NEBRASKA
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DEPT. OF ECONOMIC DEVELOPMENT

2018-2019 FINAL EVALUATION:

NEBRASKA DEVELOPING YOUTH TALENT INITIATIVE

SEPTEMBER 2019

Dan Curran, Interim Director

INTRODUCTION

Implemented in 2015, LB 657: the Nebraska Developing Youth Talent Initiative (DYTI) was created to support an industry-defined approach to expose seventh and eighth grade students to occupations within the manufacturing and information technology (IT) industries. By piquing interest in these industries and occupations at an early age, the DYTI seeks to develop a youth talent pipeline into high- school career and technical academies, post-secondary programs, and employment across the state.

Workforce needs across the industry spectrum are evolving, particularly within the manufacturing and IT sectors, two of the largest non-farm economic drivers in Nebraska. Manufacturing alone contributes directly and indirectly over $24.032 billion[1] to Nebraska's economy annually. Looming retirements, public misconceptions about careers in manufacturing, and advanced skill-sets require collaborative efforts on many fronts. By the year 2024, the IT industry and other industries with high IT occupational densities will see an increased demand for employees from 15% to 31%.[2]

Eligible applicants are for-profit businesses, or a consortium of businesses, working in partnership with a public school system. Applicant businesses must outline their goals and strategy to develop the future workforce by providing exposure to and generating interest in the skills, technologies, and career opportunities relevant to manufacturing and/or IT occupations to 7th and 8th grade students.

Applications are independently scored by a committee of leaders from the Nebraska Department(s) of Economic Development (DED), Education (NDE), and Labor (DOL). Scoring criteria includes demonstration of the following:

- Impact on businesses, communities, and students
- Program sustainability
- Evidence of regional workforce need and relevance of the proposed project to the need
- Clear goals and projected outcomes
- External evaluation plan
- Budget and project timeline

The DED awards and administers $250,000 annually to a minimum of two business applicants, one of which must be based in a county with a population under 100,000. Since 2015, eight companies and three consortiums have been awarded the DYTI Grant.

2015-2016 Awards	
Hollman Media (Kearney)	$117,148
*Flowserve (Hastings)	$120,881
TOTAL:	$238,029

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1 US Department of Commerce, Bureau of Economic Analysis; and IMPLAN multipliers https://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=2#reqid=70&step=1&isuri=1

2 NDOL, Office of Labor Market Information https://neworks.nebraska.gov/gsipub/index.asp?docid=4401

2016-2017 Awards	
*Distefano (Omaha)	$120,500
MetalQuest (Hebron)	$121,343
TOTAL:	$241,843
2017-2018 Awards	
Aulick (Scottsbluff)	$107,962
*BD (Broken Bow)	$ 67,113
Cyclonaire (York)	$ 74,835
TOTAL:	$249,910
2018-2019 Awards	
Nucor Detailing Center (Norfolk)	$124,977
Reinke Manufacturing (Deshler)	$125,000
TOTAL:	$249,977
2019-2020 Awards	
Orthman Manufacturing (Lexington)	$125,000
Reinke Manufacturing (Deshler)	$22,000
Vistabeam (Gering)	$103,000
TOTAL:	$250,000

(*) indicates consortium

Data is collected by the applicants and by external, third-party evaluators. Schools collect both quantitative data on enrollments and qualitative data on impacted areas difficult to examine numerically. External evaluators conduct pre- and post- surveys to assess the impact DYTI programs had on participating student's perceptions, knowledge, and interest in pursuing careers in manufacturing and/or IT.

2018-2019 PROGRAM EVALUATIONS

Following are overviews of the DYTI program outcomes for Nucor Detailing Center and Reinke Manufacturing. Detailed focus group responses are included in the appendix.

Nucor Detailing Center (Norfolk)

The Nebraska Developing Youth Talent Initiative Grant project implemented by Nucor Detailing Center sought to increase exposure, awareness, interest, and participation in drafting and manufacturing careers for students attending Norfolk Junior High School, Battle Creek Public Schools, Madison Public Schools, Pierce Public Schools, and Stanton Public Schools. Students are exposed to manufacturing, drafting and other IT related careers through a 3-hour, Nucor Detailing Center-led presentation of design and fabrication. Students are also provided hands-on access to design software and age-appropriate manufacturing equipment that replicate the design-to-fabrication work flow involved in manufacturing. Norfolk Junior High School converted a computer lab into its "Creation Station" with permanent on-site equipment. A trailer with equipment rotates among the other school partners.

