclusively on a data set provided by the New Mexico Higher Education Department (HED) which matches HED data to Department of Workforce Solutions (DWS) data. HED compiled the DWS data, built a series of coding queries to ensure that the HED and DWS data accurately connected to each other, and then refined the resulting data set before providing it to the LFC. This data set contains information on every graduate from every public higher education institution in New Mexico from 2009 to 2014, including their major, highest level of degree awarded, credits upon graduation, employment in New Mexico, salary, industry code of employer, and where they graduated high school. This data set does not include employment information for self, contract, or out-of-state employment, nor does it include information on state of birth or residency. Science, Technology, Engineering, and Math (STEM) graduates are defined by the majors that HED has adopted as STEM, and allied health graduates are excluded from this definition for the scope of this report, in large part because an LFC evaluation of health workforce outcomes was published in 2013.

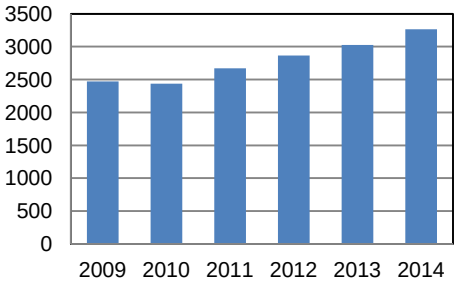
STEM Awards, 2009-14



Source: HED

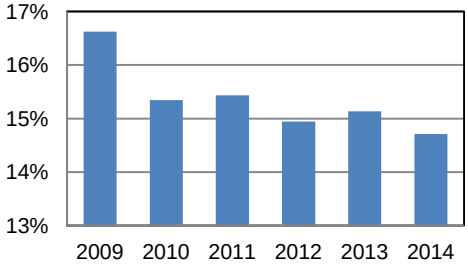
The number of higher education STEM awards received per year has increased by 32 percent from 2009 to 2014, including all degree types from certificates to doctorates, as can be seen in Chart 3. This compares to an increase of 47 percent for non-STEM awards over the same time period, lowering the share of STEM awards from 17 percent to 15 percent. Institutions graduated 15,911 unique STEM students from 2009 to 2014, an average of 2,652 graduates per year, about 50 percent of whom received a bachelor degree, with the rest earning certificates, associates, masters, and doctorates.

Chart 3a. All STEM Awards



Source: HED

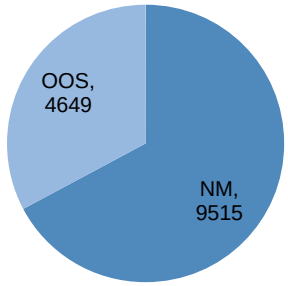
Chart 3b. STEM Percent of all Awards



Source: HED

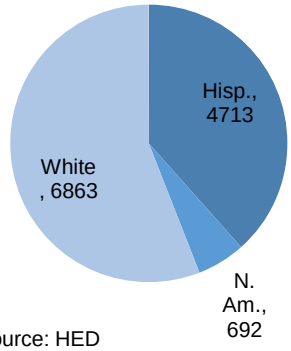
STEM awards have increased similarly for all demographics at all institutions, for all undergraduate award types, and in all STEM fields. Awards for Hispanic students increased the fastest, at 90 percent. Of all white graduates, 16 percent major in STEM, while 12 percent of all Hispanic and Native American graduates major in STEM. Chart 4 shows the percent of all graduates within each demographic that major in STEM, as well as the percent of all STEM graduates that earn an advanced degree (masters or doctorate). Chart 4 also includes this information for students who attended high school in New Mexico and those that attended high school out-of-state (NM versus OOS in the chart). Thirty percent of all STEM graduates who did not attend high school in New Mexico are receiving advanced degrees, versus 12 percent of all STEM graduates from New Mexico high schools. Of white STEM graduates, 24 percent earn advanced degrees while for Hispanic and Native American STEM graduates, 11 percent earn advanced degrees. Native American STEM graduates are the most likely to be employed in New Mexico at 67 percent, and are working for the lowest median salary of $32 thousand. White STEM graduates are the least likely to be employed in New Mexico at 59 percent, and are working at the highest median salary of $39 thousand.

STEM Graduates, 2009-2014



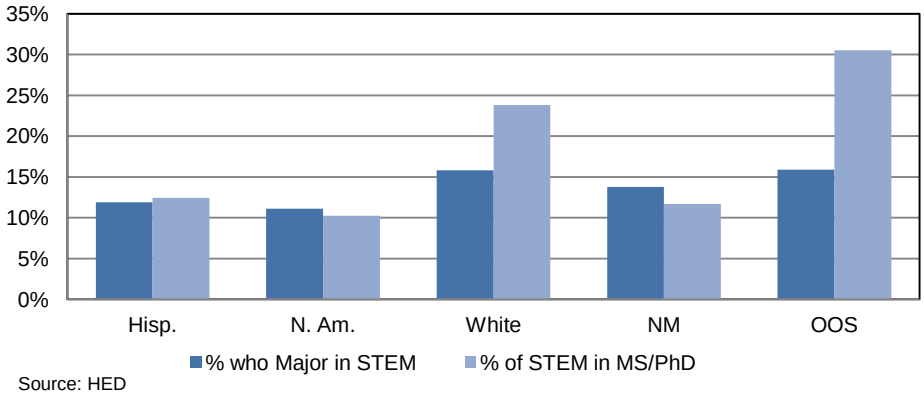
Source: HED

STEM Graduates, 2009-2014



Source: HED

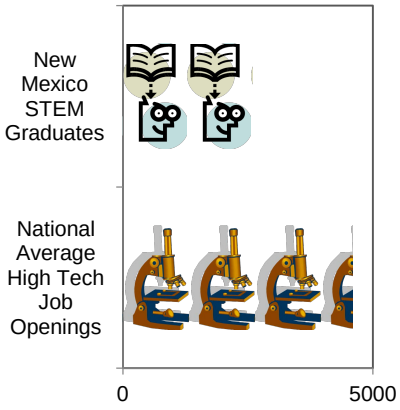
Chart 4. Participation in STEM by Demographics



Source: HED

Higher education institutions are underproducing STEM graduates for an average high tech economy.

2016 STEM Graduates and High Tech Job Openings



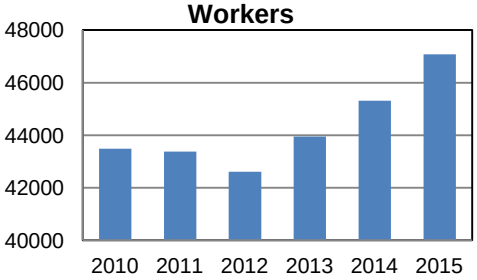
Source: HED and Brookings Institute

The 2015 State of New Mexico Workforce Report predicts 30 thousand total job openings per year in the state, 10 thousand of which are expected to come from new jobs with the remaining 20 thousand created from workers leaving their occupation, according to the New Mexico Department of Workforce Solutions. If replacement job openings reflect the current distribution of STEM employees in New Mexico (6 percent) and new job openings reflect the national average of high tech job growth since the recession according to the Brookings Institute (34 percent of new jobs requiring a STEM degree since the recession), then 4,600 jobs per year will require a STEM degree in New Mexico; however, institutions are under-producing STEM graduates (2,652 graduates for 4,600 job openings).

New Mexico has been adding STEM jobs since the recession and the amount of STEM graduates staying to work in New Mexico has been increasing. The STEM workforce has added an average of 1,100 new jobs per year since 2012 according to analysis of U.S. Bureau of Labor Statistics (BLS) data and from 2010 to 2015 the percent of STEM graduates working in New Mexico increased from 50 percent to 60 percent, as seen in Chart 5. To be clear, BLS data reports the occupation of workers, which is not the same measure as the industry they are working in. For example, a computer administrator for an art studio is a STEM worker in the art

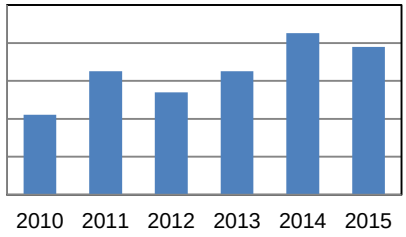
industry, while an illustrator for a semiconductor manufacturing company is an art worker in the high tech industry.

