



An Assessment of STEAM Careers and Workforce Development in Northern New Mexico

An Interactive Qualifying Project submitted to the faculty of
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Abstract

STEAM fields are a vital contribution to a successful economy and society. The goal of this project was to gather information about what inspires individuals to pursue STEAM career pathways, what local STEAM career opportunities are available, and what are effective methods to connect individuals interested in STEAM careers and available opportunities in Northern New Mexico (NNM). We created a website for the NNM Community Learning Network containing information we gathered via interviews, surveys, and online research. We recommend early access to STEAM education, marketing STEAM careers in engaging ways, and seeking a mentor or role model in the STEAM industry to aid in sparking an interest in pursuing STEAM careers.

Executive Summary

Introduction and Goal/Objectives

Careers in science, technology, engineering, arts, and mathematics (STEAM) are an important part of the American economy. Since 1990, employment in STEM (science, technology, engineering, and mathematics; excluding the arts) has grown 79% (Graf, Fry, & Funk, 2020). However, the STEM sector in New Mexico has not grown proportionally to the rest of the states. STEM companies in New Mexico hire less in-state graduates as compared to the national average (New Mexico Legislative Finance Committee, 2016). Based on predictions that occupations in STEM fields are expected to see considerable growth as compared to the growth predicted of other career fields in the United States (United States Bureau of Labor Statistics, 2020), there are opportunities to promote STEAM education and career opportunities in Northern New Mexico to individuals that are interested in pursuing STEAM careers. In 2020, the Community Learning Network (CLN) in Northern New Mexico initiated a project to promote STEAM education to teachers, students, and parents entitled the Northern New Mexico STEAM Coalition. Programs like the Northern New Mexico STEAM Coalition aid individuals in discovering the possibilities that STEAM career fields have to offer.

The goal of this project was to aid the Community Learning Network by documenting what inspires individuals to pursue STEAM career pathways, what local career opportunities are available, and what methods can connect individuals and the available STEAM career opportunities. We focused primarily on the fields of science, technology, engineering, and mathematics (STEM) because a strong foundation in careers in the arts fields is already present in New Mexico. Our findings are organized and presented in an interactive informational website. To accomplish our goal we:

- Discovered what inspires individuals to pursue STEAM career pathways.
- Learned what opportunities are available in Northern New Mexico and the surrounding area.
- Learned what methods have best connected individuals pursuing STEAM careers and the available opportunities.

Findings

First, to determine what interests individuals in pursuing STEAM careers, we interviewed 3 local school faculty members and 3 representatives of STEAM career development/ community outreach organizations from New Mexico and Massachusetts. To further reinforce these results, we distributed surveys to 25 STEAM field workers and college students to discover their career development stories. Survey results, which were reinforced by the insights of the interview candidates, suggested that individuals tend to pursue STEM fields largely due to two reasons: 1) the individual took up interest in learning STEAM subjects from a young age, and 2) the individual was inspired after identifying STEAM approaches as a practical way to solve local issues.

Second, to evaluate the present state of the local STEAM industry, we reached out to a contact from the New Mexico Chamber of Commerce, who helped to answer our questions regarding the availability of local STEAM jobs. They informed us of various STEAM industries, such as film, biosciences, aerospace/ drones, directed energy/ defense, and satellites which are either already developed or are expected to develop soon within the state. Furthermore, this contact provided us with survey results that the New Mexico Chamber of Commerce had recently received from various businesses across the state. We analyzed where the respondents to this survey reported their organization was located, and we discovered that a large number of

these businesses are based in or near urban/ metropolitan areas such as Albuquerque and Santa Fe.

Third, to identify effective ways to connect individuals to their professional fields of interest, we interviewed 3 representatives of career development nonprofits and 4 school faculty members/ program directors from Massachusetts and Northern New Mexico. Of the methods investigated, we found that mentorship and career technical education (CTE) in particular served to best connect individuals to their workforce of interest. Individuals with experience working with local mentorship programs' mentors can provide their students with valuable feedback and experience. Their role in expanding a student's skills and interests can prove invaluable to the early career development of these students. CTE further enforces this idea, as it offers its participants direct connections to the workforce of interest. This primarily furthers its participants' technical skills. Simultaneously, CTE programs have also been proven to encourage development of soft skills (such as teamwork, communication skills, etc.)- something that many employers across New Mexico have reported to be surprisingly underdeveloped in the state's current workforce.

Recommendations

Based on these findings, we recommend that the Community Learning Network pursue the following ideas to better promote STEAM to interested individuals:

- *Promote early age STEAM education.* Young children should be exposed to STEAM education as early as possible to allow for a greater time period to discover STEAM field opportunities, so promote better early age STEAM field education in school and outside of school.
- *Promote STEAM careers in multiple ways.* To attract a wider pool of interested individuals, convey STEAM careers as careers that are technically driven, a different means for problem solving, and address compelling problems.
- *Support CTE/internships/apprenticeships.* Encourage schools to reach out to STEAM companies/organizations that offer internships or apprenticeships; Such programs foster growth of students' technical and interpersonal skills.
- *Promote programs with mentors/role models.* Promote programs that involve individuals being paired with a mentor or role model that guides the individual along the individual's paths of interest.

In addition, we recommend that further research be conducted to discover the career interests of minors.

The findings of this project were documented in an interactive website (<https://steamforstudents.weebly.com>). This website serves as an informational source for individuals interested in pursuing a career in a STEAM field.

STEAM careers are only continuing to grow nationally, and this project serves as an exemplification of improvements that can be made to aid the STEAM career opportunities and connectivity to individuals in Northern New Mexico. STEAM fields are important for our national economy, and pathways that link interested individuals with opportunities to ensure individuals can more easily gain and apply the skills and knowledge that are necessary for innovation are vital to our economic growth.

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1.0 Introduction

STEAM (Science, Technology, Engineering, Arts, and Mathematics) careers have long been an important part of American society. Careers in these fields are important to develop for the United States to continue to lead on a global scale. Strong STEAM industries not only promote a thriving economy, but also offer society “tools and systems that characterize modern culture” (NAS, 2007). These tools and systems can be anything from hip replacements to easy digital access. It is necessary to continue to build upon the knowledge, skills, and understanding of STEAM fields in young generations for our future individuals to be able to solve the complex problems each new day brings (U.S. Department of Education, n.d.).

Since 1990, employment just in science, technology, engineering, and mathematics (STEM; excluding the arts) occupations across the United States has grown 79% (Graf, Fry, & Funk, 2020). Yet, not all states have seen such growth in local employment and have not equally benefited from the economic opportunities created by a thriving STEM sector. In particular, New Mexico’s high-tech workforce is made up of approximately 20% less STEM graduates from within the state as compared to the national average (New Mexico Legislative Finance Committee, 2016). Each year, about 4,600 high-tech industry job openings are available in New Mexico, but only 2,600 students at higher education institutions in New Mexico graduate in STEM (New Mexico Legislative Finance Committee, 2016). There are career opportunities available for those individuals that graduate in STEM fields in New Mexico, but those looking to pursue careers in STEM fields have found difficulty transitioning from education to developing careers in the workforce.

To aid in the push for a better realization of the possibilities that STEAM businesses and employment can bring to Northern New Mexico (NNM) specifically, organizations such as the Community Learning Network (CLN) in NNM and University of New Mexico have aimed to promote STEAM education and career pathways along with supporting the arts (considering careers in the arts are already prominent in the area, this project had a focus on STEM to exclude the arts). In 2020, the CLN initiated the Northern New Mexico STEAM Coalition which promotes STEAM education for teachers, students, and parents in the counties of Los Alamos, Mora, Rio Arriba, Sandoval, Santa Fe, San Miguel, and Taos through online learning tools (Northern New Mexico STEAM Hub, 2020). The programs developed by the CLN and similar organizations help individuals more conveniently discover the possibilities that STEAM learning has to offer with the hope that individuals may be better inspired to create their own career pathways that are of interest to them.

The goal of this project was to aid the Community Learning Network by documenting what inspires individuals to pursue STEM career pathways, what local career opportunities are available, and what methods can connect individuals and the available STEM career opportunities. After researching these objectives, we developed a website to present our findings. We completed a combination of interviews, surveys, and online research to support the creation of the informational website. In total, nine individuals from different careers relating to STEAM were interviewed based upon their career background. We also obtained 25 responses from surveys sent to college students and STEAM professionals in NNM.

The purpose of the created website is for individuals interested in pursuing STEAM careers to gain a better understanding of the scope of STEAM careers in Northern New Mexico. It is also expected that other associated organizations such as STEAM companies and educational institutions may more broadly use the provided information for future endeavors with relation to STEAM.

2.0 Background

In this chapter we discuss why STEAM industries are in high demand, the current status of STEAM industries in New Mexico, and methods that have supported improving STEAM opportunities.

2.1 STEAM Fields are an Important Part of Society

The presence of STEAM companies in metropolitan areas promotes positive economic growth. For example, “Greater STEM skills at the metro level are strongly associated with higher patents per worker (an indicator of innovation), lower unemployment, a lower rate of job losses during the recent recession and early recovery, higher exports as a share of gross domestic product (GDP) (a measure of international competitiveness), and higher incomes,” (Rothwell, 2013).

Table 1 illustrates that between the years 2019 and 2029, STEM fields are expected to see considerable growth compared to the growth predicted of other fields in the USA. (The findings in this table were last updated on September 1, 2020 by the United States Bureau of Labor Statistics. Thus, complications caused or otherwise exacerbated by COVID-19 are accounted for.) Given the expected growth in the near future, it would be very beneficial to New Mexico’s industries to develop their STEM workforce early to capitalize on this growth. This data set demonstrates the increasing demand for a properly trained workforce in the STEM fields far beyond any other industry. With the STEM fields projected to increase by nearly double the amount of any other occupations, it is imperative for schools and companies to collaborate and promote productive, real-world-oriented education for the developing workforce.

PROJECTED GROWTH OF OCCUPATIONS 2019-2029

Occupation Category	Employment (thousands)		Change, 2019-29		Median Annual Wage, 2019
	2019	2029	Number (thousands)	Percent (%)	Annual Wage, 2019
Total, all occupations	162,796	168,835	6,039	3.7	\$39,810
STEM occupations	9,955	10,753	798	8.0	\$86,980
Non-STEM occupations	152,841	158,082	5,241	3.4	\$38,160

Last updated on September 1, 2020 - takes into consideration the issues caused by COVID-19
Data from the Bureau of Labor Statistics 2020

Table 1: Projected growth of STEM and non-STEM related occupations in America between the years 2019 and 2029 (Source: Bureau of Labor Statistics 2020)

However, the benefits of more thorough integration of STEAM fields goes beyond more developed STEAM industries. Skills learned through STEAM subjects provide skills required for non-STEAM related jobs, such as teamwork, communication and accountability. STEAM jobs and likewise prerequisite training/education nurture soft skills, which are applicable to a wide variety of occupations in all careers (Los Alamos National Lab, 2020). Soft skills gained in STEAM education can help young adults enter a more broad workforce. R. Black (personnel communication, December 1, 2020) states that these skills are the number one issue that New Mexico employers claim are missing in the upcoming workforce.

2.2 STEAM Industries in New Mexico

According to the New Mexico Higher Education Department, there is a positive trend in degrees being awarded within the state as seen in Figure 2 (New Mexico, 2019). New Mexico higher education institutions awarded 32% more STEM degrees in the year 2014 than they did in the year 2009, indicating a growth of higher STEM education in the state during this time. Simultaneously, however, the same colleges awarded 47% more graduate and undergraduate non-STEM degrees (New Mexico Legislative Finance Committee, 2016). These trends show that despite an overall increase in the amount of higher education awards recently earned in New Mexico, the state has begun producing STEM graduates at a lower rate proportionally to the rate

at which it produces non-STEM graduates. Given the current data available, an increase in STEMH degrees awarded is also evident (the H indicates “Health” which is sometimes combined with science, etc.). Between the years 2016 to 2019, the percentage of STEMH degrees out of total degrees awarded were the following: 29.65% in 2016-2017 (New Mexico, 2017), 31.00% in 2017-2018 (New Mexico, 2018), and 34.53% in 2018-2019 (New Mexico, 2019).