The project was guided by one overarching goal of *exposing an increasing number of students to career opportunities in the region's manufacturing and information technology industries.* Supporting this goal were a series of measurable outcomes that included

(1) **An increase in participants' awareness of both manufacturing and IT careers,** with outcomes consistent across sites, grade levels and genders.
(2) **An increase in participants' interest in manufacturing careers**, with outcomes consistent across sites, grade levels, and genders.
(3) **Provide each school access to design software and age-appropriate manufacturing equipment**.
(4) **Increase students who enter career pathways leading to postsecondary study in manufacturing, drafting and IT programs.**

INCREASED AWARENESS

The project had a largely positive affect on increasing awareness in manufacturing and IT. The weighted average of responses for all students increased from 3.34 (pre-survey) to 3.79 (post-survey) in the field of manufacturing and from 3.41 (pre-survey) to 3.65 (post-survey) in the field of IT, using a 5-point Likert-scale. Of further encouragement is the large percentage of "don't know" responses for each field, which decreased from 38.15% to 17.76% (in manufacturing) and from 32.10% and 25.88% (in IT). This indicates that the project provided students some clarity regarding these career fields, particularly in manufacturing which was the primary focus of the project.

Additionally, the data show gains in awareness of careers for females which are largely consistent with those experienced by their male counterparts. This indicates that the project is having an impact on females' interest and awareness in the career fields, despite baselines that lag behind their male counterparts.

INCREASED INTEREST

The survey data show a positive increase in student interest in manufacturing careers with weighted average of responses across all sites increasing from 2.9 (pre-survey) to 3.12 (post-survey). This includes gains from 7.14% to 9.51% in the percentage of students who responded "strongly agree" and from 21.58% to 27.65% for those responding "agree." Collectively, this represents an increase from 28.72% to 37.16% in the percent of students who expressed an interest in manufacturing careers.

In the field of IT, the survey data show a slight decrease in the percentage of students who expressed an interest in IT careers, with the weighted average of responses decreasing from 3.08 to 3.02 between the pre- and post-surveys. Given the increases in interest in manufacturing careers, it is likely that some of the positive gains experienced in the area of manufacturing resulted in correlating decreases in IT.

DESIGN SOFTWARE AND AGE-APPROPRIATE MANUFACTURING

To support teacher's use of the equipment, staff from Nucor Detailing Center led 24 hours of training on the equipment. This included training on each of the four major pieces of equipment purchased using DYTI funds, including the Embroidery and Vinyl Cutter, Laser Cutter/Engraver, 3D Printer and CNC Machine.

A total of two trainings were offered on each machine over a two-week period to provide teachers two options for training on each piece of equipment. This commitment to flexibility and understanding the demands of the schools and teachers was a recurring theme throughout Nucor Detailing Center's implementation of the grant.

Each training took place at Nucor Detailing Center in Norfolk and a total of ten teachers across the five partnering

school systems attended at least one of the trainings with several teachers participating in several of the offerings.

CONCLUSIONS

Nucor Detailing Center and its school partners demonstrated strong commitment to connecting 7th and 8th grade students to opportunities in manufacturing, drafting and other IT careers through hands-on use of age-appropriate manufacturing hardware and software as well as industry-led career exploration. The DYTI project seeks to improve schools, communities and businesses by creating a pipeline that connects students to quality local manufacturing and IT occupations. Data collected from throughout the project show that the project is having a positive impact on student's interest and awareness of careers in manufacturing and IT.

Reinke Manufacturing (Deshler)

The Developing Youth Talent Initiative project implemented by Reinke created courses and daily mentorships to expose students to the manufacturing industry through skill development and application to fabrication technology, equipment and career opportunities. Curriculum that focused on the application of math and science related to coding and use of the CNC mill was developed and integrated into 7th and 8th graders' Shop Tech course at Deshler Public Schools and will be available to additional area public schools in the future. Students were provided instruction and opportunities for self-paced, hands-on work on a CNC Mill, HAAS Simulators, CNC Lathe, Circle and Precision Measurement Tools, Air pressure simulators, Circuit PHET simulator and Circuit hands on simulator.

The Goals for Reinke were:

1) Elevate business/school connections to improve students' awareness of careers and educational requirements in the manufacturing sciences.
2) To improve the skills and knowledge of 7th and 8th grade students (at least 206 students) attending 4 rural school districts in Thayer County in fabrication and technologies used in the manufacturing sciences to advance interests in careers and post-secondary education.

The program evaluation process examined the following questions:

1) To what extent does the project increase student awareness and interest in manufacturing careers and related training?
2) To what extent does the project increase teacher or community awareness of and interest in manufacturing science careers and training?
3) To what extent does the project result in industry engagement in outreach and education?
4) To what extent does the project prompt manufacturing related education in participating schools?

INCREASED AWARENESS

Student Survey Highlights

Project evaluation included student, parent and teacher pre- and post-surveys and a student discussion group. Survey data shows declines in student awareness between the pre- and post-surveys, which may have been impacted by the small number of respondents and a considerable difference in female respondents (i.e. there was a higher proportion of female post-survey respondents). A gain in awareness was demonstrated in the prompt "Knowing how to use math and science together will help me to invent useful things" increasing from 3.00 (using a 4-point Likert-scale) to 3.15 between the pre- and post-surveys. The change was more significant for female students, where female responses increased by +.32 and male responses increased +.05.