Chart 5a. New Mexico STEM Workers



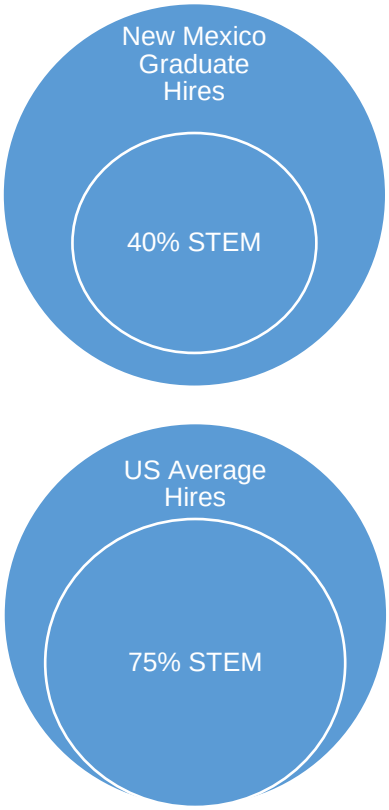
Source: BLS

Chart 5b. Percent ofSTEM Graduates Employed in NM



Source: HED and DWS

Chart 6. Computer Systems Design Industry



New Mexico high tech industries hire a lower percentage of the STEM share of their workforce from New Mexico institutions. The high tech industry in New Mexico hires a lower percent of graduates with STEM degrees from New Mexico institutions than expected from the industry national average. For example, the diagram in Chart 6 shows this effect for the computer systems design industry. That is, 75 percent of the workforce holds a STEM degree in computer systems design companies nationwide, but only 40 percent of New Mexico graduates hired by computer systems design companies in New Mexico hold a STEM degree. On average, the difference between employment share of New Mexico STEM graduates versus the national average is 20 percentage points less in New Mexico's high tech industries. The cause of this finding is unclear, but it may indicate that New Mexico high tech industries prefer to hire STEM graduates from other states. Alternatively, it may mean that high tech companies in New Mexico require a less STEM-knowledgeable workforce. Table 1 shows the number of all New Mexico graduates hired by New Mexico high tech industries from 2010 to 2015 and compares the percent hired who graduated in STEM to the national average, as adopted by analysis from Brookings Institute. The information presented in Table 1 is limited to industries with 50 or more hires of New Mexico graduates from 2010 to 2015.

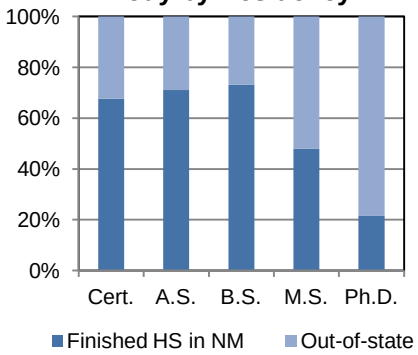
Table 2. STEM Share of High Tech Industry Employment, 2010-15

NAICS	Industry	NM grads hired	% STEM of NM grads hired	US Average STEM	Difference
5416	Tech. Consulting	275	39%	39%	0%
2211	Power Generation	222	45%	47%	-2%
2122	Ore Mining	106	45%	48%	-3%
3344	Semiconductors	212	42%	50%	-8%
5413	Engineering	828	66%	74%	-8%
3399	Miscellaneous	65	9%	23%	-14%
3364	Aerospace	71	44%	60%	-16%
2111	Oil and gas	199	37%	58%	-21%
5417	Scientific R&D	2171	51%	73%	-22%
5172	Wireless	494	8%	40%	-32%
5415	Computer Systems	418	40%	75%	-35%
6215	Medical labs	521	14%	50%	-36%
5191	Other Information	58	3%	40%	-37%

Source: HED and DWS and Brookings Institute

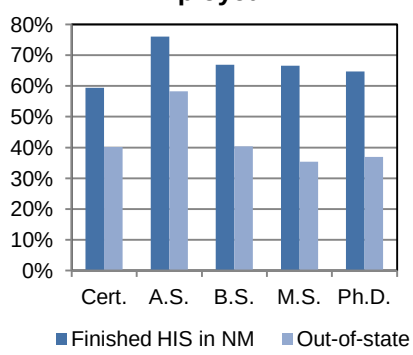
STEM graduates from out of state are far more likely to receive advanced degrees and far less likely to be employed in New Mexico. Graduates who did not attend high school in New Mexico are 20 percent more likely to major in STEM and three times more likely to receive an advanced degree compared to their New Mexico high school graduate counterparts, as seen in Chart 7. Seventy-two percent of all Ph.D. STEM graduates did not attend high school in New Mexico, and this demographic is dominated by students from outside the U.S. Of all master and doctorate graduates who did not attend high school in New Mexico, 55 percent are from another country. Thirty-seven percent of Ph.D. STEM graduates from out-of-state are employed in New Mexico versus 65 percent of their in-state counterparts. Of all STEM degree-types, STEM graduates who attended high school in New Mexico are over 50 percent more likely to be employed in New Mexico and are making $4 thousand more than their out-of-state counterparts.

Chart 7a. STEM Student Body by Residency



Source: HED and DWS

Chart 7b. STEM Graduates Employed in NM

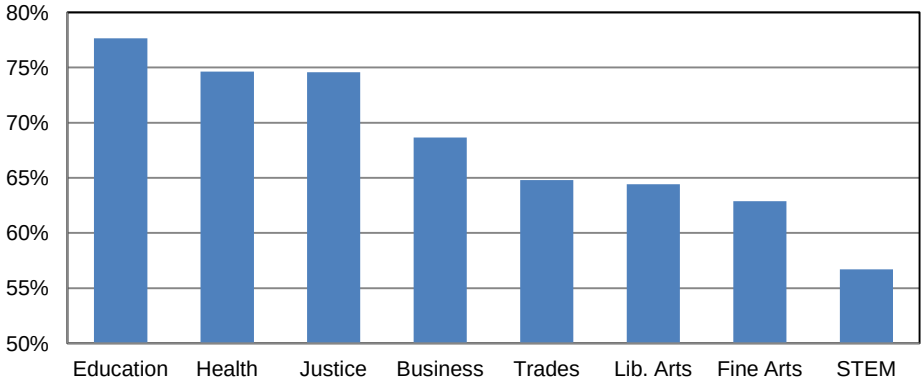


Source: HED and DWS

STEM graduates working in New Mexico have the highest median salary outside of the health fields.

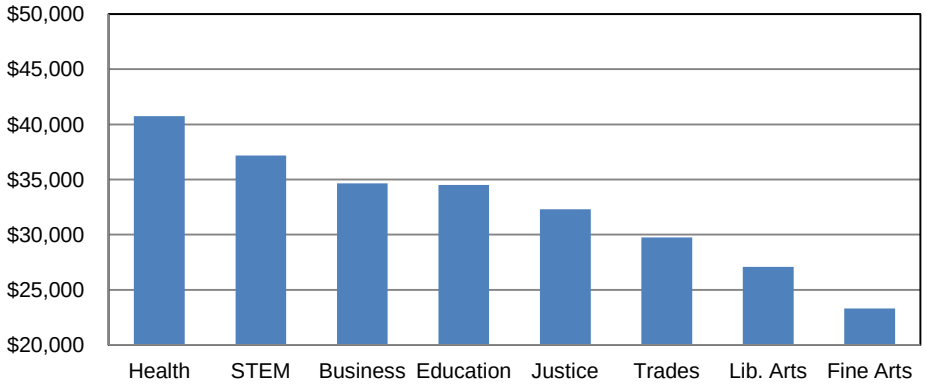
The median salary for STEM graduates one year after graduation is $37 thousand, second only to allied health which is $41 thousand, as shown in Chart 8b. Graduates in education, health, and law are the most likely to be working in New Mexico, at rates around 75 percent, compared to 57 percent for STEM graduates, as shown in Chart 8a. Graduates with an associate degree are the most likely STEM graduates to be employed in New Mexico, at 70 percent, but this decreases to 40 percent for STEM doctorate graduates.