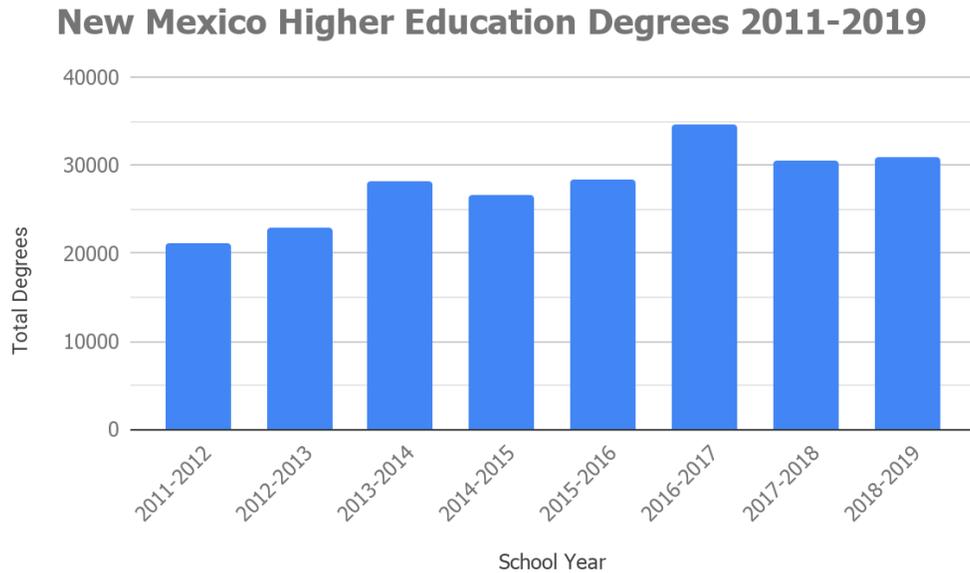


Figure 1: Number of degrees and certificates awarded between 2011-2019 (Source: New Mexico Higher Education Department)

This data set shows that although the STEM field is growing in the state, proportionally speaking, fewer students are seeking higher education in STEM related majors as compared to non-STEM related majors (New Mexico Bureau of Labor Statistics 2016). During the same time period from 2009-2014, STEM degrees went from making up approximately 16.5% of awards received to around 14.75%. This trend further displays the decline in interest of students pursuing STEM fields during the elapsed 5 years.

2.2.1 High-tech Industry Trends

New Mexico’s high-tech industry labor statistics present figures that help to better define the current STEAM industry relationship in the state. Firstly, according to the New Mexico Legislative Finance Committee’s findings when referencing the US Census (Figure 2), between the years 2000 and 2012, the number of available jobs in the high-tech industries shrank by approximately 30%. This falloff compared with other regions is remarkable. This represents the single largest statewide high-tech industry downsize in the country during that time period by over 15%. The same source suggests that 47 states saw growth in their statewide high-tech industries over this time. Many midwestern states such as North and South Dakota and Wyoming saw their high-tech industries almost double in size. Many southwestern states grew their high-tech industries by much smaller margins, though this certainly does little to explain why New Mexico in particular performed so poorly during this time whereas other states flourished.

does not make sense to train a new employee when there is one which already has training that just needs to be updated to meet a company's specific needs.

In Northern New Mexico, the largest employer of STEAM career professionals is Los Alamos National Laboratory (LANL). LANL is most famous for the Manhattan Project, which developed the world's first nuclear bomb. Today, LANL conducts much of its research in the same field of nuclear physics but more so in regard to limiting contamination and long term effects (Los Alamos National Laboratory). Though it is the largest and one of the longest lasting, LANL is not the sole opportunity in the region.

2.3 Linking STEAM Career Opportunities with Individuals Interested in STEAM Fields

Individuals that are interested in STEAM career opportunities can follow many different directions throughout their career. They determine their own career pathways based upon many criteria such as interest and available opportunities. To help promote STEAM opportunities to individuals, there are many different methods that have proven positive feedback.

2.3.1 Forging One's Own Career Pathway

To understand best methods to link job opportunities with individuals, it is best to understand how a career pathway is defined as well as how people can alter their own personal career pathway. A career pathway is a general definition that can have many meanings, yet it is used to describe the general path that an individual follows to build their career. The term career pathway stems from the term career track, which describes the route an individual follows to develop a career. The term career track may seem to suggest that there is one specific way to a specific career, but in reality, there are many ways to achieve different careers. Hence, the term career pathway is more widely used today to promote the idea that young adults do not have to follow one specific path, but rather that they have options. This term addresses the idea that individuals may develop a variety of technical skills, background knowledge, and behavioral characteristics that can apply to a wide range of otherwise seemingly unrelated careers (Heery & Noon, 2008).

Career pathways differ from person to person, but the idea behind them is to show young adults the many different career options they have within a field of study. The New Mexico Public Education Department specifically uses career clusters as a larger grouping of career pathways "based on similarities in foundational knowledge and skills needed to achieve success" (Career Clusters). Career clusters are a much more general grouping to better categorize the many directions a career pathway can go. In a career pathway, a sequence of four classes in order is said to "master all the common career technical core standards of the pathway," (Career Clusters). The career planning assistance provided by NMHED is meant to be a cycle that can be repeated as many times as the student sees fit until they find what they believe suits them.

Yet, it is important to keep note that each individual can develop their own pathways. Each individual needs guidance to help them work through the possibilities of their career, but, in turn, they can pursue many different individual careers. Figure 3 below displays some of the numerous career pathways that an individual may follow to build their career.

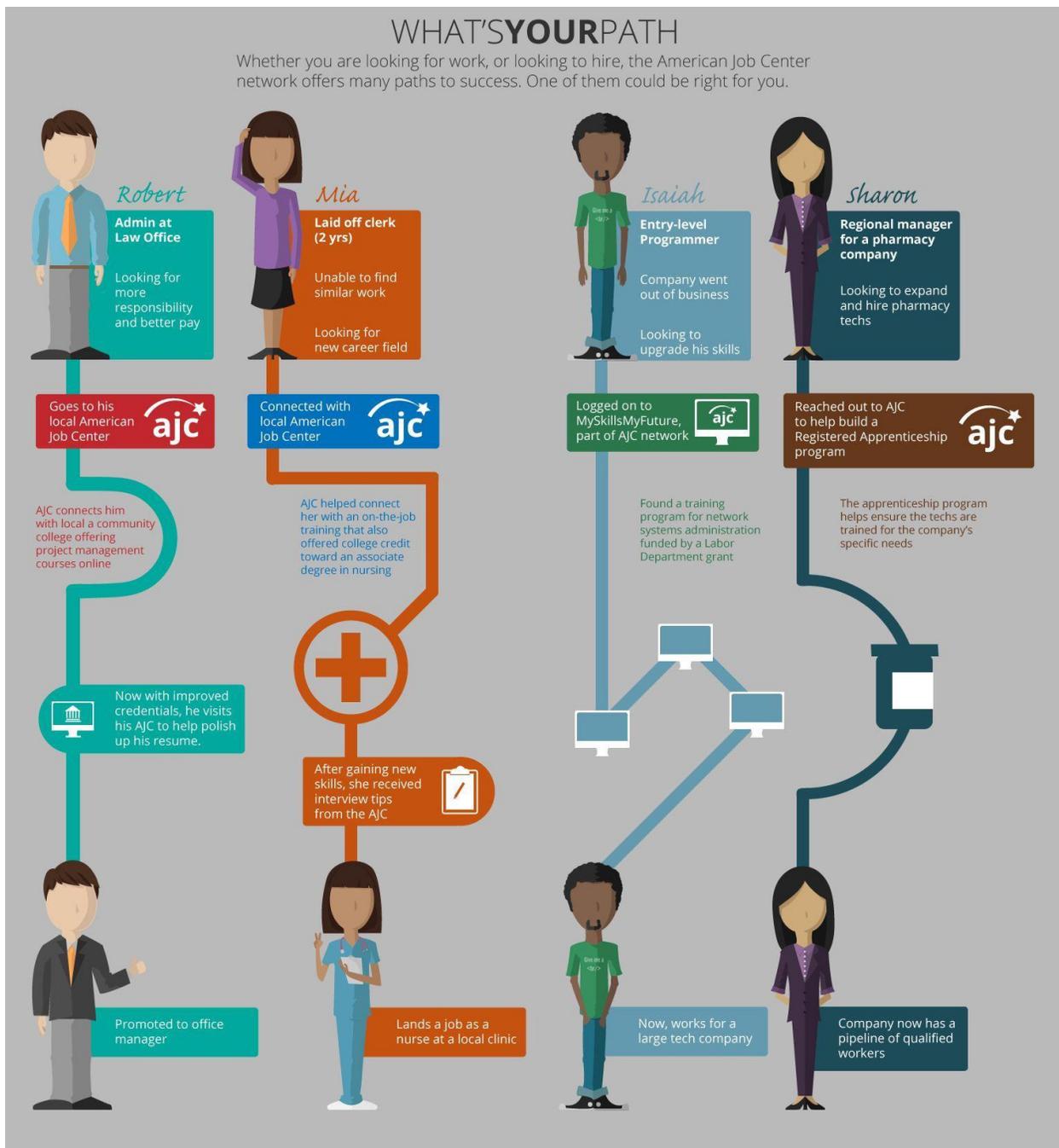


Figure 3: What's Your Path? (Source: CareerOneStop, partner of the American Job Center)

2.3.2 What are Factors that Influence Individuals' Career Pathways?

There are many factors that can affect someone pursuing a career in STEAM, one being that it is necessary to spark an individual's interests to introduce them to STEAM career opportunities. This can be through life at home as well as other factors such as connecting an individual with a mentor. A study suggests that connecting students with professionals of similar culture, ethnic groups, and other characteristics has a positive impact on inspiring students' interests (Kricorian et al., 2020). This study utilized an anonymous survey completed by MiOra, a STEM-driven non-profit educational organization, asking participants what an important influence

was when choosing their career. Most of the participants stressed the importance of communicating and learning from a mentor that is of the same gender and ethnicity as the respondent, which can be seen in Figure 4.

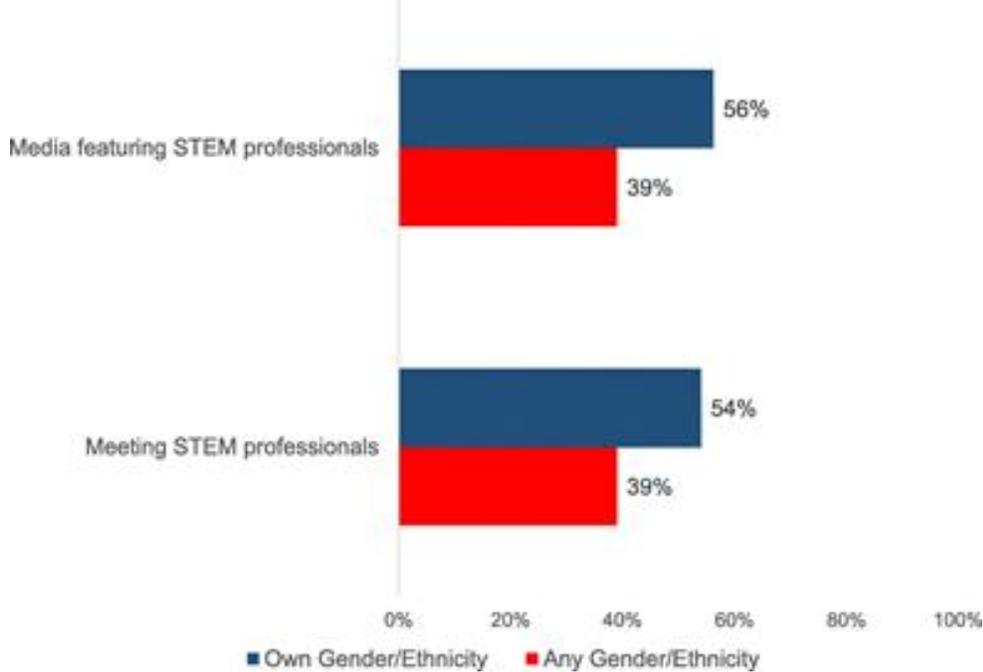


Figure 4: Gender/Ethnicity influences on STEM field pursuit (Source: *International Journal of STEM Education*)

Along with this, a study conducted suggested that the academic aspirations and efficacy views of an individual’s parents largely affected the choices and views that children had when creating their career trajectories (Bandura et al., 2001). It was found that children base their opinions and expectations for themselves based on the facts of what they know about themselves. They tend to pursue ideas and opportunities that they can see themselves pursuing in the future. If they do not believe that they can pursue a certain occupation because they are not made out for it, then they will not pursue that occupation.