Student post-survey prompts showed students believe parents would be supportive if they chose to pursue a career in STEM or manufacturing. 68.2% of students responded Yes (as opposed to No and Not Sure) in the pre-survey and 92.3% students responded Strongly Agree or Agree (as opposed to Disagree or Strongly Disagree) in the post-survey (the response options to the prompt changed between the pre- and post-surveys).

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Students in the discussion group were asked to share what they learned from their experiences with the activities related to the class and grant. The comments were overwhelmingly positive and primarily focused on what they

had learned about coding, about using the simulator to see where they had errors in the coding, and the preparation that was necessary before they used the CNC mill. Students were excited to share what they had learned and created in the class. This included notebooks which contained their coding and aluminum blocks with designs created by the students using the CNC mill.

Parent Survey Highlights:

The parent surveys indicated an increase in positive attitude towards careers in STEM and manufacturing related fields between the pre- and post-survey. The average response for the prompt "I have encouraged my child(ren) to consider careers in STEM or manufacturing related fields increased from 2.40 (on a scale of 1-4) to 2.89; a change of +.49 between pre-and post-surveys. This is significant as parent views on careers play an influential role for students as they make career and post-secondary education decisions.

CONCLUSIONS

Reinke demonstrated significant commitment to fostering students' interest and awareness in STEM and manufacturing careers through exposure to fabrication curriculum and equipment. Reinke staff and the teachers and students at Deshler Public Schools were highly engaged in the class and grant activities. Qualitative data collected on the student surveys, teacher surveys, parent surveys, student discussion group, and teacher discussion group, were overwhelming positive about the impact of the grant activities. The impacted areas included soft skills such as problem solving and critical thinking as well as an increased awareness of manufacturing and technology related careers. There was also evidence that teachers may have thought differently about how to use instructional strategies to increase student engagement, problem solving, and critical thinking because of the grant. There were few negative comments or feedback related to the project. It was also clear through the qualitative data that the project helped to create a positive view of the business partner in school, had a positive impact on the relationship between the business partner and the school, and increased the collaboration between the business partner and the school.

The following reports were submitted by each grant recipient.

NEBRASKA DEVELOPING YOUTH TALENT INITIATIVE FINAL REPORT

Prepared for Nucor Detailing Center

By Frank Shimerdla
June 2019

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Executive Summary

The Nebraska Developing Youth Talent Initiative Grant award implemented by Nucor Detailing Center sought to increase exposure, awareness, interest, and participation in drafting and manufacturing careers for students attending Norfolk Junior High School, Battle Creek Public Schools, Madison Public Schools, Pierce Public Schools, and Stanton Public Schools.
Key activities initiated through the grant include:

- **Acquisition of drafting and manufacturing supplies and equipment to provide students at the targeted schools with access to hands-on instructional activities that simulate those occurring within drafting and manufacturing careers.** This specifically included the development of a makerspace at Norfolk Junior High School and a mobile "creation station" that was shared amongst Stanton, Pierce, Madison and Battle Creek schools). Through these environments, each school was provided access to a 3D printer, CNC machine, laser cutter, vinyl cutter, embroidery machine, computers to run the equipment, 3d scanner and 3d pens.
- **Teacher training (provided by Nucor staff) to support the use and integration of the equipment into the classroom.** A total of 24 hours of training was provided to 10 teachers across the target schools in July to August of 2018. Led by Nucor staff, the trainings were designed to introduce teachers to the equipment provided through the grant and impart a foundational knowledge to support the instruction to occur throughout the grant.
- **Career presentations by Nucor staff to lead learning projects and provide students with direct access to drafting and manufacturing industry representatives.** This included a total of 30 separate events held at the partnering schools. The presentations included an overview of careers in drafting and manufacturing, Nucor-led demonstrations of equipment and facilitation of projects utilizing the equipment.
- **Ongoing support and technical assistance to teachers and schools in the continued integration of the equipment and related coursework.** Nucor staff provided on-call technical assistance to teachers throughout the year to ensure their ability and confidence in using the grant-funded equipment.

The enclosed report documents the impact of these activities relative to the NDYTI Grant Program's goals of increasing awareness and interest in manufacturing careers, and its progress toward the goals outlined in Nucor Detailing Center's 2018 NDYTI grant application. As shown throughout the report and the enclosed data, the NDYTI project implemented by Nucor Detailing Center is having a demonstrable positive impact on students' awareness and interest in drafting and manufacturing careers. Further, interviews with teachers indicate a positive and lasting impact of the project relative to instruction.