Chart 8a. NM Employment Percent by Field



Source: HED and DWS

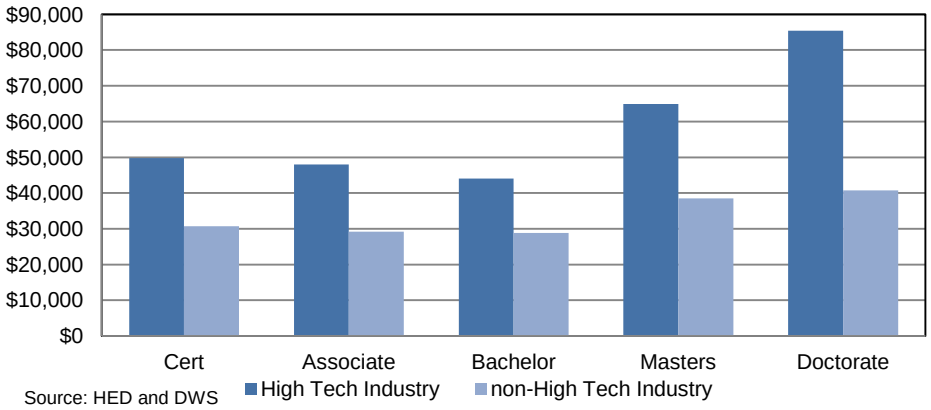
Chart 8b. Median Salary in New Mexico by Field



Source: HED and DWS

STEM graduates working in the high tech industry have higher salaries than graduates from any other field in any other industry. For STEM graduates working specifically in the high tech industry in New Mexico, the median salary increases significantly to $49 thousand, surpassing salaries in the allied health fields by $8 thousand. Non-STEM graduates working in the high tech industry in New Mexico also see a large pay raise from $32 thousand if working outside the industry to $39 thousand inside of it, underscoring the importance of the high tech industry as a robust and valuable component of the economy. Chart 9 illustrates how salaries for STEM graduates increase by nearly 60 to 100 percent when working in the high tech industry in New Mexico, depending on the level of degree awarded. The high tech industry that dominates New Mexico STEM employment, hiring 43 percent of all STEM graduates working in the industry, is scientific research and development (i.e. national laboratories and research institutions).

Chart 9. Salaries of STEM Graduates in New Mexico



Source: HED and DWS

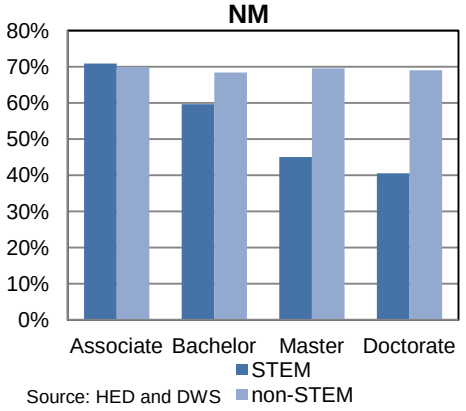
Costs, credits earned, employment, and salaries vary by several factors across institutions, for the same degree. For STEM associate degrees at two-year institutions, the average New Mexico employment rate is 71 percent, ranging from 40 percent to 80 percent. For STEM bachelor degrees, average New Mexico employment is 60 percent, ranging from 50 percent at the New Mexico Institute of Mining and Technology (NMT) to 90 percent at Northern New Mexico College. Median salaries for STEM graduates working in New Mexico vary the most for associate degrees, ranging from $25 thousand at The University of New Mexico - Valencia to $66 thousand at New Mexico Junior College. Salaries are highest for graduates from institutions located near the extraction industries and Los Alamos. NMT STEM graduates have the highest salaries in New Mexico among the research institutions, but also the lowest New

Mexico employment rates. Employment rates and salaries for each institution are shown in the appendix.

Median instruction and general (I&G) spending per degree awarded varies by a factor of five and total credits completed upon graduation varies by 30 credits between institutions. New Mexico Junior College has the lowest spending per associate degree at $11 thousand while Northern New Mexico College has the highest at $49 thousand. Spending per degree is calculated by dividing the total I&G budget of the institution by the total number of student credit hours (SCH) completed at the institution, in order to estimate cost per credit. This number is then multiplied by the median SCH completed by graduates upon award of their degree. Spending per bachelor's degree at four-year institutions ranges from $37 thousand at Eastern New Mexico University to $81 thousand at NMT. I&G spending per degree for four-year institutions and select two-year institutions is shown in the appendix

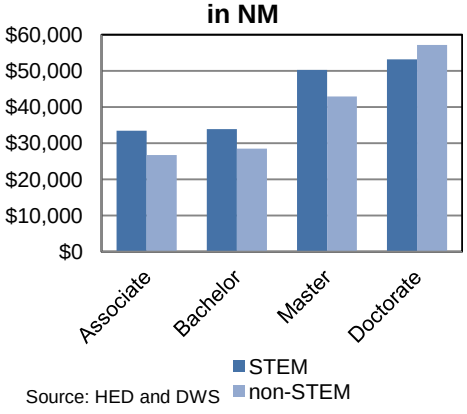
At 56 percent, Mesalands Community College (MCC) has the highest percent of its graduates majoring in STEM than any other two-year institution by a factor of three. However, MCC also has the lowest New Mexico STEM employment rate (43 percent) by 20 percentage points, the lowest percent of its STEM graduates from New Mexico (41 percent) by 18 percentage points, and the highest spending per STEM associate degree among two-year institutions ($29 thousand) by $3,000 per graduate.

Chart 10a. Employment in NM



Source: HED and DWS

Chart 10b. Median Salaries in NM



Source: HED and DWS

Undergraduate STEM education brings a direct and measurable return on investment to the state.

The employment rates and salaries of STEM and non-STEM graduates by degree type are shown in Chart 10. The larger salaries for STEM graduates at all degree types except for doctorate-level can be seen, as well as the sharp drop off of STEM employment in New Mexico by degree type. The median I&G spent to produce an associate degree is $18,300 for STEM versus $17,100 for non-STEM and non-health (STEM-H). For bachelor degrees, the median cost is $52,600 for STEM versus $46,300 for non-STEM-H. When considering median salaries of recent graduates, the state pays an additional $1,200 for STEM associates but the graduate receives the benefit of an additional $6,700 in income versus non-STEM-H graduates. At a marginal tax rate of 5 percent, the state recovers its extra investment in STEM associate degrees within 4 years of graduation. Assuming a graduate works for 35 years at 3 percent annual salary growth, a STEM associate graduate will be making an additional $19 thousand in income upon retirement compared to a non-STEM-H graduate. The cumulative additional tax revenue for the state over this time period produces a direct return on investment (ROI) for the general fund of $17 for every one extra dollar spent on producing associate STEM degrees. For a STEM bachelor graduate, the state pays an additional $6,300 but the graduate earns an additional $5,300 in income one year after graduation, or an additional $15 thousand in income upon retirement, compared to non-STEM-H graduates. Taking into account that STEM bachelor graduates are less likely to be employed in New Mexico compared to their non-STEM peers, the additional costs of educating STEM bachelors are recovered by the state in 20 years, an ROI of $2. These estimates are meant to be conservative, and do not include analysis of US Census data that indicates bachelor salaries diverge and increase from associate salaries a few years after graduation. Analysis from the University of New Mexico indicates that bachelor salaries differentiate from $1 thousand more than associate one year after graduation, to $5 thousand more 7 years after graduation.

It is not possible to calculate the cost of master and doctorate degree production from the data set used for this report. However, as STEM masters graduates earn $7 thousand more than non-STEM-H, the additional cost of graduating STEM masters would have to be $14 thousand for the state not to have a direct, positive ROI from tax revenue on their increased earnings, even taking into account the lower rate at which STEM masters graduates are employed in New Mexico. Doctoral STEM graduates earn less than their non-STEM-H peers, and so the state does not see a direct financial return on investment for Ph.D. STEM education. It should be noted however, that STEM Ph.D. salaries will look arbitrarily low one year after graduation because 45 percent of STEM Ph.D. graduates take low-salary postdoctoral positions according to the National Science Foundation.

Recommendations

HED, WSD, and higher education institutions should seek feedback from the high tech industry in New Mexico to better understand if a greater proportion of the industry's STEM hires come from out-of-state, and if so, why.

Higher education institutions should continue to normalize degree requirements to 60 credits for associate degrees and 120 credits for bachelor degrees in order to reduce the cost of STEM education and time to completion.

HED should evaluate the possibility of further incentivizing STEM education in the funding formula, considering the measurable rate of return on the investment.

Institutions are beginning to incorporate Innovation into Education and Research Outcomes but Lack a Coordination of Efforts

Transitioning to a culture of innovation at universities is nationally recognized as a necessary strategy for 21st century education and economic prosperity.