Individuals need to also develop the skills and knowledge that are necessary to pursue a career in STEAM. This can be done through learning basic life skills or through schooling. A method that has been utilized to promote STEAM education to marginalized groups has come through utilizing the online education programs. For example, CLASET (Collaborative Learning And Support Environment for Teachers) is a program that helps provide educational sessions for Native American schools in rural areas through aiding teachers with methods to better allow students to learn class material (Kilde, 2016). This is just one online program, but other programs, whether being virtual or in person, can aid to educate students with the information necessary to approach a career in STEAM.

It is also important to note that students of different educational levels pursue opportunities based upon what they perceive the opportunities to be (Fouad et al., 2010). Results of this examination suggested that the pursuing of a math or science curriculum was affected by perceptions of barriers and supports of the desired pathway. Students need to have a full grasp and understanding of the career pathways that they would want to pursue. Although pathways can take

an individual in many different directions, students should be taught to have a full understanding of the possibilities that are available to them to further their careers.

2.3.3 *How can STEAM Career Opportunities be Promoted?*

Based upon the interests that move someone towards pursuing a career in STEAM, there are many promotional strategies that have been utilized across the United States to help bring possibilities to fruition. For example, career panels and mass hiring/networking events have had an influence on people's choices. First year students at the College of Mount Saint Vincent were required to take a first-year course that helped better introduce the students to skills that were necessary to better develop their lives (Kerrigan et al., 2018). This course was led by a peer leader, an upperclassman at the same college that worked in the course to convey to the first-year students the use of some skills including critical thinking, discipline, and working in groups. Through some years of study, the program had confirmed that the success of students could be improved through having a connection with a mentor as well as other cohorts.

Secondly, in-school programs, after-school programs, and positive perceptions of students' teachers have helped to encourage STEAM fields to students that are being educated. Students and teachers that were a part of in-school and after-school programs were assessed to better understand their interactions as well as the feelings of the students towards STEAM (McDavid et al., 2020). The results of the survey suggested that a better self-motivation to pursue different STEAM programs was brought forth when the students had a positive perception of their teachers. Along with this, it was suggested that the in-school educational structure should consider alleviating some approaches that may potentially create a sense of negativity with regards to STEAM careers. The educational approaches may affect the interests and views created in the students when considering a career in STEAM (McDavid et al., 2020).

Also, a study conducted on a participant group of high school students from the southwestern United States that held low socioeconomic status and attended a summer research opportunity in which focused on STEM and was held on a university campus suggested that career goals of the students had been reinforced (Yalvac et al., 2018). This study was completed utilizing qualitative study methodology through a survey given to the students at the end of the professor-taught experience. Many of the students that completed the final survey were Hispanic females (With regards to STEM careers in the United States, Hispanic females are a minority ethnicity and gender.) Thus, research opportunities are another way to help promote STEAM fields and learning to students.

Finally, a positive impact on creating connections for students desiring to enter a STEAM field have come through community colleges. In *Community College STEM Pathways Guide: A Collaborative Online System for Design and Implementation of STEM Pathways Programs* (2016), researchers suggested that programs in which community colleges are involved act as a positive collaboration system for high-school students and job opportunities post-collegiate graduation. In Northern New Mexico, there are nine total state funded and tribal colleges and universities (Northern New Mexico STEAM Hub, 2020). In this sense, NNM's community colleges can work to build programs that create a positive systematic approach for educated students to pursue available job opportunities after their collegiate career.

2.4 Conclusion

The CLN is a charitable non-profit organization based out of Santa Fe, New Mexico, that specifically focuses on education. Launched in 2014, the CLN aims to create relationships between

individuals, especially students, and companies/organizations in the community, provide resources for learning, and promote collective well-being. They strive to transform the lives of those around them as well as the communities, neighborhoods, and families. This year, CLN with the help of local businesses and foundations created the Northern New Mexico STEAM Coalition which promotes STEM learning for teachers, students, and parents through online teaching tools (Northern New Mexico STEAM Hub, 2020).

With the Northern New Mexico STEAM Coalition already in place, the CLN hopes to see an increase in STEAM careers in the area. This project was set to aid the CLN's efforts to help promote STEAM career opportunities and learning to those that have an interest in a STEAM career pathway.

3.0 Methodology

The goal of this project was to aid the Community Learning Network by documenting what inspires individuals to pursue STEM career pathways, what local career opportunities are available, and what methods can connect individuals and the available STEM career opportunities. After researching these objectives, we developed a website to present our findings. To create this deliverable, information was collected focusing on the following project objectives:

Objective #1: Discover what inspires individuals to pursue STEAM career pathways.

Objective #2: Learn what opportunities are available in Northern New Mexico and the surrounding area.

Objective #3: Learn what methods have best connected individuals pursuing STEAM careers and the available opportunities.

3.1 Objective #1: What inspires individuals to pursue STEAM career pathways?

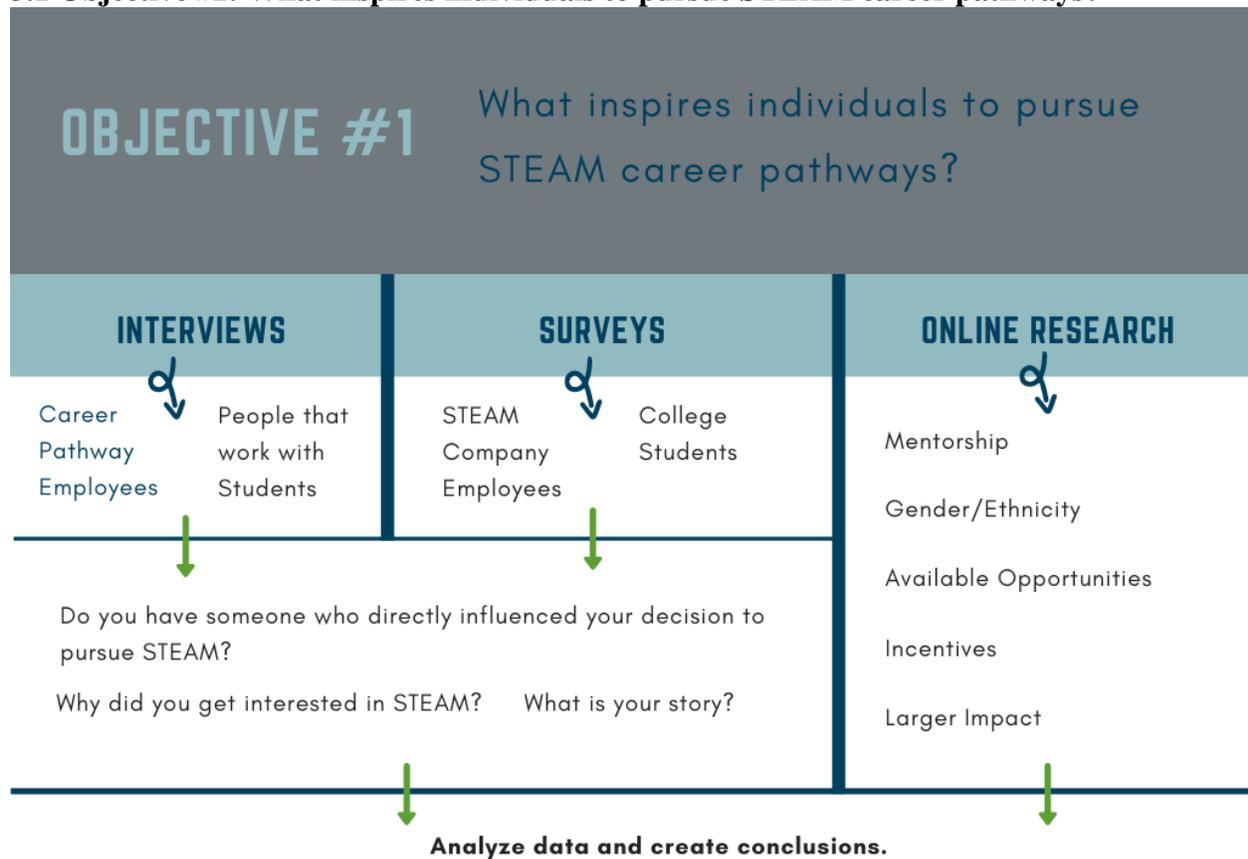


Figure 5: Methodology covering Objective #1 (Created by Reilly Norum and Thaddaeus Zuber)

To create a better methodology of promoting STEAM career opportunities to interested individuals, it is best to discover what actually inspires individuals to pursue STEAM. To do this, students were asked what inspires them to learn about STEAM, and employees of different STEAM companies were asked what inspired them to seek a career in STEAM. By discovering what inspires people to learn STEAM skills as well as what inspires people to seek careers in

STEAM, better strategies can be created to support individuals towards their aspirations in STEAM careers.

We gathered information through three methods: 1) interviews to find personal stories, 2) surveys to find personal stories, and 3) completing online research (Figure 5).

Firstly, we conducted interviews with two groups. First, career pathway employees, and second, people that work with students. With regard to the location of individuals that were interviewed to hear their personal stories, individuals from Northern New Mexico as well as people from across the state of Massachusetts were included. Interview inquiries were sent to 21 individuals. In total, eight individuals were interviewed through an online Zoom video platform. Positions such as Director of Innovation Pathways, Executive Director, and Mentorship Director were interviewed (See Appendix A). All interview candidates were referenced to us through Jennifer Case Nevarez (Director and Lead Educator of the CLN), Kathy Chen (Executive Director of STEM Education at WPI), and Seth Tuler (Associate Professor - Interdisciplinary at WPI). Many of the questions asked to the interviewees related to the individual's personal experiences as well as the reasoning behind why they pursued the career they have today (See Appendix A).

Secondly, we conducted surveys with two groups. First, STEAM company employees, and second, college students. All individuals that were surveyed were from NNM. Survey inquiries were sent via email to 52 companies and seven public colleges/universities. These surveys, in the shape of a Google form, were asked to be distributed among individuals interested in/involved in STEAM work. In total, 25 individuals responded, seven being STEAM company employees and 18 being college students. Many of the questions asked in the surveys again related to the individual's personal experiences as well as the reasoning behind why they pursued STEAM careers (See Appendix B and Appendix C).

Thirdly, we conducted online research looking for information suggesting reasons why individuals pursue a career in a STEAM field. Much of this research had a focus on the effects of mentorships, gender/ethnicity, available opportunities, incentives, and having a larger impact. Being that much of the upfront research on these topics resulted in many useful resources, we continued a more in-depth search relating to these topics. Various databases that are made available to students at WPI through the online library were used as search engines.

Through analyzing and working to create infographics that convey a better visual representation of the responses to the interview and survey questions presented, we could better create suggestions and recommendations for what to do next. By working to better convey the responses, we could also analyze the difference in responses based upon location as well as differing culture/socio-economic status. Similar studies also helped with this methodology as even more information was presented to us through others completing similar studies on related people using alike tactics.