Key Project Findings/Themes

As discussed throughout the enclosed report, several key findings emerged during the evaluation of Nucor Detailing Center's Nebraska Developing Youth Talent Initiative grant. These findings are cited as follows with a variety of data (both quantitative and qualitative) provided throughout this report to substantiate and provide deeper insight into these outcomes and findings:

- **An increase in participants' awareness of both manufacturing and IT careers,** with outcomes consistent across sites, grade levels and genders

- **An increase in participants' interest in manufacturing careers**, with outcomes consistent across sites, grade levels, and genders. No discernible interest gains in IT (which was a secondary focus of the grant).
- **An effective approach to providing access to design software and manufacturing equipment**. The project represents a unique approach to serving multiple schools of varying enrollment, and offers a replicable framework for serving other schools and regions with small enrollments of students where the purchase of such equipment presents cost challenges.
- **The project was effective in engaging students and teachers alike.** As described in the enclosed report, the equipment and career presentations provided students with the opportunity to create and express themselves through the products developed through the use of the grant-funded equipment.
- **Significant investment of time, leadership and resources by Nucor Detailing Center**. The project fully embraced the spirit of the NDYTI grant initiative. From its conception to the expiration of grant funding, the project was driven by Nucor's strong commitment to increasing awareness and interest in careers. As stated throughout the report, Nucor Detailing Center and Mr. Dave Decarolis and Mr. Justin Olson are to be commended for their tremendous and tireless work and strong commitment to the project.

Goal/Data Summary

To assess the impact of its NDYTI grant project, Nucor Detailing Center, working with Frank Shimerdla (external evaluator), utilized an array of strategies including pre- and post-surveys of students at the target sites, observation, and interviews with teachers and staff. The enclosed section details performance data collected relative to each of the program goals, including those common performance measures established for the NDYTI program and those established by NUCOR specific to the project.

NDYTI Common Performance Measure and Program Goal: Increasing Awareness in Manufacturing and IT Careers

To measure student awareness of careers in manufacturing (which includes drafting) and IT, a pre- and post-survey was administered to students before and after the career presentations at each of the partnering schools. The survey included a statement (e.g., "I have a strong understanding of careers in the manufacturing field, which includes drafting") and asked students to share their level of agreement with statement using a 5-point Likert-scale. Potential responses included "strongly disagree," "disagree," "don't know," "agree" and "strongly agree." The enclosed table includes summary data for the project as well as each site.

Results shown include the percentage of students per each response as well as a weighted average and are broken down by site. Given the sample size, data for the surrounding partnering school districts (i.e., Pierce, Battle Creek, Madison and Stanton) have been combined.

As the enclosed data show, survey responses indicate a strong increase in students' understanding of careers in manufacturing (see Table 1) and IT (see Table 2). In fact, the weighted average of responses for all students increased from 3.34 (pre) to 3.79 (post) in the field of manufacturing and from 3.41 (pre) to 3.65) in the field of IT. Of further encouragement is the large percentage of "don't know" responses for each field, which decreased from 38.15% to 17.76% (in manufacturing) and from 32.10% and 25.88% (in IT). This indicates that the project provided students some clarity regarding these career fields, particularly in manufacturing which

was the primary focus of the project.

TABLE 1: "I HAVE A STRONG UNDERSTANDING OF JOBS IN THE MANUFACTURING FIELD (WHICH INCLUDES DRAFTING)"

	STRONGLY AGREE		AGREE		DON'T KNOW		DISAGREE		STRONGLY DISAGREE		WEIGHTED AVERAGE	
Site	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*
All *(n = 671/456)*	8.49%	14.91 %	36.8 %	58.99 %	38.15 %	17.76 %	12.82 %	6.36%	3.73 %	1.97 %	3.34	3.79
Norfolk Jr. *(n = 543/367)*	7.73%	15.53 %	38.12 %	59.40 %	37.57 %	17.17 %	12.89 %	5.99%	3.68 %	1.91 %	3.33	3.81
Other sites *(n = 125/87)*	11.29 %	12.64 %	30.65 %	57.47 %	41.13 %	19.54 %	12.90 %	8.05%	4.03 %	2.30 %	3.32	3.70

TABLE 2: "I HAVE A STRONG UNDERSTANDING OF JOBS IN THE INFORMATION TECHNOLOGY (IT) FIELD"

	STRONGLY AGREE		AGREE		DON'T KNOW		DISAGREE		STRONGLY DISAGREE		WEIGHTED AVERAGE	
Site	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*
All *(n = 673/452)*	9.96%	14.60 %	41.46 %	48.45 %	32.10 %	25.88 %	12.18 %	9.51%	4.31 %	1.55 %	3.41	3.65
Norfolk Jr. *(n = 544/363)*	9.01%	15.43 %	42.46 %	50.41 %	31.43 %	23.42 %	12.87 %	9.37%	4.23 %	1.38 %	3.39	3.69
Other sites *(n = 125/87)*	13.60 %	10.34 %	36.80 %	41.38 %	35.20 %	35.63 %	9.60%	10.34 %	4.80 %	2.30 %	3.45	3.47

NDYTI Common Performance Measure and Program Goal: Increasing Interest in Manufacturing and IT Careers

In addition to their understanding of these careers, students were also asked to share their level of interest in manufacturing and IT as a potential career field. While it is understood that students in grades 7 and 8 are just beginning to explore potential careers, this measure serves to assess current interest and may be predictive of future activity in related educational and other programming which may lead to a career in these high-growth fields.