Publications like the National Science Foundation's National Action Plan and organizations like the Organization for Economic Co-operation and Development's (OECD) Centre for Educational Research and Innovation, have called for a 21st century education model centered on innovation and inter-disciplinary learning outcomes in order to prepare an effective workforce for the future. That is, while the 20th century economy was driven by technological advancements in specialized fields like telecommunications, digital computing, and organic chemistry, the 21st century economy is expected to be driven by interdisciplinary innovations between these fields like mobile internet, advanced robotics, and next-generation genomics. Opportunities for faculty and students to engage in interdisciplinary innovation at higher education institutions are therefore a key component of learning outcomes in the 21st century. Furthermore, commercialization of innovative research and development is a natural byproduct of such an educational model. Universities nationwide are therefore transitioning their educational delivery, research, and administrative services to align with educating and commercializing innovation. A succinct description of this transition and how it fits into the mission of higher education can be found in the overview of Duke University's Innovation and Entrepreneurship Initiative:

"[Duke] reimagines the role of the university in modern society, away from an institution whose work ends with the creation of ideas and toward one whose work begins with those ideas… As we begin the 21st century, our university continues to evolve toward an institution that values the translation of knowledge…to practical application that betters the human condition… We will achieve this goal by providing the educational and material resources that enable innovation and entrepreneurship…"

Examples of promoting innovation at the University of New Mexico's (UNM) peer institutions include the University of Utah Innovation Scholar program which teaches undergraduates about the process of innovation, the University of Texas at Austin Innovation Center which provides students and faculty access to business development resources, and the University of Oklahoma Innovation Hub which provides students and faculty with open access to workshops and equipment designed for facilitating innovation. Best practices in innovation look to facilitate unpredictable intellectual interactions, called collisions, across academic disciplines and demographics. The latest academic research has developed sophisticated techniques to measure these interactions and has discovered that they are positively correlated with increased economic output (c.f. *Network Diversity and Economic Development*, 2010, Science; *The Origins of Scaling in Cities*, 2013, Science).

New Mexico institutions are engaged in, but in the nascent phase of, incorporating innovation into their education, research, and economic development models. In New Mexico, UNM's nascent Innovate Academy registers interested students from all majors into programs and courses taken together that are designed to promote interdisciplinary innovation and entrepreneurship. The plan of Innovation Academy is to begin by incorporating

innovation into the classroom, then eventually into whole degree programs. The pending Innovate ABQ project, a partnership between UNM, local government, and business, is focused on developing space in downtown Albuquerque for UNM's Innovate Academy and technology transfer offices as well as potential future public-private partnerships. Innovate ABQ's strategy is to facilitate collisions between students, faculty, and industry that can lead to marketable innovation through collaborative research and development. Central New Mexico Community College has built an initiative downtown called the STEMulus center where students can access equipment for innovation and take fast-paced Cyber Academy courses in information technology. New Mexico State University (NMSU) has redesigned the programmatic features of its Arrowhead Center to integrate more fully into the university's innovation cycle, including offering services to students, faculty, and businesses like technology commercialization, access to university research facilities, and business incubation and acceleration.

The New Mexico Research Park and Economic Development Act allows higher education institutions to create tax-exempt corporations to develop research parks, including facilities and real property, to promote scientific, educational, and economic development opportunities. UNM and NMSU have developed large research parks as a result of the legislation, the UNM Science and Technology Park, and NMSU's Arrowhead Park, respectively. However, the research park websites indicate that about half of the parks' tenancies are occupied by contractor, non-profit, or government organizations. While the Research Park Act has demonstrably been effective at real estate development, it is not clear how effective it has been at incentivizing innovation in New Mexico without significant and serious commitment to programmatic investment by host institutions. For instance, STC.UNM, UNM's technology transfer office located at their research park, received over 40 patents, generated $1.5 million in licensing income, and created 10 start-up companies from UNM research in FY15. The number of start-ups created by STC.UNM ranks in the top quartile of its peers and the number of patents awarded ranks UNM the 42nd top university in the world in patents according to the Intellectual Property Owners Association. Therefore, while the UNM Science and Technology Park alone has not made a clear impact on private high tech industry growth, STC.UNM has been a successful program for technology transfer at UNM and provides evidence that development may need to be leveraged by coordinated programs to be successful. Likewise, the Vice President of Economic Development at NMSU created a *Strategic Business Plan* in 2012 that called for specific, programmatic changes to Arrowhead in order to promote student involvement and business incubation at Arrowhead. NMSU is now in the process of consolidating all aspects of commercializing innovation for businesses, researchers, and students through one portal at Arrowhead Center.

Innovative research in New Mexico is not being effectively utilized by institutions or the state as a strategic asset to foster economic investment and interest from corporations at the national or international level.

Corporate interaction is a natural byproduct of STEM innovation because of its commercialization potential, but New Mexico institutions do not bring in as much corporate sponsored research funding as their peers, nor have they explicitly coordinated corporate relations as their peers have. New Mexico's three research institutions received a combined $411 million for research in FY14 with a total of $14.4 million, or 3.5 percent, funded through corporate sponsored research. New Mexico Tech (NMT), which carries out research for a large amount of weapons testing contracts, received a plurality of the corporate sponsored research dollars in

the state. Table 3 compares corporate sponsored research dollars among UNM's self-identified list of peer institutions for FY14, sorted by percent of total research dollars from corporate sponsorship. UNM and NMSU are in the bottom quartile.

Table 3. Corporate Sponsored Research at UNM's Peer Institutions

Institution	Total Research (in thousands)	Corporate Sponsored Research	Corporate Sponsored Research	Established Corporate Relations Office
U. Texas, Austin	$585,251	12.2%	$71,349	Y
U. Colorado, Denver	$411,020	9.0%	$36,800	N
U. Houston	$140,597	8.3%	$11,700	N
Texas A & M	$854,214	8.3%	$70,607	Y
U. Utah	$486,140	7.8%	$37,697	Y
Texas Tech U.	$159,308	5.7%	$9,052	N
U. California, Riverside	$133,558	5.1%	$6,839	Y
U. Oklahoma, Norman	$253,344	5.1%	$12,910	Y
U. Nebraska, Lincoln	$278,299	4.3%	$11,920	Y
U. Kansas	$301,534	4.2%	$12,704	Y
Oklahoma State U.	$126,543	3.9%	$4,992	Y
U. Iowa	$449,147	3.8%	$17,183	N
Arizona State U.	$426,651	3.6%	$15,518	Y
U. Colorado, Boulder	$379,475	3.5%	$13,159	Y
U. Tennessee	$179,041	3.4%	$6,069	Y
U. Missouri, Columbia	$237,266	2.8%	$6,707	Y
U. Arizona	$588,088	2.8%	$16,372	Y
U. Texas, El Paso	$79,537	2.5%	$2,014	N
Florida International U.	$132,531	2.5%	$3,337	N
U. New Mexico	$228,849	2.4%	$5,582	N
U. Texas, Arlington	$89,175	2.2%	$1,986	N
New Mexico State U.	$134,262	1.7%	$2,225	N
U. Nevada, Las Vegas	$39,448	1.7%	$651	N

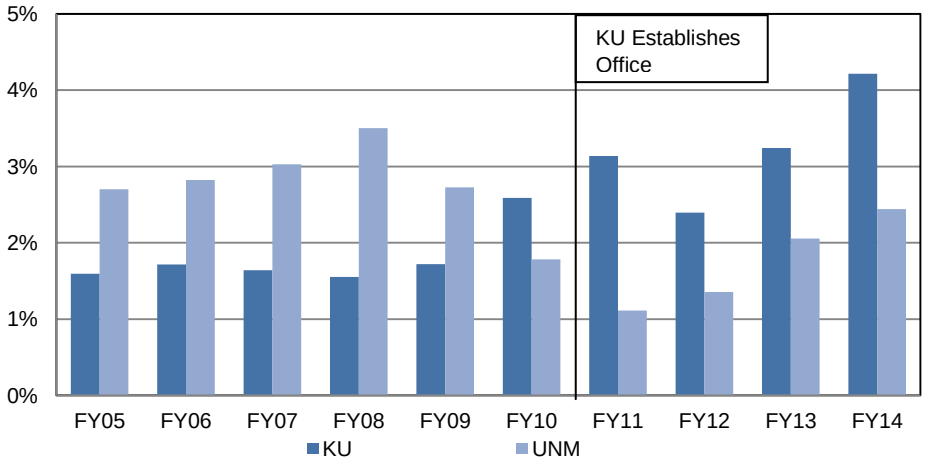
Source: National Science Foundation and LFC analysis

The Vice President of Research and Economic Development at NMT focuses on corporate relations and raises a significantly higher amount of corporate sponsored research, but neither UNM nor NMSU have an explicit, institutional focus on corporate relations. While it has robust technology transfer (STC.UNM) and philanthropic (UNM Foundation) organizations associated with it, UNM currently has a decentralized approach to seeking corporate-sponsored research. NMSU is currently developing a more centralized approach to corporate relations at its Arrowhead Center, driven by their Vice President of Economic Development, but is in the beginning of the process. As a consequence, there is no formal process where relationships with private industry are established, coordinated, and maintained at the institutional level in New Mexico's largest research institutions. That is not to say that relationships with private industry are not established by stakeholders of the institutions, but that those relationships are not necessarily maintained and perpetuated by the institutions and are predicated on the availability of the stakeholder. For instance, say a faculty member establishes a collaboration

with a company that chooses to work with and fund an assistantship for the faculty member's graduate student. Were the faculty member or graduate student to move on from the institution, and the company wishes to continue funding and maintaining a relationship with the institution, there is currently no formal way for it to do so at New Mexico's largest research universities. Furthermore, promoting research is not currently the purview of state agencies or programs like the New Mexico Economic Development Department or the Technology Research Collaborative. As a consequence, there is no evidence that innovative research at higher education institutions is being utilized as a strategic asset to foster economic investment and interest from corporations at the national or international level. Consensus by a panel of representatives from the three research universities and three national laboratories agreed that the lack of corporate relationships was a gap in New Mexico's innovation cycle at the Innovate New Mexico Technology Showcase in April 2016.