3.2 Objective #2: What opportunities are available in NNM and the surrounding area?

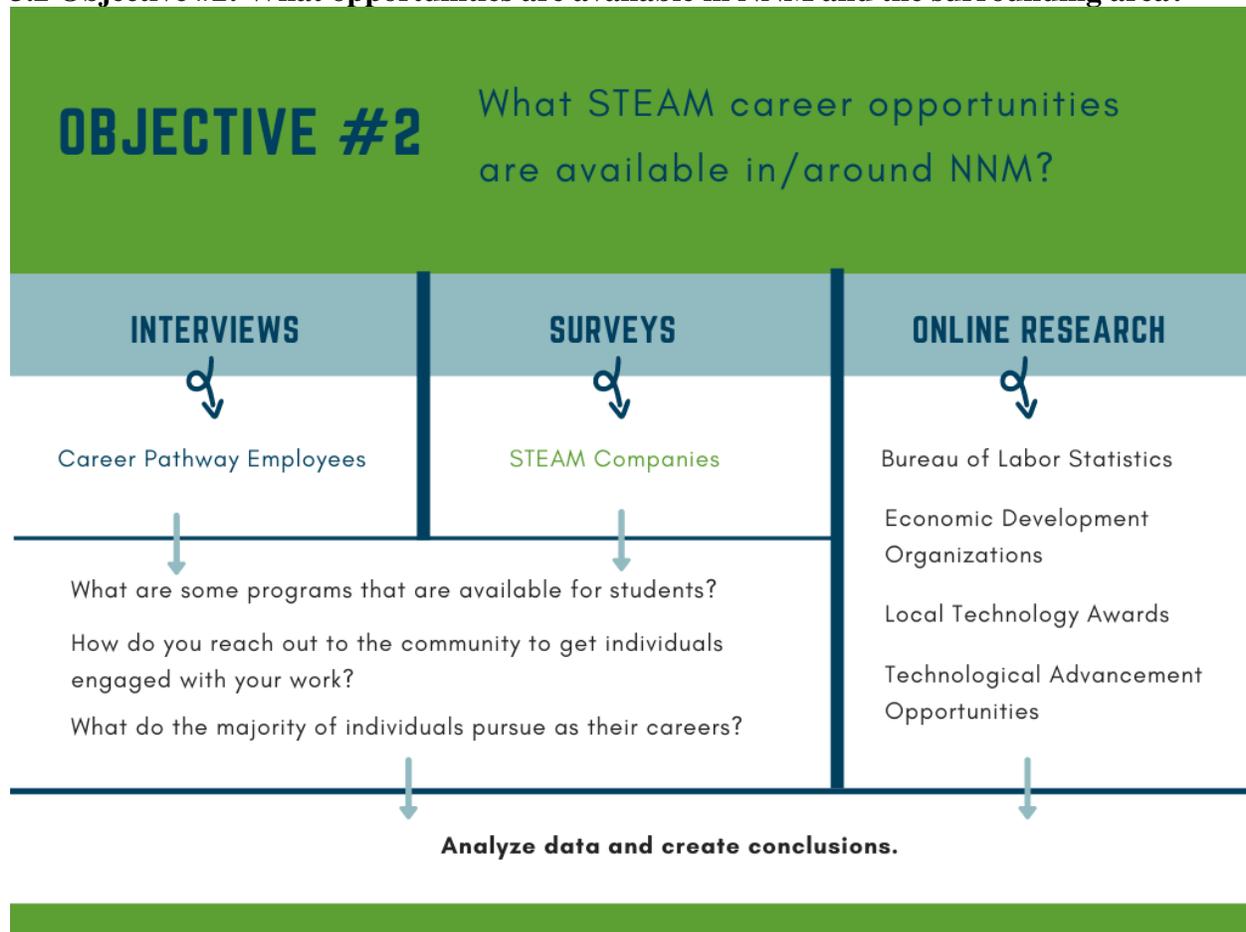


Figure 6: Methodology covering Objective #2 (Created by Reilly Norum and Thaddaeus Zuber)

Along with knowing what drives individuals to pursue STEAM careers, it is also important to learn what STEAM career opportunities are available in and around NNM. This is necessary to know so that individuals will know the opportunities that they can pursue in their future. By knowing what STEAM career opportunities are annually available in the area, individuals can adjust their career pathway to better make themselves fit for an available job. Also, by understanding the opportunities in the area, better suggestions regarding the connection between the local population and nearby companies can be made.

We gathered information through three methods: 1) interviews to find available opportunities, 2) surveys to find available opportunities, and 3) completing online research (Figure 6).

Firstly, we conducted interviews with career pathway employees. Individuals from NNM were interviewed. Again, eight individuals were interviewed through an online Zoom video platform. Positions such as Science Department Coordinator, Community Outreach Specialist, and Mentorship Director were interviewed (See Appendix A). All interview candidates were referenced to us through Jennifer Case Nevarez, Kathy Chen, and Seth Tuler. Many of the questions asked to the interviewees related to the individual's perspective of the STEAM job availability in NNM (See Appendix A).

Secondly, we conducted surveys with STEAM companies in NNM. Survey inquiries were sent via email to 52 companies. These surveys, in the shape of a Google form, were asked to be distributed among individuals interested in/included in STEAM work. Unfortunately, there were no responses to this survey. Many of the questions asked in the surveys again related to the opportunities made available by each STEAM company (See Appendix D).

Thirdly, we conducted online research looking for STEAM companies in the area as well as the available industries. Much of this research was conducted on websites such as the Bureau of Labor Statistics, economic development organizations, local technology awards, and technical advancement organizations. These websites were suggested to the project group through Jennifer Case Nevarez, Seth Tuler, and other personnel that we interviewed.

Again, through analyzing and working to create infographics that convey a better visual representation of the responses to the interview and survey questions presented, we could better discover the career opportunities made available to people interested in STEAM careers. Company profiles were created and added to the team’s website. In total, 83 company profiles were created and uploaded (There was difficulty in contacting 31 of the STEAM companies in NNM, so only 52 were contacted.) This allows individuals in NNM that are interested in STEAM careers to be better informed of the opportunities that are made available to them in a STEAM field.

3.3 Objective #3: What methods have best connected individuals and the available opportunities?

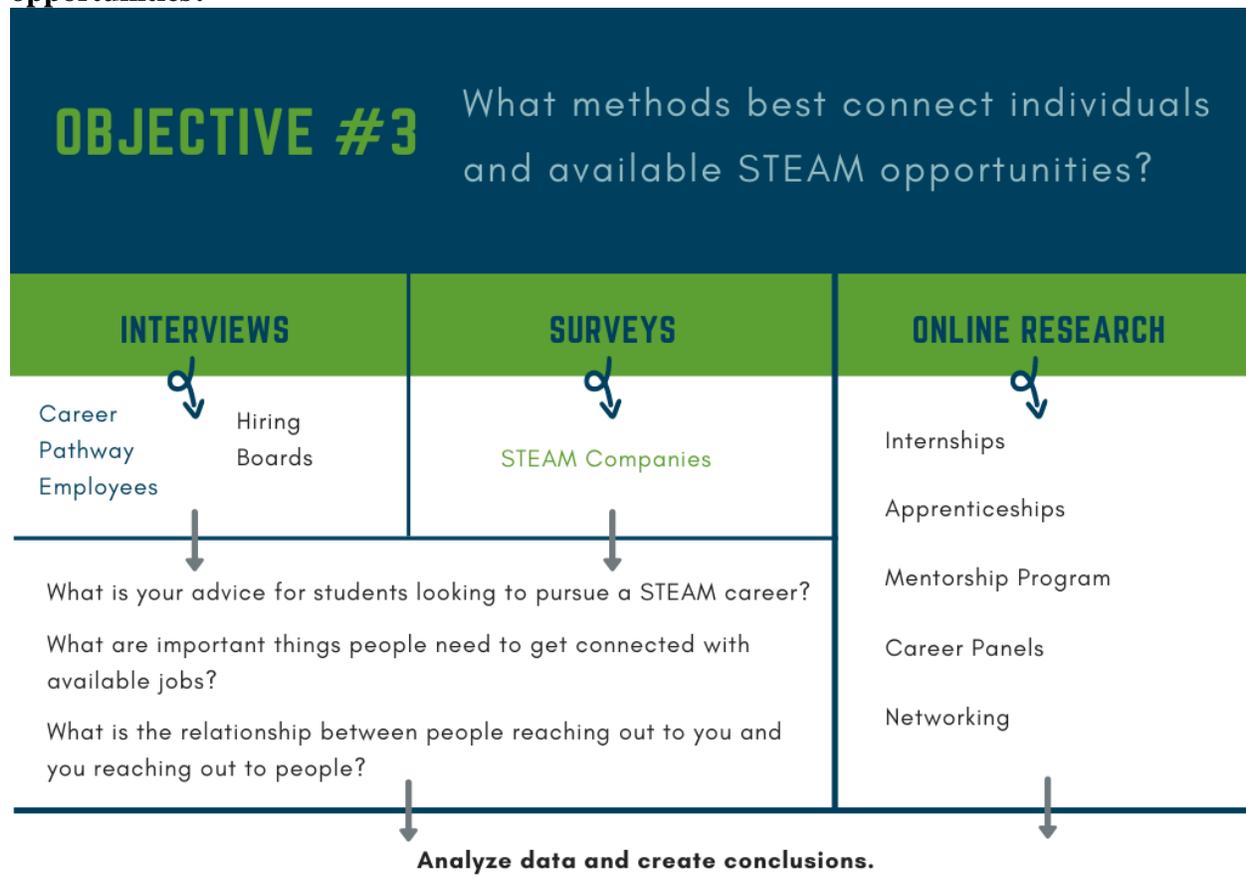


Figure 7: Methodology covering Objective #3 (Created by Reilly Norum and Thaddaeus Zuber)

Finally, along with discovering what inspires people to pursue STEAM careers as well as what are available STEAM opportunities in NNM, it was best to discover methods that best work to connect interested individuals and available STEAM opportunities. Overall, through the use of our website, this was the main objective. Individuals may use our website to learn what are some ways to become involved in a STEAM career in NNM. Thus, research was conducted to find methods that have best worked to connect individuals with the opportunities.

We gathered information through three methods: 1) interviews to find best methods, 2) surveys to find best methods, and 3) completing online research (Figure 7).

Firstly, we conducted interviews with two groups: career pathway employees and hiring boards. With regards to the location of personnel that were interviewed, individuals from NNM as well as people from across the state of Massachusetts were included. Interview inquiries were sent to 21 individuals. In total, eight individuals were interviewed through an online Zoom video platform. Positions such as Science Department Coordinator, Community Outreach Specialist, and Mentorship Director were interviewed (See Appendix A). All interview personnel were referenced to us through Jennifer Case Nevarez, Kathy Chen, and Seth Tuler. Many of the questions asked to the interviewees related to the individual's personal experiences of best methods used to connect interested individuals with available STEAM career opportunities (See Appendix A).

Secondly, we conducted surveys with STEAM companies. All personnel that were surveyed were from NNM. Survey inquiries were sent via email to 52 STEAM companies. These surveys, in the shape of a Google form, asked for a brief overview of the company, how many employees are employed there, and other logistical questions such as location (See Appendix D). Unfortunately, there were no responses to this survey.

Thirdly, we conducted online research looking for information suggesting best methods for connecting individuals with opportunities. Much of this research had a focus on the effects of internships, apprenticeships, mentorship programs, career panels, and networking. Being that much of the upfront research on these topics resulted in many useful resources, we continued a more in-depth search relating to these topics. Different databases that are made available to students at WPI through the online library were used as search engines.

Again, through analyzing and working to create infographics that convey a better visual representation of the responses to the interview questions presented, we could better create suggestions and recommendations for what to do next. By working to better convey the responses, we could also analyze the difference in responses based upon location as well as differing culture/socio-economic status. Similar studies also helped with this methodology as even more information was presented to us through others completing similar studies on related people using alike tactics.

There were problems that came along with attaining information on these objectives, one of the biggest being the difficulty of contacting individuals through a virtual setting. Being that we completed the project remotely from the East coast (this was due to the impact of the global pandemic of COVID-19), it was difficult to connect with people that reside in Northern New Mexico. If this project was completed in an in-person setting, more information could have been gathered from the locals that live in the area. Another issue when working to gain knowledge was the difficulty in connecting with minors to hear and understand their ideals and opinions. Much of this project was meant to be geared toward inspiring youth to pursue the STEAM opportunities in NNM, but the difficulty of connecting with minors in the time period allotted to us to complete the study majorly affected the methodology pathway that this project followed. Yet, from this, we

were able to create ideas and plans to the necessary steps to connect with minors should research be further conducted on this particular topic.

3.4 Ethics and Conclusion

All proper ethics were followed when conducting the research methods listed above. It was necessary that all interviews, surveys, and focus groups remained anonymous to protect the individuals that participated from any unforeseen circumstances; this was especially true given that the research subjects included minors and members of marginalized communities. Yet, these methodologies were necessary to help better understand the problem at hand and to hear the opinions and personal stories from individuals of all parties that partook in the research.