TABLE 3: "I AM INTERESTED IN A MANUFACTURING CAREER (WHICH INCLUDES DRAFTING)"

	STRONGLY AGREE		AGREE		DON'T KNOW		DISAGREE		STRONGLY DISAGREE		WEIGHTED AVERAGE	
Site	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*
All *(n = 672/452)*	7.14%	9.51%	21.58 %	27.65 %	41.82 %	35.40 %	20.24 %	20.35 %	9.23 %	7.08 %	2.97	3.12
Norfolk Jr. *(n = 543/363)*	6.62%	9.09%	22.10 %	27.82 %	40.33 %	34.16 %	21.18 %	20.94 %	9.76 %	7.99 %	2.95	3.09
Other sites *(n = 125/87)*	8.80%	11.49 %	18.40 %	27.59 %	49.60 %	40.23 %	16.00 %	17.24 %	7.20 %	3.45 %	3.06	3.26

Table 3 (enclosed) details student responses relative to interest in manufacturing careers. As shown, the survey data show a positive increase in student interest in manufacturing careers with weighted average of responses across all sites increasing from 2.9 to 3.12. This includes gains from 7.14% to 9.51% in the percentage of students who responded "strongly agree" and from 21.58% to 27.65% for those responding "agree." Collectively, this represents an increase from 28.72% to 37.16% in the percent of students who expressed an interest in manufacturing careers.

In looking specifically at IT careers, the survey data show a slight decrease in the percentage of students who expressed an interest in IT careers, with the weighted average of responses decreasing from 3.08 to 3.02. While these data indicate a declining interest, it should be noted that the project largely entailed manufacturing careers with IT featured in more of a supportive role than as a standalone industry. Further, given the increases in interest in manufacturing careers, it is likely that some of the positive gains experienced in the area of manufacturing resulted in correlating decreases in IT.

TABLE 4: "I AM INTERESTED IN AN IT (TECHNOLOGY) CAREER"												
	STRONGLY AGREE		AGREE		DON'T KNOW		DISAGREE		STRONGLY DISAGREE		WEIGHTED AVERAGE	
Site	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*
All *(n = 672/451)*	8.78%	10.20 %	25.45 %	19.07 %	38.69 %	39.47 %	18.75 %	24.83 %	8.33 %	6.43 %	3.08	3.02
Norfolk Jr. *(n = 544/363)*	8.27%	9.37%	26.29 %	19.83 %	38.05 %	39.39 %	18.75 %	24.52 %	8.64 %	6.89 %	3.07	3.00
Other sites *(n = 124/86)*	10.48 %	12.79 %	20.97 %	16.28 %	41.94 %	26.74 %	19.35 %	26.74 %	7.26 %	4.65 %	3.08	3.06

Given the underrepresentation of women in these nontraditional career fields, the evaluation included analysis of data relative to the performance of females within the project. As shown in Table 5, the data show gains for females which are largely consistent with those experienced by their male counterparts. This indicates that the project is having an impact on females' interest and awareness in the career fields, despite baselines that lag behind their male counterparts.

TABLE 5: AWARENESS AND INTEREST IN MANUFACTURING AND IT BY GENDER								
	UNDERSTANDING OF JOBS IN MANUFACTURING		UNDERSTANDING OF JOBS IN IT		INTEREST IN JOBS IN MANUFACTURING		INTEREST IN JOBS IN IT	
	Pre	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*
All	3.34	3.79	3.41	3.65	2.97	3.12	3.08	3.02
Females *(n=352)*	3.25	3.69	3.29	3.58	2.80	2.89	2.82	2.84
Males *(n=315)*	3.42	3.87	3.52	3.71	3.17	3.32	3.36	3.18

Similar to gender, there were no significant disparities in awareness and interest when looking at grade levels. Similar to the data for all students and by gender, strong improvement was shown relative to students' interest and awareness of manufacturing careers. In the area of IT, while the data show an increase in awareness of these career fields, the data also show a decrease in interest in IT careers. As previously mentioned, the project largely focused on manufacturing with IT featured more as a function within manufacturing.