The percent of total research funding coming from corporate sponsorship among UNM's peer institutions shows a statistically significant difference between those institutions with established corporate relations offices versus those without. An established corporate relations office is defined for this analysis as existing for more than a year and actively pursuing relationships with private industry through research collaboration, use of facilities and expertise, infrastructure development, and student engagement. The median percent of total research funded by corporations is 4.2 percent for institutions with corporate relations offices versus 2.5 percent for those without. Additionally, Chart 11 shows some evidence for a causal link between a corporate relations office and increased sponsored research dollars. The chart shows corporate research funding at the University of Kansas systematically increasing after establishing the Office of Corporate Partnerships in 2011, from an average of 1.6 percent through FY10 to over 4 percent in FY14. For comparison, it can be seen that UNM's corporate sponsored research funding has not systematically changed for the last decade.

Chart 11. Percent of Corporate Sponsored Research



Source: NSF

There are many national examples and guidelines for best practices for establishing collaboration between universities and corporations, like a 2006 publication by the National Council of University Research Administrators and the Industrial Research Institute, called *Guiding Principles for University-Industry Endeavors*. In a 2014 publication on *Enhancing University Research through Corporate Engagement and Collaboration*, the Provost and the Executive Director of

Corporate Partnerships at the University of Kansas outline the process that their institution underwent in consolidating their corporate relationships efforts. The university formed a nonprofit in 2008 to commercialize intellectual property, but as that was its only function, the publication calls its effectiveness "far from ideal." For instance, research agreements with industry sponsors were separately negotiated by 16 different groups across campus. Therefore, in 2011, the university created the Associate Vice Chancellor of Innovation and Entrepreneurship and the Office of Corporate Partnerships, which consolidated the services of technology transfer, faculty startup formation, and corporate partnerships. By creating one portal for external engagement, the university identified that it offers several different products to corporations, including faculty expertise, lab capabilities, student talent, workforce development, technology licensing, and philanthropy. In order to manage all of the different potential needs of interested corporations, the university created an industry portal that showcases in one place the university products that can be accessed by companies, and the Office of Corporate Partnerships developed a customer relationship management system from a best practice employed in the corporate world that tracks all corporate interactions across campus. Similarly, Kansas State University in a 2010 publication on the need for a holistic, single portal approach to corporate relations, acknowledges that "the landscape of corporate giving across the country is shifting, with industry moving away from traditional corporate philanthropy to a focus on return on investment in their relationships with universities." The Kansas State publication further notes that corporations desire coordinated interactions with universities to navigate their complex, decentralized system of competing interests. A centralized corporate liaison network at the institution that coordinates efforts across campus and presents one, easily navigable portal to interested external parties must have buy in at the highest administrative levels to be effective, according to the publication.

Corporate relations offices that fit the models described by Kansas' research institutions exist in the majority of UNM peer institutions, including institutions in Texas, Oklahoma, Colorado, Arizona, Utah, and California, as listed in the far right column of Table 3. Corporate relations offices are defined as holding a common set of programmatic features that include being an identifiable entry point into the university for potential corporate partners, coordinating corporate relationships across campus, developing corporate relationships at the national level, and offering the following university "products" to corporate partners:

- Corporate Sponsored Research and Development
- University Laboratories and Equipment
- Access to Student Talent
- Philanthropic Investment
- Workforce Development
- Technical and Scientific Services
- Technology Transfer and Licensing
- Infrastructure Development and Relocation Opportunities

The benefits of well established relationships between universities and corporations are not limited to additional research funding and employment opportunities for graduates; they can also lead to significant regional economic development. Economic opportunity created by establishing relationships with large corporations may draw top New Mexico graduates out-of-state in the short term. However, the potential for corporate re-investment brought about by established relationships with higher education institutions is well documented and can help reshape New Mexico's economic future in the long term. For example, in 2013,

GlaxoSmithKline, a British pharmaceutical company, and Texas A&M University, received approval from the U.S. Department of Health and Human Services to develop a $91 million influenza-vaccine manufacturing facility at the Center for Innovation in Advanced Development and Manufacturing on the Texas A&M University campus in College Station, TX. In 2015, the University of South Carolina (USC) and IBM partnered on a 10-year, $70 million contract to create the Center for Applied Innovation and Advanced Analytics, where researchers at USC and IBM will work to analyze data to customize curriculum for higher education students. The center will be housed in a $25 million, 110,000 square foot building in the downtown Innovista Research District on the university campus in Columbia, SC. The new building is being built by private enterprise that will recoup its money in leases to the private sector tenants. IBM is expected to hire 100 employees to work alongside university faculty and student researchers at the center. The building is expected to open in spring 2016.

Interviews of economic developers in New Mexico conducted by LFC staff over the course of the evaluation revealed four common themes for what impedes high tech industry growth in New Mexico: lack of infrastructure, business management, and venture capitalism, and little incentive for national laboratory researchers to commercialize. Tasking universities as engines and agents of innovation through their strengths as educators and researches addresses all of these impediments to high tech industry growth. Working with universities gives businesses access to infrastructure and talent. Working with industry gives innovative researchers access to business management and funding. Involving students in the process provides incentives to commercialize research for innovative students, who likely have no opportunity cost of lost income or job security.

Recommendations

Higher education institutions should continue to incorporate innovation into their education models, using nationally developed best practices for doing so. Innovation should be implemented through the strategic plan and mission of the institution, primarily for the purpose of improved student learning outcomes.

New Mexico's higher education research institutions should consolidate and coordinate all corporate relations under one office, including the following corporate interactions with the institution:

- Corporate Sponsored Research
- Use of University Laboratories and Equipment
- Access to Student Talent
- Philanthropic Investment
- Workforce Development
- Technical and Scientific Services
- Technology Transfer and Licensing
- Corporate Partnerships
- Infrastructure Development and Relocation Opportunities

The legislature should consider reallocating funds for the initial implementation and development of consolidating corporate relations at the higher education research institutions from other funds currently used for economic development that LFC analysis indicates may be ineffective or inefficient on a cost-per-job basis.

NEW MEXICO HIGHER EDUCATION DEPARTMENT

SUSANA MARTINEZ
GOVERNOR

DR. BARBARA DAMRON
CABINET SECRETARY

May 11, 2016

Mr. David Abbey, Director
Legislative Finance Committee
125 Don Gaspar
Santa Fe, NM 87501

Dear Director Abbey,

I have reviewed the Legislative Finance Committee's (LFC) recent program evaluation report, *Science, Technology, Engineering, and Math (STEM) – Degree Production and Employment Outcomes*, in draft form. The report effectively highlights the return on investment for New Mexico from STEM education when STEM graduates decide to work in the state.

The New Mexico Higher Education Department (HED) and the LFC have agreed on incentivizing STEM education within the higher education funding formula, but other policy incentives could possibly be developed, proposed, and implemented in the future as well.

The report recognizes how New Mexico higher education institutions are currently promoting innovation and entrepreneurship, but also pinpoints the need for more coordination of these efforts. The creation of corporate relations offices at research universities has the potential to foster long-term corporate/research partnerships which, in turn, would encourage high tech economic development and STEM graduate retention in New Mexico. In order to create such corporate relations offices without increasing total administrative costs, research institutions would need to consolidate existing corporate interactions.

Research universities should also consider examining how corporate funding could be included within the framework of peer-reviewed research while also protecting academic freedom and preserving the faculty promotion and tenure process.

HED is continually refining its data collection and analysis processes for the purpose of providing useful information, such as the graduate-to-workforce data matches provided for this report, to the public. Through quantitative analysis and program evaluation, the data can inform policy decisions and identify how best to improve statewide educational and economic outcomes.

HED looks forward to working with the LFC on additional program evaluations in the future.

Sincerely,

Barbara L. Damron

Barbara Damron, PhD, RN, FAAN
Cabinet Secretary, Higher Education Department

Appendix A: Evaluation, Scope, and Methodology

Evaluation Objectives.

- Evaluate the effectiveness of incentivizing STEM degree production.
- Assess the status of, and institutions of higher education efforts to improve high tech economic development.

Scope and Methodology.