All of the information that was obtained throughout all methodologies was stored, analyzed, and grouped into an informational website. This website was created based off of the findings and information that was discovered through the various research methods explained above.

4.0 Findings

After following the previously mentioned methodology, findings were collected from each of the research subjects regarding STEAM careers in Northern New Mexico. Overall, the major findings of this project were:

- STEAM must attract the attention of local students.
- There must be organizations nearby looking to hire individuals with STEAM-oriented skill sets.
- Programs should be put in place that will help connect students and job seekers to their career fields of interest.

4.1 What Inspires Individuals to Pursue STEAM Careers?

We interviewed 9 individuals in total, each with varying professional relationships to career development and education. To gain a better understanding of what inspires individuals to pursue STEAM careers, we asked these individuals for their insights into the subject. We also surveyed various STEAM undergraduate college students and STEAM workers from Northern New Mexico. Altogether, we received responses from 25 respondents who detailed their stories of how they became interested in their careers. From these responses, two main reasons why respondents chose to pursue STEAM careers were most prevalent:

- The respondent developed an interest in STEAM at a young age and continued to develop this interest through their education.
- The respondent developed an interest in STEAM after recognizing skillsets related to STEAM could be used to practically solve local problems.

4.1.1 *Exposure to STEAM at a Young Age*

Several individuals which we interviewed had stressed the importance of teaching youth STEAM concepts from a young age. R. Black (personal communication, December 1, 2020) believes that early education plays a large role in how skills are learned by students. He told us that the time at which students pick up new skills “starts very early. It starts in elementary school and how we teach.”

We received responses from several STEAM students and workers across New Mexico with responses detailing how these individuals decided to pursue careers in the STEAM. As aforementioned, many individuals stated in their responses to the survey that they found interest in STEAM subjects from a young age and thus pursued them accordingly. Furthermore, students were able to identify a large number of extracurricular activities and clubs that helped them to make their decision to pursue STEAM careers. Such activities included internships, after-school clubs, educational summer camps, and academic competitions.

We believe that the impact these influences have had on students developing careers is due to their efficacy of engaging youth. These activities provide youth with an interactive learning experience that gives their participants an outlet to express their interests in fun and creative ways. Based on this philosophy, we believe that the following organizations have done an excellent job inspiring youth to pursue STEAM careers, and they should be recognized as examples of organizations in New Mexico which have successfully conveyed these ideas:

1) MeowWolf is a company which features interactive exhibits in cities such as Santa Fe, New Mexico for families to explore. The MeowWolf experience presents the arts in a unique and eye-catching way with the goal of inspiring its participants to explore this field.

2) Explora, a science museum in Santa Fe, New Mexico, provides an interactive experience for families to explore various disciplines of STEM. Explora also hosts larger events such as their STEM Fiesta.

4.1.2 Recognizing STEAM as a Means to Solve Problems

According to several representatives from local educational non-profit organizations, the everyday applications of STEAM remain vaguely ambiguous to many individuals from Northern New Mexico. The tangibility and usefulness of such industries is not always fully understood. As a result, the general public understanding of STEAM at large is not very comprehensive, and so local interest in developing STEAM careers declines accordingly. R. Estrada (personal communication, November 23, 2020), who works with Los Alamos National Labs' Higher Education and Workforce department, believes that interaction between local individuals and surrounding companies (such as through internships and apprenticeships) may help to alleviate the negative effects of this issue. Interaction between the community and STEAM firms may help to contextualize these firms' work for local communities; Rather than being portrayed as complex math and science, this helps to give individuals the idea that STEAM provides tools to help communities solve their problems. This relationship gives communities an understanding of local problems and as well as how to approach these issues; In turn, the local community earns rapport with local organizations that can address local problems.

The personal relationship between STEAM firms and the surrounding communities through career technical education and community outreach is extremely helpful in building familiarity with STEAM. L. Leshin (personal communication, November 20, 2020), President of Worcester Polytechnic Institute- one of the United States' leading engineering universities- believes that one of the key elements to recruiting people to the STEM workforce is to market the industry as an intuitive and innovative solution to the world's problems. Leshin believes that the perception of STEM as such is crucial to getting people involved in STEM. Critically, career technical educational programs nurture this viewpoint, thus generating larger amounts of interest in developing STEM careers. Estrada believes that growing this familiarity within Northern New Mexico will most likely foster growth of a stronger local STEAM workforce.

4.2 What STEAM Career Opportunities are Available in Northern New Mexico?

Researching a diverse array of companies across Northern New Mexico showed many of the job opportunities available in the region are based in urban/metropolitan areas. In 2020, the New Mexico Chamber of Commerce received survey responses from 657 individual companies across New Mexico asking for where they are based. Analyzing this data set to determine where the majority of job opportunities in the state are located yielded the following results (Note: The method of distribution of this survey is unknown to us):

- At least 174 (26.48% of responses) responses came from companies based in zip codes in or near Albuquerque, New Mexico (New Mexico Chamber of Commerce, 2020)
- At least 66 (10.05% of responses) responses came from companies based in zip codes in or near Santa Fe, New Mexico (New Mexico Chamber of Commerce, 2020)

Data from the Southern part of the state is consistent with the hypothesis that the majority of businesses in the state are concentrated in urban and metropolitan areas (New Mexico Chamber of Commerce, 2020). Figure 8 depicts a map of the results from this data set.

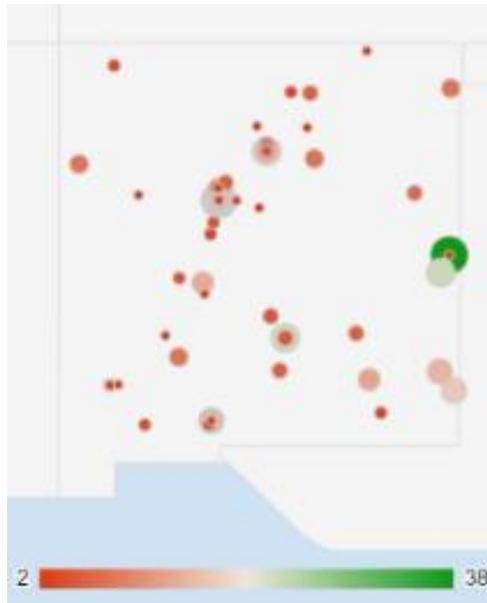


Figure 8: Distribution of Careers in New Mexico (Created by Reilly Norum. Data from New Mexico Chamber of Commerce)

Over the course of this project, we individually investigated 83 organizations that employ STEAM workers from across Northern New Mexico. Over 60% of the sampled organizations were located in Albuquerque, New Mexico. This number includes a large number of organizations which employ over 300 total workers. Other organizations in this sample included companies such as Los Alamos National Lab, which hires over 10,000 employees, the United States Navy, and Intel, which hires approximately 1,200 employees.

Relative to the total number of organizations in the region that hire STEAM workers, the sample size for this data set is small. Although the sample size for one data set is limited, analysis of these two data sets indicates that many jobs (including STEAM jobs) tend to gravitate towards metropolitan/urban areas.

Discussion with R. Black (personal communication, December 1, 2020) of the New Mexico Chamber of Commerce revealed that industries such as research and development, natural gas, and film have recently done quite well in New Mexico. On the other hand (as confirmed by 2016 studies from the New Mexico Legislative Finance Committee), the manufacturing and technology industries, respectively, have underperformed within the state comparatively to these industries. However, Black also believes that various STEAM industries are on the rise in New Mexico. Such fields include bioscience startups, directed energy, aerospace, medical/ recreational cannabis, and satellites.

4.3 How Can Individuals be Better Connected to these Opportunities?

We investigated methods local organizations have developed to connect the students and job seekers to the workforce. Altogether, we found that these organizations were most effective when they provide direct connections to the workforce and create an environment where the learner can best develop relevant skill sets to their interests. With these reasons in mind, we were able to identify two methods which we feel effectively connect individuals to the workforce:

- Mentorship programs which pair students/job seekers with role models to guide them through their career path.

- Career technical education (CTE) programs which provide students/job seekers with hands-on experience in their field of interest.

4.3.1 Establishing Mentors/Role Models

After surveying 18 STEAM college students and 7 STEAM workers across Northern New Mexico, we received data indicating the importance of mentorship in developing one's career. Although 63% of students surveyed reported that they could not identify a single role model which directly influenced them to pursue their current career choices, the survey sent out to STEAM workers suggested that finding a mentor would be helpful to the growth of students looking to enter related industries.

Speaking with individuals that have experience working with mentorship programs confirmed what the STEAM workers in the survey had to say about the significance of role models in developing youths' careers. From interviews with these individuals, we discovered that the sense of direction which a mentor can give their pupils is highly valuable to the student. These mentors firstly can serve as a coach or advisor for their students. By consistently staying in contact with their students and getting an understanding of their strengths and weaknesses, mentors can point their student's focus towards training or reinforcing specific skill sets that are relevant to the student's area of interest. Furthermore, when a student reaches a point where they are ready to explore internships or other work experience, their mentor will be able to highlight specific opportunities catered towards the individual's unique skill set. In an interview with a faculty member of Monte Del Sol Charter School's mentorship program (personal communication, November 23, 2020), the interviewee suggested that such programs are "a fantastic opportunity to have exposure to things [students] wouldn't [otherwise have the opportunity to experience]." The targeted leadership that a mentor provides can make it much easier for the student to develop their early career than if the students had been left to their own devices.

The results of the STEAM-oriented student survey were surprising given their contrast with the findings of the STEAM career survey responses and related interviews, which suggest that mentorship can be a very effective way to connect students to the workplace. Overall, this could be indicative of several things. Firstly, this contrast could imply that a larger sample is needed to properly evaluate the efficacy of role models in early STEAM career development. Second, the current perceived lack of significant role models in Northern New Mexico could be indicative of deeper issues rooted within the educational system in Northern New Mexico. Third, if the STEAM student survey is accurate despite low response rates, the results could refute the testimonies of the aforementioned STEAM workers and interviewees whom we reached out to. However, due to the lack of a large sample size used in the survey and the lack of deeper research done into these findings, these possibilities are simply speculation.

4.3.2 Career Technical Education, Internships, Apprenticeships

Among the candidates we interviewed for this project were 3 representatives of a variety of nonprofit organizations and school systems from Northern New Mexico and Massachusetts. All of these representatives have experience developing unique educational experiences for local youth looking to get an early start developing careers. Various public schools in cities such as Santa Fe have begun experimenting with more hands-on education through career technical education. Their programs, though at present limited in availability, provide students with connections to professionals. Local companies work in collaboration with these schools to set up a hybrid learning environment where students can learn traditionally through classwork as well as

hands-on experience in a field of interest. Although ultimately students may not decide to pursue careers in the field they initially selected to engage with, advocates for this approach such as a representative of Worcester Public Schools (personal communication, November 20, 2020) believe that such programs provide students with irreplaceable insights into the professional world that will help direct these students going forward.

Through speaking with these contacts, we were able to recognize universal benefits to youth exposure to career technical education. Individuals experienced working with CTE told us that primarily these programs develop technical skills which are relevant to the student/interns' field of interest. Additionally, this work experience also fosters growth of students' soft skills. (Soft skills are defined as skills that allow individuals to communicate and work effectively with other individuals, e.g. team management, conflict resolution, honesty, etc.). He claims that career technical education programs give students a more well-rounded and more personalized set of skills, comparatively to an education that can be provided by a traditional classroom setting (personal communication, November 20, 2020).