Table 6: Awareness and Interest in Manufacturing and IT by Grade Level								
	Understanding of Jobs in Manufacturing		Understanding of Jobs in IT		Interest in Jobs in Manufacturing		Interest in Jobs in IT	
	Pre	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*
All	3.34	3.79	3.41	3.65	2.97	3.12	3.08	3.02
Grade 7 *(n=257)*	3.42	3.81	3.43	3.69	3.07	3.14	3.09	2.99
Grade 8 *(n=197)*	3.27	3.76	3.38	3.59	2.89	3.10	3.06	3.06

To increase student exposure and potential interest in manufacturing and IT, Nucor led career presentations at each of the partnering schools. This included 21 separate days of presentations at Norfolk Junior High School, 2 days at Pierce Junior High, 3 days at Battle Creek Junior High, 2 days at Madison Junior High and 2 days at Stanton Junior High.

The presentations were again led by Mr. Decarolis and Mr. Olson with assistance provided by additional Nucor staff. Observations obtained from a March 21 presentation at Norfolk Junior High include several common themes which also emerged during the teacher training. The level of commitment and resources provided to this component of the project was again evident. The presentation guided students through the design and creation of a mobile phone stand using the 3D Printer. The presentation was extremely hands-on and fast-paced, given the duration of the class period. Students identified an image and then using the Revit software, designed the phone stand. The project itself appealed to students' ability to express themselves and this would be a theme that emerged in other areas of the evaluation as well. As students worked on their projects, Dave and Justin were available to answer questions and help students troubleshoot as they designed their projects. It should be mentioned that Dave and Justin developed a very good report when working with the junior high school students. Several of the students were identified by name and from observation, were really engaged in their projects.

March 22 Career Presentation at Norfolk Jr. High School

Given the number of projects coupled with the time limitations, the students loaded their projects onto flash drives. It was understood that Nucor would "print" the projects at the Detailing Center. This represents a tremendous time investment from Nucor and again reflects their commitment to the project and the students.

In addition to the Career Presentations, Nucor also provided an estimated additional 15 hours of instruction to various "other" classes at the schools including art, special education, and match among others. These presentations served to extend awareness and engagement experiences in manufacturing, and to a lesser extent IT, to students in these classes. It also served to test the co-curricular potential of the equipment and the increasingly ubiquitous nature of manufacturing and IT.

In addition to these activities, Nucor also provided presentations to the STEM class at Norfolk Junior High (estimated at 15 hours of classroom contact) and another 10 hours of on-call technical assistance and on-site training to teachers in the use of the equipment.

Goal: Provide Each School Access to Design Software and Age-Appropriate Manufacturing Equipment

In its implementation of the NDYTI grant project, Nucor Detailing Center sought to provide equitable access to design and engineering equipment to teachers and students at each of the five partnering school sites (Norfolk, Battle Creek, Madison, Pierce and Stanton Junior High Schools). As briefly described in the Executive Summary, this included the establishment of a makerspace at Norfolk Junior High School and a mobile "Creation Station" that rotated between the four remaining junior high schools. Norfolk Junior High School includes an enrollment of 615 students; whereas Battle Creek, Madison, Pierce and Stanton Junior High Schools have a combined enrollment of 304 students.

Photo taken during August 6, 2018 training with teachers learning to use the embroidery machines.

Through the permanent makerspace at Norfolk Junior High and the mobile Creation Station, 100% of students attending the sites were provided access to a 3D printer, CNC machine, laser cutter, vinyl cutter, embroidery machine, computers to run the equipment, 3d scanner and 3d pens.

To support teacher's use of the equipment, Nucor Detailing Center, coordinated by Mr. Dave Decarolis and Mr. Justin Olson, led 24 hours of training on the equipment. This included training on each of the four major pieces of equipment (Embroidery and Vinyl Cutter, Laser Cutter/Engraver, 3D Printer and CNC Machine).

A total of two trainings were offered on each machine over a two-week period to provide teachers two options for training on each piece of equipment. This commitment to flexibility and understanding the demands of the schools and teachers was a recurring theme throughout Nucor's implementation of the grant (described further throughout this report).

Each training took place at Nucor Detailing Center in Norfolk and a total of ten teachers across the five partnering school systems attended at least one of the trainings with several teachers participating in several of the offerings.

Photo taken during August 6, 2018 training on Vinyl Cutter machine

Observations from a training which took place on August 6, 2018 (Embroidery and Vinyl Cutter Training) revealed or confirmed some findings regarding the quality of the training and its relevance to the overall goals of the project. The training was attended by a total of eight teachers. The presentation, led by Mr. Dave Decarolis and Mr. Justin Olson, included an overview of the Vinyl Cutter and Embroidery machines.

Dave and Justin did an excellent job of facilitating the training, responding to teacher questions, and engaging the teachers throughout the project-based learning activities embedded within the training curriculum. (The effectiveness of Dave and Justin as both trainers and in facilitating the career presentations were a consistent theme during post-program interviews.) The training entailed a hands-on approach and Dave recommended to the teachers that they utilize a similar approach when exposing students to the equipment. He clearly suggested that by engaging the students with the equipment they will "think they are playing when in fact they are actually learning."