- Review applicable laws and regulations.
- Review prior LFC reports and file documents.
- Review external program evaluations, reports, peer-reviewed educational studies, and other literature.
- Calculate STEM degree production cost
    - Average cost of teaching STEM
        - Average credits at graduation
        - Average cost of equipment and teacher salary per STEM credit
    - Average cost of graduating STEM
        - Total STEM budget divided by number of degrees per year
        - Potentially normalize for non-STEM majors taking STEM courses
    - Average cost of state appropriations, including performance funding and RPSPs, related to STEM degree production
    - **Sources**: Collect data from HED first, institutions second, IPEDS/literature last
    - **Further work:** Break down by major and institution
- Compare STEM degree production to STEM workforce needs
    - Average STEM graduates per year
    - Average STEM work force needs per year
    - Average STEM graduate salaries and benefit to the state
    - Percent of STEM graduates from NM, percent of graduates who stay in NM
    - **Sources:** Collect data from HED and WSD first, institutions second, BLS/Census/literature last
    - **Further work:** Break down by high school, major, institution, work sector, and region
- Review national best practices for promoting high tech economic development related to research universities
    - Literature review focusing in particular on best practices in regions of the country with similar intellectual capital like NC research triangle, Brookhaven, Livermore, Goddard, Fermi, Oak Ridge, etc.
    - Examine partnerships between universities and research labs throughout the country and determine how successful versions can be mimicked with LANL, SANDIA, or AFRL.
- Examine institutional efforts to promote high tech economic development Review interim Job Council and other legislative recommendations
    - Field visits to R1 research parks like Arrowhead, CHTM, etc.
    - Field visits to R1 tech transfer and business incubator centers like STC, ABQInnovate, etc.
    - Review infrastructure related to high tech economic development like high speed internet, high tech facilities and labs, etc.
- Identify best practices and performance in high tech economic development by and in partnership with New Mexico research universities
    - Collect outcomes measurements and evaluate performance
    - Collect information from economic developers, venture capitalists, business leaders, etc.

Evaluation Team.
Travis McIntyre, Lead Program Evaluator

Authority for Evaluation. LFC is authorized under the provisions of Section 2-5-3 NMSA 1978 to examine laws governing the finances and operations of departments, agencies, and institutions of New Mexico and all of its political subdivisions; the effects of laws on the proper functioning of these governmental units; and the policies and costs. LFC is also authorized to make recommendations for change to the Legislature. In furtherance of its statutory responsibility, LFC may conduct inquiries into specific transactions affecting the operating policies and cost of governmental units and their compliance with state laws.

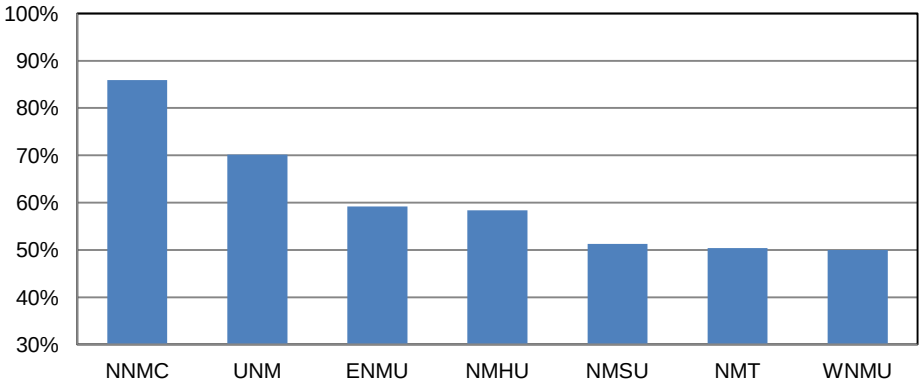
Exit Conferences. The contents of this report were discussed with Dr. Barbara Damron, Secretary of the Higher Education Department, Andrew Jacobson, Deputy Secretary of the Higher Education Department, and Clayton Lobaugh, Operations Research Analyst of the Higher Education Department on May 10, 2016. A report draft was provided to the Higher Education Department on May 4, 2016 for a formal written response.

Report Distribution. This report is intended for the information of the Office of the Governor; The Higher Education Department; Office of the State Auditor; and the Legislative Finance Committee. This restriction is not intended to limit distribution of this report, which is a matter of public record.