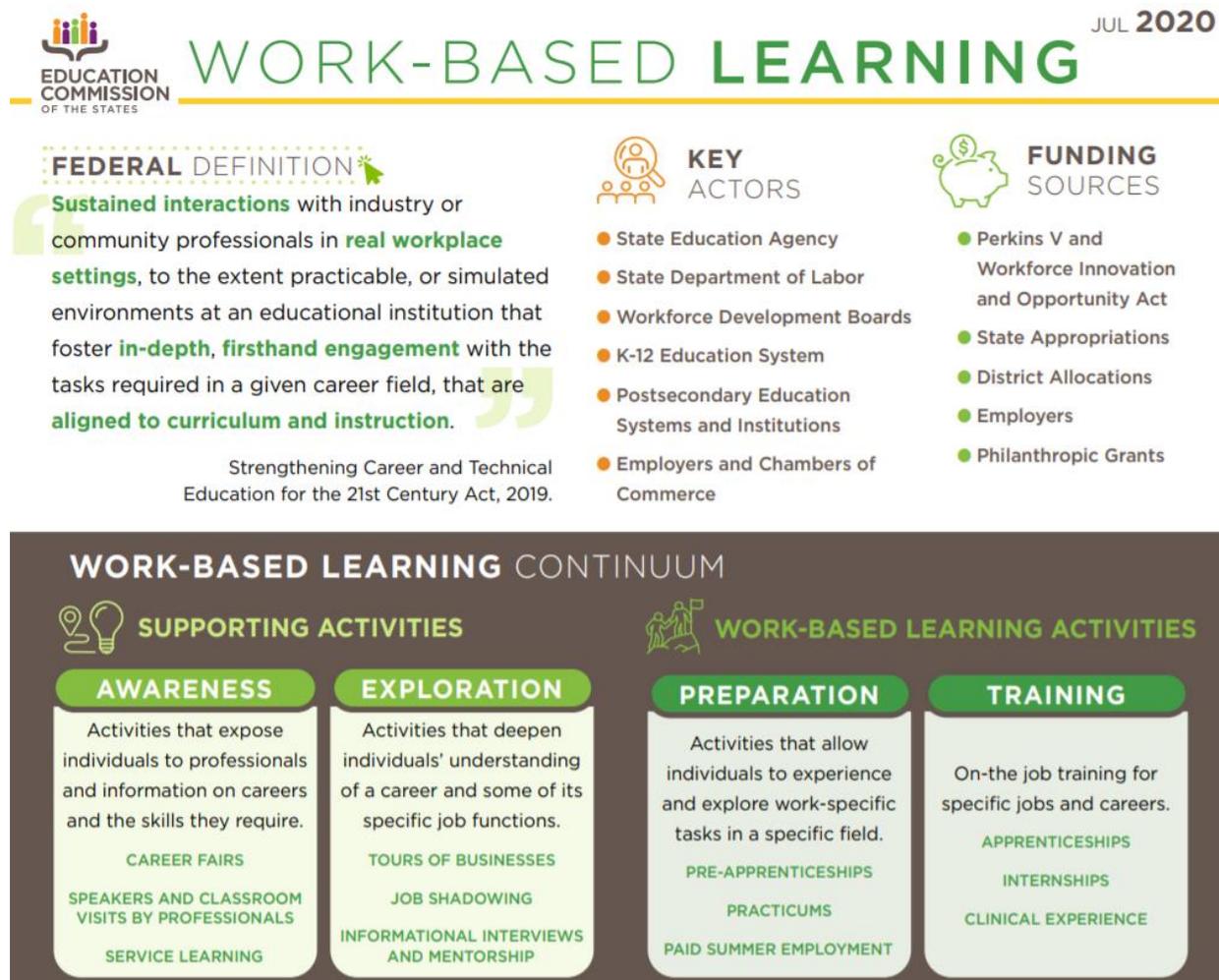


Figure 9: Infographic on CTE from Education Commission of the States (Source: Tom Keily/ Education Commission of the States, <https://www.ecs.org/work-based-learning/>)

Early Exposure to Relevant Subjects

We spoke with the director of a CTE program (personal communication, November 20, 2020) based in Worcester, Massachusetts, who advocates that such programs still give students proper exposure to subjects typically taught in a classroom, but also go one step further to connect them to the workforce. These programs provide students the ability to establish a firm grasp on tangible skills that are more fine-tuned to fit the needs of a student's specific interest. Of course, universal skills such as the fundamentals of mathematics or English can be more easily taught in a classroom setting. Thus, CTE programs still provide students with traditional classroom education. However, CTE programs go one step further in their ability to connect students directly to the workforce. Rather than teaching career-specific skills from the classroom, such programs enroll students in internships and apprenticeships to train such technical prowess. These experiences present students with challenges that help develop skill sets that are better suited for their career interests. Thus, on top of getting the education they would be getting regardless, students come away from the program with stronger resumes, familiarity of the field, and even certifications for various technical skills.

Development of Soft Skills

Employers of any industry are always looking for candidates with strong communication and team working skills to fill their job openings. In a presentation on the future of New Mexico's workforce, R. Black (personal communication, December 1, 2020), president and CEO of New Mexico Association of Commerce and Industry, reported that New Mexico employers have experienced dissatisfaction with the soft skills of their employees. Such skills specifically included attributes such as personal responsibility and honesty. He expressed severe concern for this, as soft skills transcend the boundaries of any one industry. Local organizations in New Mexico have even begun to use the term "essential skills" rather than "soft skills" due to how important it is for individuals to develop these skills. Whereas a lack of technical proficiency may only affect a single industry, a widespread lack of interpersonal skills is indicative of a much larger issue at hand that can severely hurt the state's entire workforce.

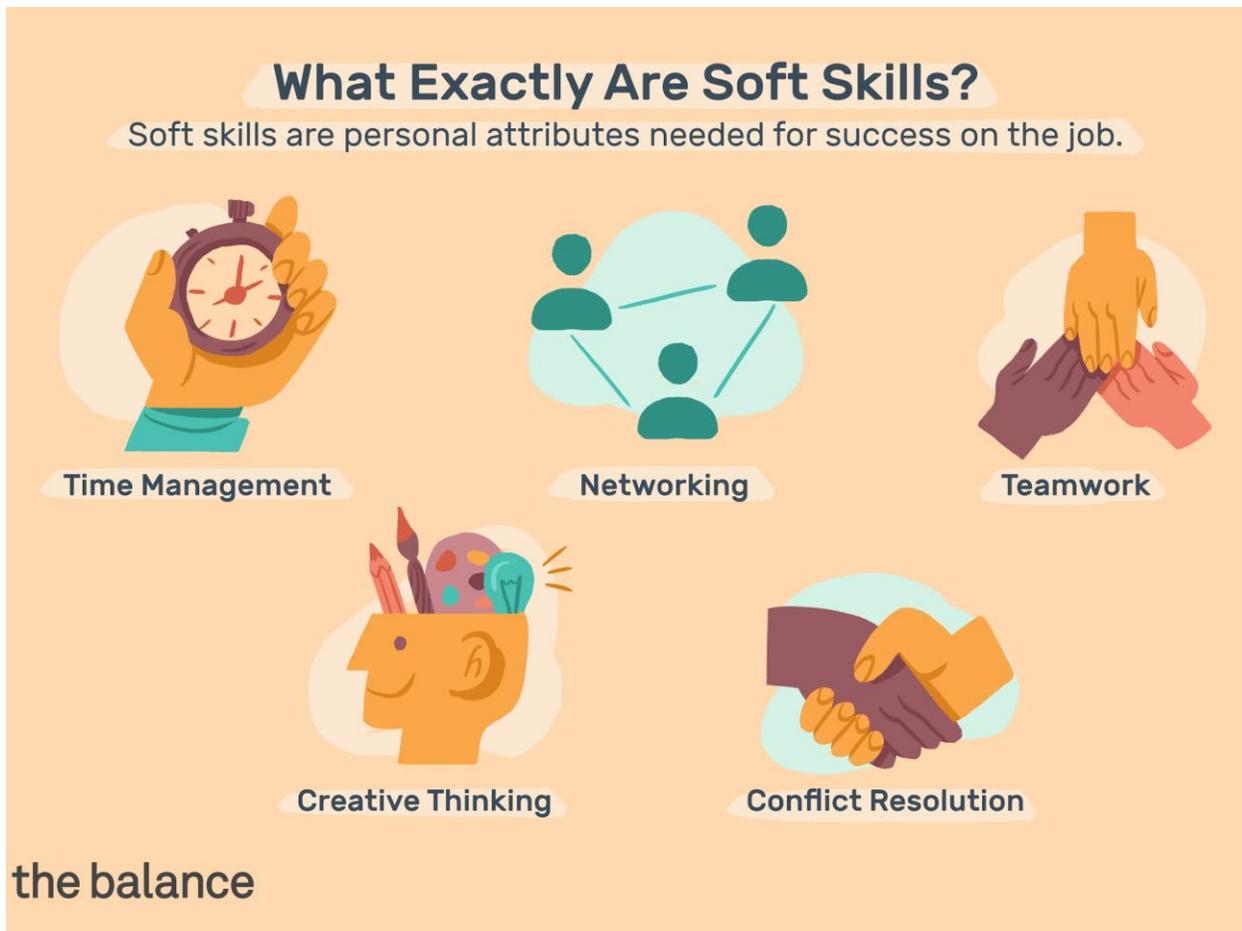


Figure 10: What Exactly are Soft Skills? (From the Balance Careers, Chiechi, 2020)

When questioned further as to how the shortcomings of local soft skills should be addressed, Black strongly emphasized the application of career technical education. He believes that these opportunities place individuals in an environment which encourages teamwork, cooperation, and a very healthy and interactive work ethic. Black strongly urged that these programs must be integrated into the educational systems. He argued that training soft skills from a young age is critical to developing a strong future workforce. These programs provide a way for students to interact with other students, teachers, and workers in a professional environment. Through working on projects in this setting, students are provided with experience working as a team with a diverse group of people. This pushes students out of their comfort zone and encourages effective development of communication skills, personal responsibility, and the like.

Challenges Developing Skills in a Virtual Environment

The COVID-19 pandemic suddenly forced a large amount of learning and work related activities into a virtual environment. Many teachers and employers across the world were not prepared for this sudden change, and a sudden shift to a virtual setting has challenged educators and employers in such regard. However, the effects this unexpected change has had on career technical education is not entirely agreed upon.

R. Black (personal communication, December 1, 2020) claims that this change has dulled the efficacy of career technical education. Many educators and employers have reported

experiencing a harder time engaging and interacting with their classes through video conferences and online education. Thus, educators and workers may have experienced unexpected difficulty communicating their goals and instilling key soft skills in their students through these programs. Students may also not be able to communicate with each other as effectively, making it more difficult to develop effective interpersonal skills as compared to an in-person environment.

Conversely, a representative of a CTE program from Worcester, Massachusetts does not agree that the online environment will harm the overall efficacy of career technical education. Rather, he suggests that it presents students and educators with a unique challenge. This representative recognizes that the situation is certainly unique and not something everyone was fully equipped to address on such short notice. However, he believes educators can make the most out of video conferencing software to enhance the overall experience. Although communication through video conferences may be awkward or challenging for those involved with the program, learning how to properly operate these video conference software may prove to be an increasingly important part of post-pandemic society. Thus, this could serve as a learning opportunity for all involved (personal communication, November 20,2020).

Furthermore, the aforementioned representative from Worcester's CTE program suggests that the virtual environment highlights the shortcomings of the program's participants. By exploring the functionality of breakout rooms, screen sharing, and chat, educators can clearly see which students are having trouble communicating with others. A student excelling in communication skills will not notice the barriers of a virtual environment as much as a student struggling with communication skills. Among other signs, students finding difficulty to communicate ideas may remain quiet, not share their screen or participate in chat. If educators involved in the career technical education programs can properly recognize and take advantage of this, this representative believes this virtual learning environment may even prove to be beneficial in some regards despite initial difficulties (personal communication, November 20,2020).

5.0 Deliverable and Informational Website

In order to best communicate the findings of this project, we developed a website which will be featured on the New Mexico Steam Coalition’s website nmsteamhub.com . The website features resources which can be used to educate individuals of STEAM opportunities across Northern New Mexico. By providing widely available access to this resource, we hope to effectively communicate ways that will foster increased interest in STEAM and make it easier for those interested in STEAM to enter the workforce.

With the information gathered during the duration of the project, an informational website was developed as a resource for students. The website, entitled STEAM for Students, consists of multiple pages full of important information and resources when determining a career pathway: What the H*ck is STEAM?, STEAM Careers, Company Profiles, Professional Profiles, and Additional Resources.