In post-grant interviews, several of the teachers commended Nucor for the training, including such statements as "it was really good," "very informative," and "it gave me a good experience to use the machines." Consistent with other areas of the project implementation, the training represented a significant commitment of time and resource by Nucor Detailing Center. In addition to the curriculum, set up, material and facilitation time, Nucor also provided a lunch for the teachers.

Interviews with teachers suggest that the equipment had a positive impact on the learning environment within their classrooms and provide deeper insights into the project and strategies for better integrating the equipment into the curriculum. Several of the teachers noted that equipment was very appealing to the students once they got used to the equipment. Initially, some students had an attitude of "what are we going to do with this," or were hesitant in fear of breaking the equipment. Once engaged, the students enjoyed the opportunity to create using the equipment. Self-expression appears to be a potentially powerful use of the equipment, which was evident both in the post-program interviews with teachers and during the observation of the career presentation where the students designed a mobile phone stand. As one teacher put it, "working with junior high kids, the opportunity to make things look cool really seemed to get them involved." One other teacher noted that the equipment was effective in engaging a couple of students with behavior problems who "don't always buy in." She noted it was "rewarding" to see the students get engage and "thrive."

While several of the teachers commended Nucor for the training, when asked what could have worked better with the project, recommendations were provided (and should be considered moving forward) which may have enhanced the impact of the project. A teacher from one of the surrounding schools noted that having the creation station for short periods of time was disruptive and presented some challenges integrating the equipment into the curriculum. Another teacher noted that she wished she was more familiar with the machines, as "trying to learn all the machines at once was a little daunting." Two additional teachers felt that more staff from their schools should have attended the training, and one teacher struggled to manage the workflow of students through the machines.

These responses are consistent with challenges faced in previous NDYTI projects that included new equipment. It anticipated that familiarity with the machines will improve over time given continued use and Nucor continued work with the teachers.

Goal: Increase students who enter career pathways leading to postsecondary study in manufacturing, drafting and IT programs.

Nucor's NDYTI Project included two longer-term goals targeting an increase in the number of students who pursue careers within manufacturing, draft and IT fields. These include (1) an

increase in enrollment in related career academy programming at the high schools and (2) an increase in manufacturing, drafting and IT programs of study at Northeast Community College. As long-term goals, data to confirm the impact of the project in pathways are not available at the time of this report. Nucor will be working closely with the targeted school systems to monitor enrollments in career academy and related coursework and with Northeast Community College to monitor enrollments in manufacturing, drafting and IT courses and programs of study. It is understood that the impact of the program, if any, will be apparent in four years when the current 8th grade students served by the project graduate form high school and enroll in college.
While the enrollment data will not be available until Fall of 2019 for the high school enrollment and 2023 for college, a survey question was administered to students measure their level of interest in participating in future coursework in the areas of manufacturing, drafting and IT. Similar to the previously enclosed survey data, responses were collected using and pre- and post-survey to assess changes in intent as a result of the presentations, equipment, curricula and related interventions. As shown in Table 6, there was a slight increase in weighted average from 3.11 to 3.14 looking at pre- to post-results. While these gains are modest at best, a closer look at the data show that of those surveyed 33.71% expressed an interest in taking future coursework in manufacturing or IT during high school (as determined by combining "strongly agree" and "agree" responses).

TABLE 6: "I WOULD LIKE TO TAKE ADDITIONAL COURSES IN MANUFACTURING OR IT WHEN I GET TO HIGH SCHOOL"

	Strongly Agree		Agree		Don't Know		Disagree		Strongly Disagree		Weighted Average	
Site	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*
All *(n = 672/451)*	9.08%	9.98%	21.43 %	23.73 %	48.36 %	42.35 %	13.84 %	17.74 %	7.29 %	6.21 %	3.11	3.14

Stakeholder Feedback

In addition to the data collected to measure progress toward these goals, the evaluation also included mechanisms to collect open-ended feedback from students, specifically, to contextualize and provide a deeper understanding of the project's impacts. This included an open-ended survey question, which asked the students to identify their biggest challenge in a potential manufacturing or IT career. Responses were categorized based on the nature of the response. Given the range of potential responses, categorization was a largely subjective process. Response categories are detailed in the enclosed table with example responses for each category also included. These categories range from industry-specific challenges such as using technology to general employment challenges, such as pay.

The open-ended responses were collected during the pre-survey and post-survey offering an opportunity to assess any changes in perceived challenges as result of the program. Results of the survey are included and discussed on the following pages.