Charles Sallee
Deputy Director for Program Evaluation

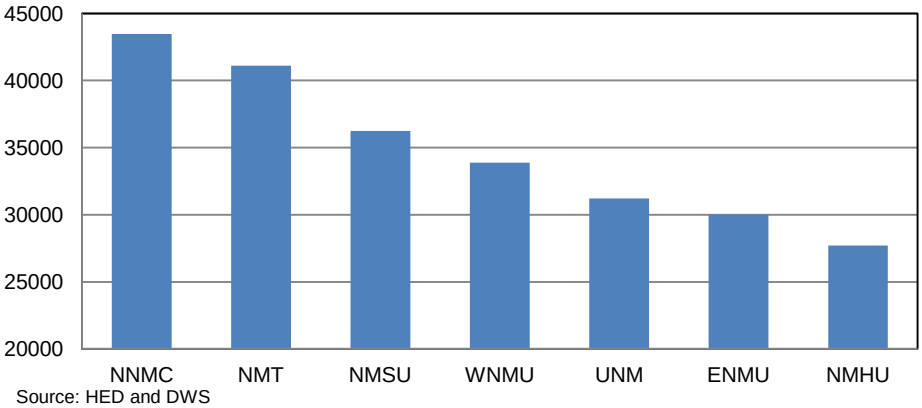
Appendix B: Various Additional Charts

STEM B.S. Employment in NM, 2010-15



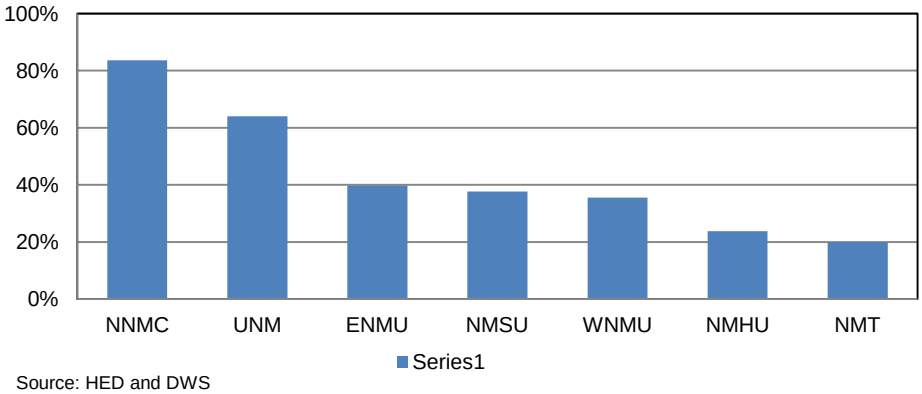
Source: HED and DWS

STEM B.S. Median Salary, 2010-15



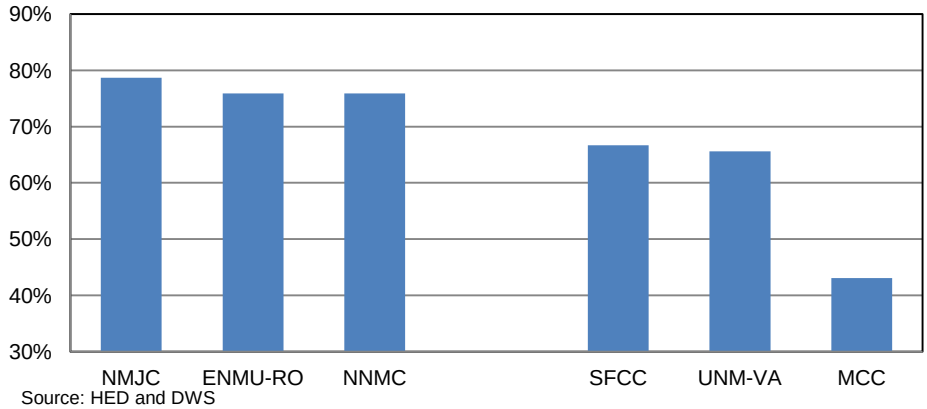
Source: HED and DWS

B.S. Grads Working in NM near Alma Mater, 2010-15



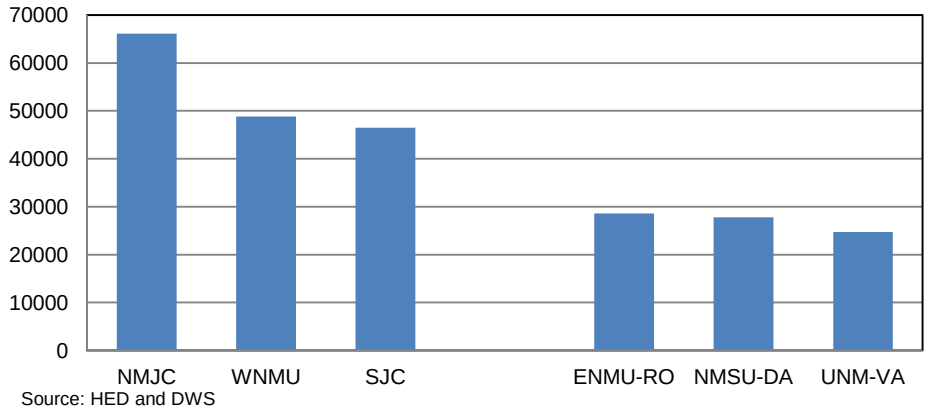
Source: HED and DWS

High and Low STEM A.S. Employment, 2010-15



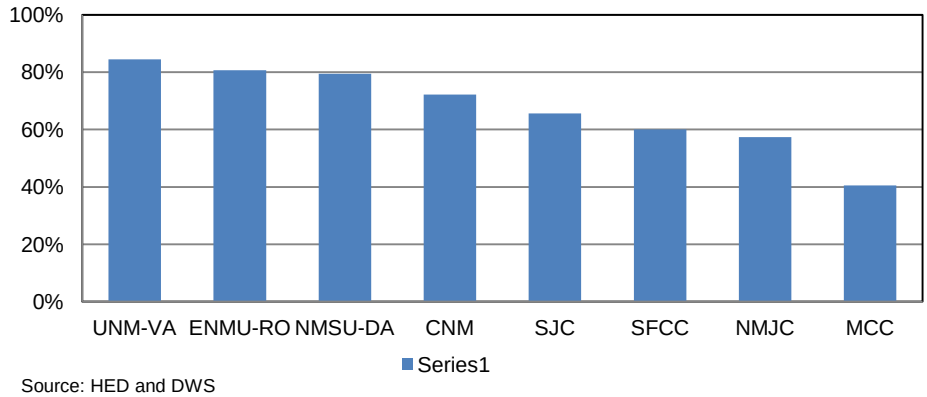
Source: HED and DWS

High and Low STEM A.S. Salary, 2010-15



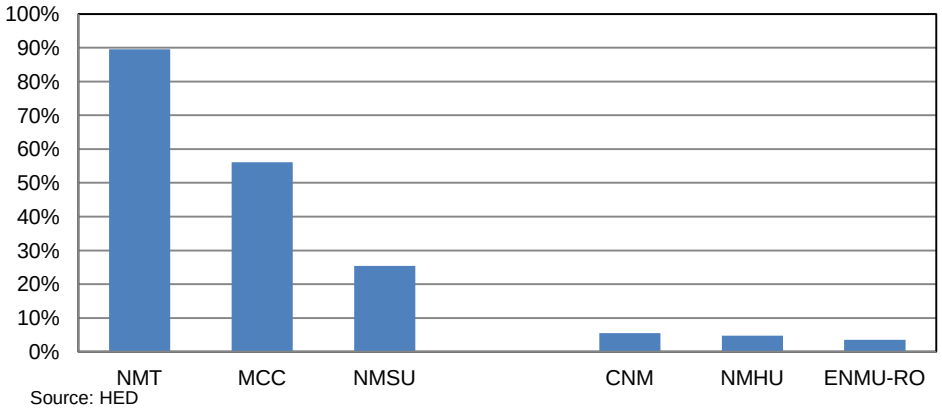
Source: HED and DWS

A.S. STEM Grads Working in NM near Alma Mater, N>50



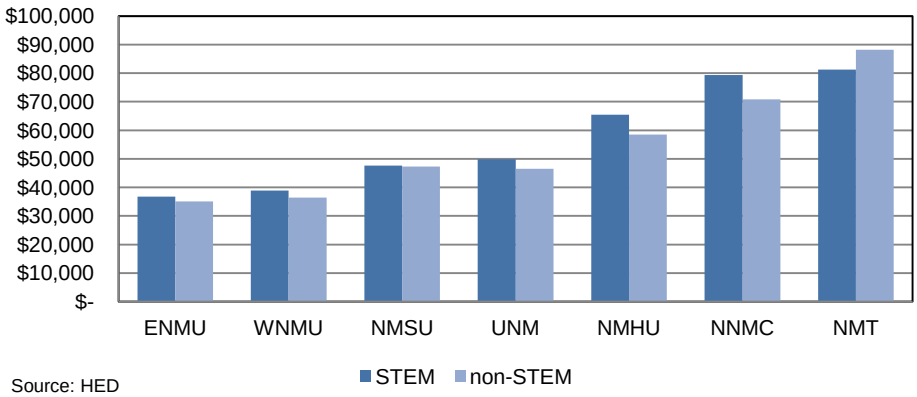
Source: HED and DWS

Highest and Lowest STEM Percent of all Awards, 2010-15



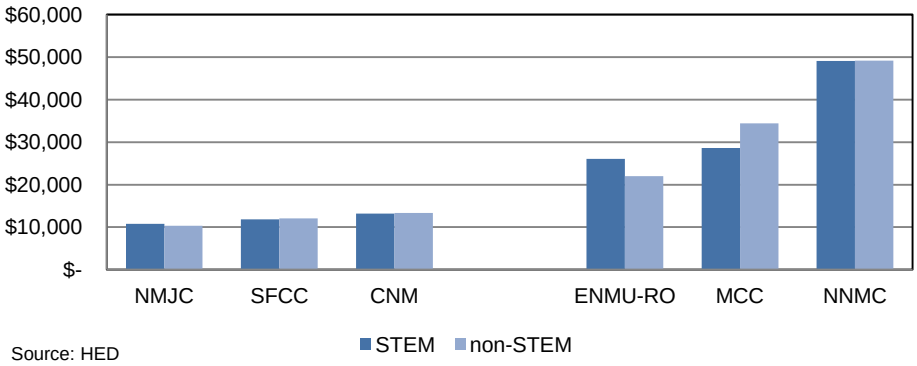
Source: HED

Median I&G Spending per B.S. Degree, 2010-15



Source: HED

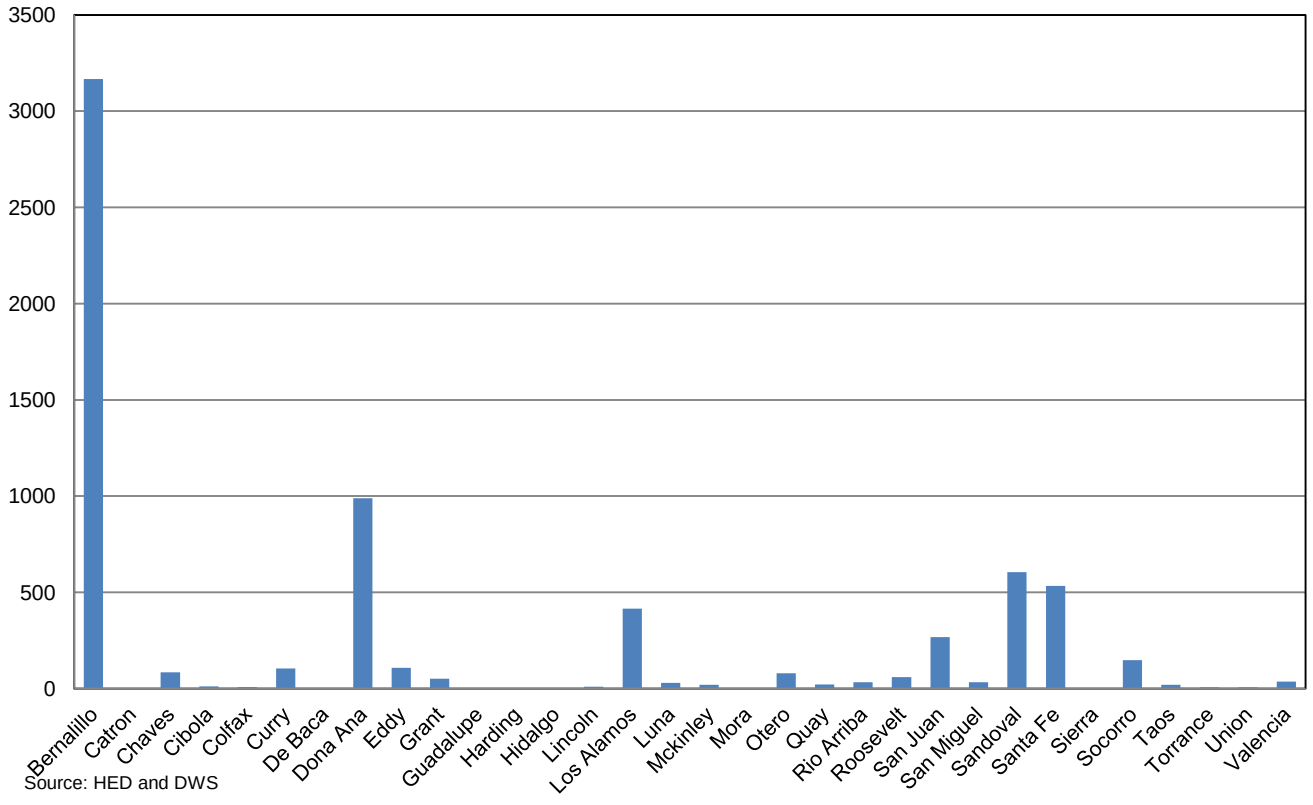
High and Low Median I&G Spending per A.S. Degree, 2010-2015