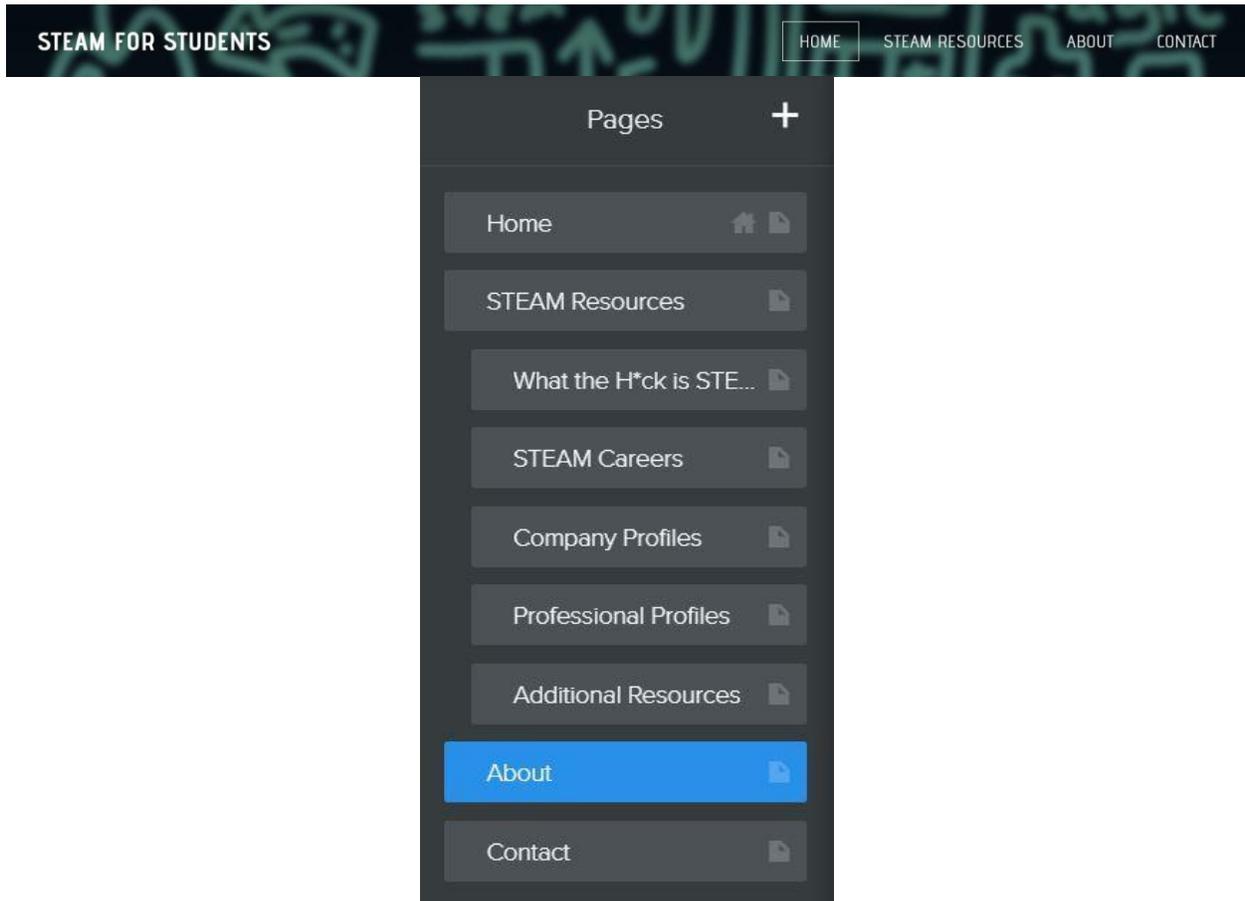


Figure 11: STEAM for Students website (Created by Reilly Norum, 2020)

*What the H*ck is STEAM?*

Under the page “STEAM Resources,” the first option for users to select is a subpage called “What the h*ck is STEAM?”. This page serves to give users a technical definition of STEAM as well as some basic definitions with the intent on showing that STEAM is not just science but rather that it can be seen in most jobs. The page also debunks some myths about STEAM fields in an infographic.

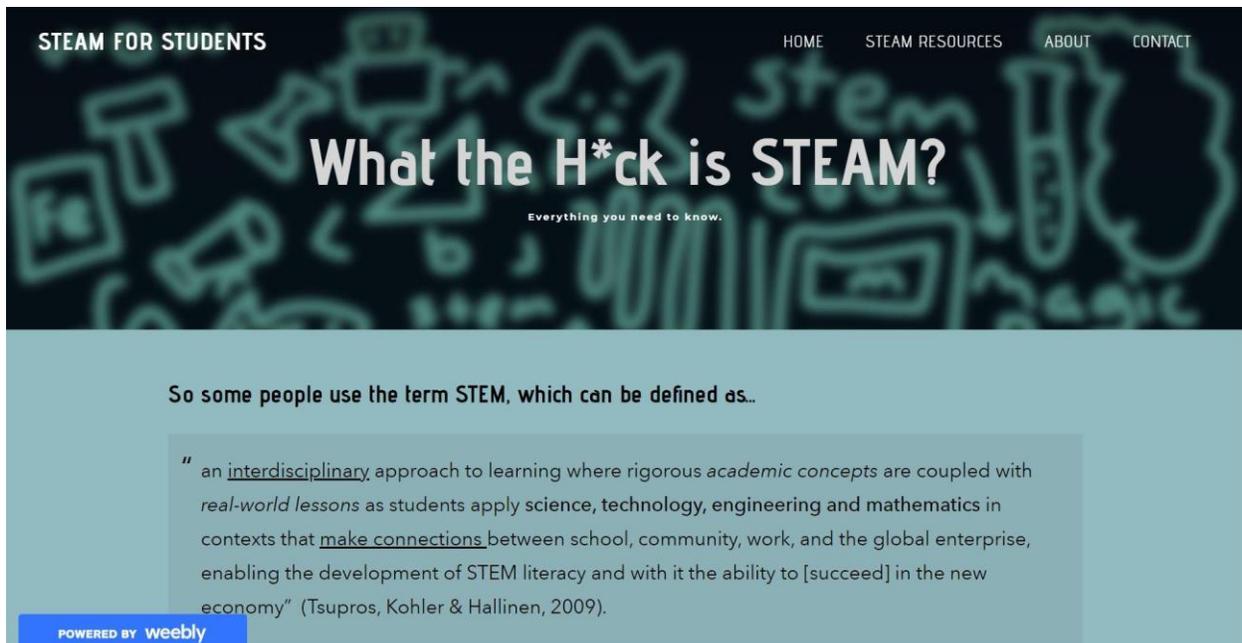


Figure 12: “What the H*ck is STEAM?” page of the STEAM for Students website (Created by Reilly Norum, 2020)

STEAM Careers

The second subpage of “STEAM Resources” focuses on what is available for careers in STEAM. On the page, there is a link to an interactive website that has an extensive list of STEAM occupations, but underneath are sources found during the project that either show what one could do with their STEAM degree or some steps on how to determine what they want. For this page, the images are able to be clicked on and will open another page where the source came from, or a page with more information.



Figure 13: “STEAM Careers” page of the STEAM for Students website (Created by Reilly Norum, 2020)

Company Profiles

The third subpage of “STEAM Resources” is a list of STEAM companies in Northern New Mexico that were gathered from multiple sources during the project. Each company has a small “profile” that has the company name, where they are located, their industry, logo, and a button with the link to their website (if available). This page serves to provide users with evidence that there are STEAM jobs available in their area and provides the information needed to further their research on a specific company if needed.

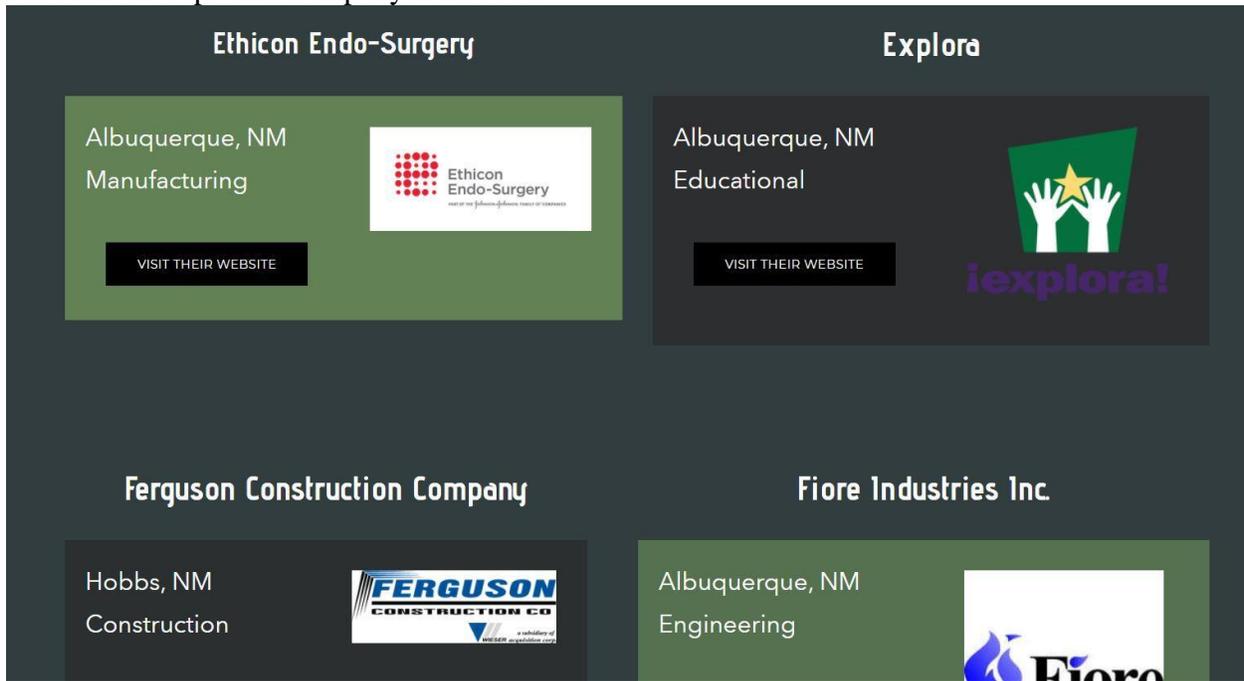


Figure 14: “Company Profiles” page of the STEAM for Students website (Created by Reilly Norum, 2020)

Professional Profiles

The fourth subpage of “STEAM Resources” is profiles of STEAM professionals in the area. Currently, there are 4 profiles as only 4 people we reached out to consented to have their information on our website, but at the bottom of the page, there is a link provided to a survey for more professionals to apply. Each profile consists of: a picture (if submitted), first name, job title, company currently employed at, college major, reason why they pursued STEAM, and advice to STEAM students.



Alex

President and Chief Science Officer at Nature's Toolbox

College Major: Biochemistry, Biophysical Chemistry

Why did you pursue STEAM? Natural Sciences are fascinating. Primarily biosciences were always catching my attention. During the last 30 years, [biochemistry](#) evolved at a rate that is unheard of. First tools for genetic



Alicia

User Experience Designer at Resilient Solutions 21

College Major: Applied Biology/Fisheries & Aquatic Sciences

Why did you pursue STEAM? Originally I pursued environmental s because I wanted to help out in areas like conservation and specifi aquaculture. My ultimate dream was to research aquaculture in the

Figure 15: “Professional Profiles” page of the STEAM for Students website (Created by Reilly Norum, 2020)

Additional Resources

The last subpage of “STEAM Resources” is additional resources that we found during our project that could be helpful in some way for students interested in STEAM. This includes videos of STEAM professionals, educational resources, online STEAM games, STEAM organizations/programs, and more. Each resource is represented by a picture (usually a logo) and is clickable, taking the user to another webpage of the source represented.