Source: HED

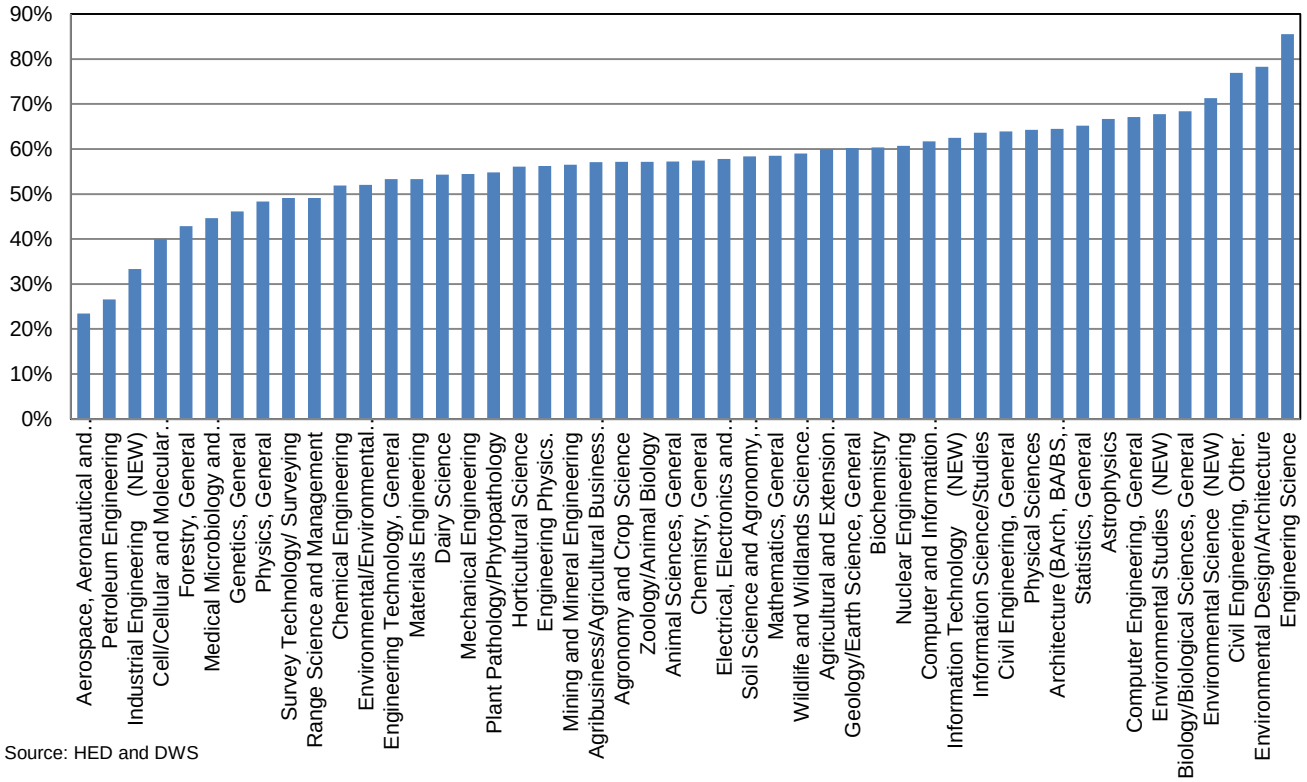
Table: Median Salaries in High Tech Industries in NM, 2010-15		
Industry	**Median Salary**	**STEM Hires**
oil and Gas extraction	$79,371	74
Basic Chemicals	$71,646	18
other General Purpose Machinery	$71,248	28
electric Power Generation, trans., and distribution	$71,052	100
Software Publishers	$68,378	11
Semiconductors and other electronic Components	$67,259	90
aerospace Products and Parts	$58,314	31
Computers and Peripheral equipment	$56,222	10
Metal ore Mining	$54,071	48
Scientific research and development	$54,054	1101
navigation, Measurement, and Control Instruments	$48,125	17
architecture and engineering	$43,194	547
Computer Systems design	$42,366	167
Mgmt., Scientific, and technical Consulting	$38,028	107
Pharmaceuticals and Medicine	$37,158	18
Medical and diagnostic laboratories	$28,854	71
Wireless telecommunications Carriers	$27,147	39

STEM Graduate Employment by County, All Awards, 2010-15



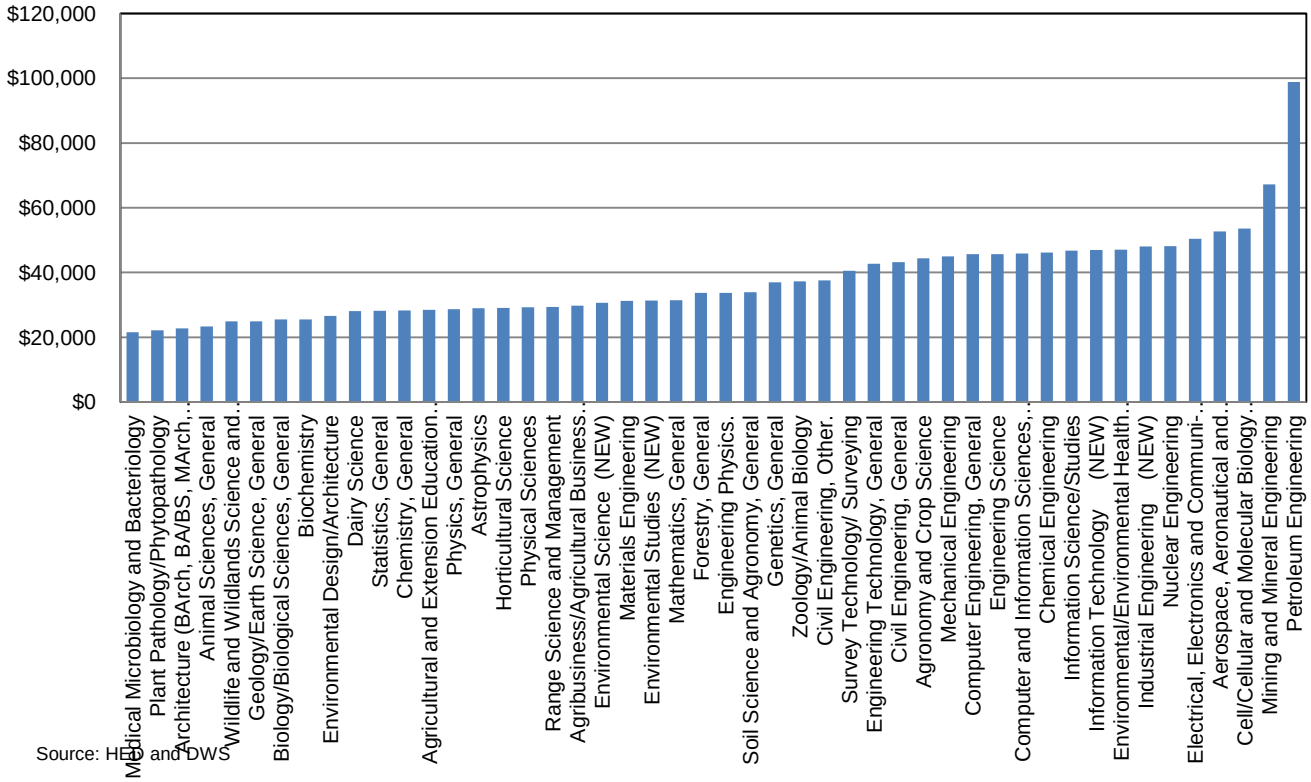
Source: HED and DWS

NM Employment of B.S. STEM Graduates by Major, 2010-15



Source: HED and DWS

NM Salary by B.S. STEM Graduates, 2010-15



Source: HED and DWS