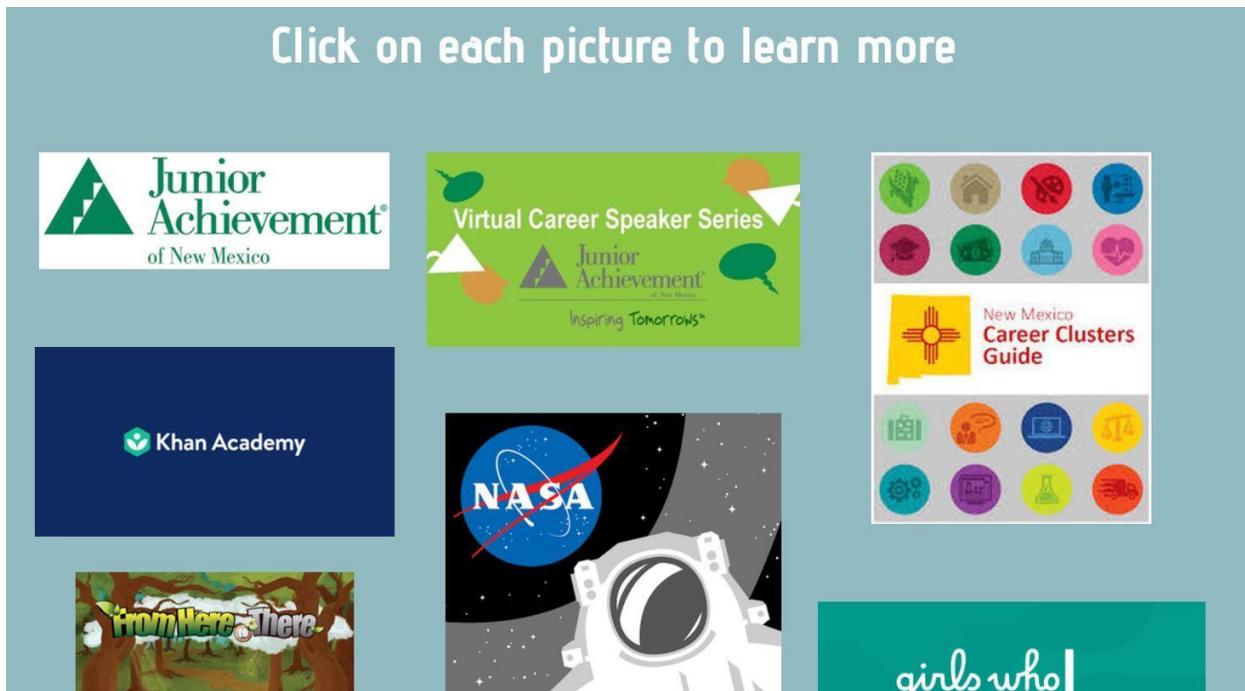


Figure 16: “Additional Resources” page of the STEAM for Students website (Created by Reilly Norum, 2020)

Other Pages

Also included on the website is an About page and a Contact Us page. The About page includes a little summary of our project and the purpose of the website as well as who we are individually (hometown, major, why we chose STEAM). The Contact Us page includes a form for name, email, and message that currently sends an email to our alias, but can easily be changed depending on what the sponsor decides to do with the website.

6.0 Recommendations

After analyzing the findings of the research, we put together a collection of recommendations based on the findings which we discovered during our research. We also included an area to extend the research we conducted to improve the understanding of student engagement in STEAM field courses and interest in the STEAM industries.

6.1 Promote Early Age STEAM Education

Early STEAM education is an imperative step to inspiring students to pursue STEAM. By doing so, children are exposed early to the skills required to be successful in a professional career. According to R. Black (personal communication, December 1, 2020), introducing students to soft skills early helps them to develop these skills more successfully as they mature. For example, many individuals entering the workforce now have either never or rarely written a professional email, a skill used very often in the workforce. Another deficiency is in general team collaboration skills. Black spoke of the importance of this explaining that he himself had never held a position which did not operate in a team-based environment. Teaching the importance of working in a team environment is a skill which students will carry through their entire career. By teaching skills such as these early in their academic careers as well as partnering these skills, students will be much more prepared to enter the workforce post-graduation.

6.2 Promote STEAM Careers in Multiple Ways

Many people view STEAM careers as sitting behind a computer, running simulations, and solving math problems. For some people, this does not inspire them to pursue a STEAM career for the rest of their life. With this in mind, the team interviewed L. Leshin (personal communication, November 20, 2020), President of Worcester Polytechnic Institute, to ask about how she markets STEAM to potential undergraduate students. Her solution for marketing STEAM is to present it as problem solving. By doing this, students see the potential of solving problems which they see in society, including environmental issues. This creates an inspiration based on interest which will help students to strive to receive degrees in STEAM.

6.3 Support CTE, Internships, and Apprenticeships

Obtaining workforce experience during school is another way to efficiently develop a new workforce. Schools which offer career and technical education (CTE) prepare students to enter the workforce with many necessary skills to be successful. A representative from a CTE program in Worcester, Massachusetts informed us of the importance of preparing students for not only the technical skills, but also the soft skills to be successful in a professional environment. During our research we also talked to R. Estrada (personal communication, November 20, 2020) from Los Alamos National Laboratory (LANL). Her position is based on community recruitment for positions offered at the laboratories. She spoke to the value of obtaining an internship, especially at LANL, due to the immense knowledge the interns receive about professional environments. This knowledge base is one which is extremely difficult to teach in schools, therefore making internships extremely important. Both internships and apprenticeships teach younger individuals technical skills which make them much more valuable to potential employers.

6.4 Promote Programs with Mentors and Role Models

We were very impressed with the mentorship program in place at Monte Del Sol charter school in Santa Fe, New Mexico. We had the opportunity to speak to two members of the faculty at this school, who discussed the philosophy behind their mentorship program as well as the

specifics of the curriculum associated with it. The school places a heavy emphasis on a unique mentorship program which is focused on catering to the interests of the students. The process of finding a mentor involves finding precisely what the student is interested in pursuing, down to the exact discipline. This focus on the interest of the student rather than just the career aspirations allows the school to find the perfect mentor to fit what their students are passionate about. A faculty member of Monte Del Sol's mentorship program explained to us that even if the students should change their interests later on down the line, the experience the mentors provide will still be useful to the student in their career path due to this focus on interest development rather than strict career focus. Overall, this faculty member believes that the program serves as a good way of challenging the students to learn new skills and being able to make the best of their individual interests. Although Monte Del Sol uses this program as an academic requirement, we believe that this is not required for success. Rather, it is important for students to have a role model or mentor to look up to and help them develop their education and career (November 23, 2020).

6.5 Contact Students from Northern New Mexico

One way to expand the research we conducted would be through contacts with high school and middle school aged students in the area. By doing so, an understanding of student inspirations in and misconceptions of STEAM fields would be obtained first hand rather than second. Ideally, focus groups would be able to gather a large amount of research directly from students while also being able to request more information from those which provide the most interesting answers to questions. With this strategy, there is potential for progressing with interviews with students that provide the most applicable information. Furthermore, to gain a large consensus of student's opinions of STEM fields, a survey could be sent out to students in different age groups to better understand the way they view the industry. Based on the potential knowledge gained by these processes, addressing misconceptions of STEAM on the website we created would be much more beneficial to students. To further the productivity of the potential information, a proposal for a student support committee would be possible, with the focus of inspiring students to pursue STEAM fields in their education to promote success in their future.

7.0 Conclusions

Our results suggested that, with regards to understanding what inspires STEAM career pathways, individuals need to be both interested and perceive available opportunities, mentors are a necessary key to guide individuals through their career journeys, and both technical skills and soft skills are necessary to succeed in the STEAM workforce. As part of the project we created a website to serve as a promotional STEAM career informational source for individuals that are interested in pursuing a career in a STEAM field in Northern New Mexico (<https://steamforstudents.weebly.com>).

STEAM careers are very important to the national and regional economies. They support growth and inspire innovation. It is vital to develop and support pathways that link interested individuals with opportunities to ensure individuals can more easily gain and apply the skills and knowledge that are necessary for innovation.

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Appendices

Appendix A: Scripted Interview Questions for Individual Personnel

Individual 1:

- Can you briefly describe your role at your organization and describe a few projects that you have done with your organization in the past that may relate to our project?
- What work have you completed that has had an impact outside of your area?
- Are you familiar with the term “career pathways”? If so, how would you define this term?
- Are there any other contacts that may be helpful and interested in meeting with our team?

Individual 2:

- Can you briefly describe your role at your organization and describe a few projects that you have done with your organization in the past that may relate to our project?
- What work have you completed that has had an impact outside of your area?
- How do you define the term “career pathways”?
- What are the most important things that people need to have to get connected with available jobs?
- How important do you think it is to be connected through LinkedIn and similar services?
- What is the relationship between people reaching out to you and you reaching out to people with regards to your services?
- Are there any other contacts that may be helpful and interested in meeting with our team?

Individual 3:

- Can you briefly describe your role at your organization?
- What is your definition of a career pathway?
- What opportunities do you present to students to help them further their education and/or careers?
- What do you believe inspires students to pursue STEM and stay engaged in it?
- How did your career evolve to bring you where you are today?

Individual 4:

- Can you briefly describe your role at your organization?
- What makes STEM important?
- What opportunities do you present to students to help them further their education and/or careers?
- What do you believe inspires students to pursue STEM and stay engaged in it?
- How did your career evolve to bring you where you are today?

Individual 5:

- Can you tell us your story and why you became interested in STEM?
- How do you market STEM to students to encourage them to come to your organization?
- Why do you believe STEM is important?

Individual 6:

- How did your schooling and career lead you to where you are now?
- What impact does having a role model have on students' early career development/education?
- What does the term "career pathway" mean to you?
- How do public schools train soft skills? What clubs also accomplish this goal?
- What skills do internships and CTE training teach students?

Individual 7:

- Can you tell us a little about what your organization does and what you do there?
- What are some of the programs that you have at your organization for students?
- How do you reach out to the community to get individuals, specifically students, engaged with what you are doing along with other STEM activities?
- Do you see any problems with the relationship between students and STEM in your state?
- How do you define the term career pathway?
- What do the majority of individuals in your area pursue as their careers? Why do they pursue these careers?

Individual 8:

- Can you tell us a little about what your organization does and what you do there?
- How do you determine how a student is paired with a mentor in your program?
- How do you keep students engaged?
- What inspires students to join your program?
- Can you give us your definition of career pathways? Why are they important?
- Do you find that students end up pursuing something similar to their interest in their mentorship?
- How did you end up doing what you do? What was your career path?
- Do you have any other questions for us?

R. Black:

- Can you give a brief overview of what your job is?
- How can New Mexico get this generation more interested in pursuing STEM?
- How can STEM be presented in a more attractive way to New Mexico youth?
- What is your definition of a career pathway?
- How important is it to be familiar with LinkedIn and other network sites, inside and out of COVID-19?
- Has New Mexico met this standard? If not, what can be done to improve it?
- How can soft skills be improved?
- How has COVID-19 affected the training process for job seekers and students?
- What has the state of New Mexico done to address problems within its STEM workforce?
- What more can the state do to improve the overall well being of the STEM workforce?

Appendix B: Questions Included on Survey Sent to College Students

- Are you at least 18 years old?*
- What gender do you identify as?
- What is your ethnicity?
- What school do you currently attend?*
- What are you majoring in currently?*
- If you attended high school, did you participate in any after school activities that directly affected the major you chose to pursue?*

 - If yes, what activities?

- Did you take any classes in high school that influenced the major you chose to pursue?*

 - Please list the classes.

- Did you have someone who directly influenced your decision to pursue your major?*

 - If so, what is their relation to you, and how did they impact your decision?

- Do you feel there was anything not asked about that influenced your decision to pursue your major? If not, put N/A.*

(*) indicates an answer was required.

Appendix C: Questions Included on Survey Sent to STEM Professionals

- What is your name?
- If you attended college, what did you study? (put N/A if you did not)
- What is your current profession?*
- What company do you work for?
- In as many words as you like, please tell us why you pursued a STEM field.*
- What is your best advice to students looking to pursue a STEM career?
- Would you like to be featured on our website designed to inspire younger individuals to pursue STEM-based careers?*
- If you are willing, please upload a picture of yourself to be used for your profile.
- The team may be interested in reaching out to some respondents for further information.
If you would like, please leave your email below so that we can contact you in the future.

(*) indicates an answer was required.

Appendix D: Questions Included on Survey Sent to STEM Companies

- Company name*
- Company industry*
- Location*
- Number of employees
- Company profile overview*

(*) indicates an answer was required.