RESPONSE CATEGORIES	EXAMPLES OF RESPONSES
Getting a job	School, college, deciding on a job, interview
General Employment Challenges	Working, hours, free time, pay
Industry-Specific Challenges	Technology, computers, tools, machinery, measurements, drafting/drawing
Readiness Skills	working with others, time management, creativity
Failure/Fear	not breaking everything, not messing up, making mistakes, I am concerned that your hand could get chopped off
Learning/Understanding	I wouldn't know how to do it, it would be too hard to understand, understanding the job, don't know how to do it,
No challenges/confident	don't feel like I have any challenges
Not interested in Manufacturing or IT	Not interested, don't want to do this career, challenge would be going to work each day, naming other career interests
Don't know	don't know, idk
No Answer	skipped questions, don't understand question, nonsense

Among the most prominent challenges cited by students in the pre-survey were "learning and understanding information," which entailed 21% responses followed by "general employment challenges" (20%), "Don't know" (12%), "skills relating to job" (11%), "not interested in manufacturing/IT" (11%), and "failure/fear" (8%).

These are documented in the enclosed table and charts which show both the number of responses and percent.

When looking at the pre- and post-survey responses, the most noticeable shifts occurred with the "Learning/Understanding Information," which experienced an 8% decrease in the percent of responses from the pre- to the post-survey. This category of responses cited such challenges as "I wouldn't know how to do it," not messing up," "making mistakes," et al. The shift in prevalence of these response may indicate an increase in student confidence regarding these careers. As previously described, the project effectively exposed students to equipment similar to that which is found in the manufacturing workplace. Having the opportunity to work with such equipment may have built confidence, which was confirmed by one teacher in her post-program interview who stated that student were afraid of "breaking something" at first but as they became comfortable with the equipment, they were really "hooked."

Response	Pre-Survey *(n=664)*	Post-Survey *(n=462)*
Learning/Understanding Information	21%	13%
General Employment Challenges	20%	25%
Don't know	12%	9%
Not interested in Manufacturing or IT	11%	13%
Readiness Skills	11%	12%
Failure/Fear	8%	8%
No answer	8%	8%
Industry-Specific Challenges	4%	10%
Getting a job	3%	3%
No challenges/confident	2%	0%

Another dramatic change occurred in the category of "general employment challenges" and entailed such responses as "working, hours, free time, and pay." Responses from the pre- to the post-survey increased from 20% to 25%. While there are no clear reasons for this shift, these challenges should be accounted for as students continue to consider careers. The other most notable shift was in the category of "Industry-Specific Challenges," which includes such things as "technology," "computers," "tools," "machinery," "measurements" and "drafting/drawing." These increased from 4% of responses to 10% of responses, and as student become more familiar and confident with equipment, these results should continue to be monitored to determine the impact of the equipment in resolving these perceived challenges.

Summary

Nucor Detailing Center should be commended for its commitment to and its implementation of the Nebraska Developing Youth Talent Initiative Grant. The Project embodied the full spirit of the NDYTI grant program: the project was fully initiated and led by the industry partner which committed considerable inkind and other resources to the project. Nucor effectively engaged the partners from the planning of the project to its conclusion and have expressed a clear commitment to continue the project after grant funding expires. Both Mr. Decarolis and Mr. Olson are also to be commended. Not only were they instrumental in all aspects of the project's implementation, teachers frequently cited their availability and generosity to help when asked. Further, and perhaps most importantly, data collected from throughout the project show that the project is having a positive impact on students' interest and awareness of careers in manufacturing.

Additional Notes/Resources

Link to March 25, 2019 article on the Nebraska Public School Advantage website, featuring Nucor's NDYTI Grant project
https://www.nebraska-advantage.org/made-stanton-nucors-makerspace-opening-eyes-and-doors-students

Diagram 1: Word Cloud Pre-Survey Responses

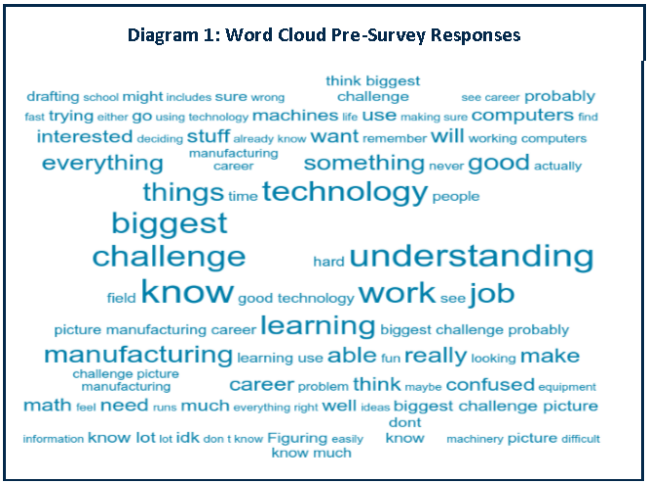
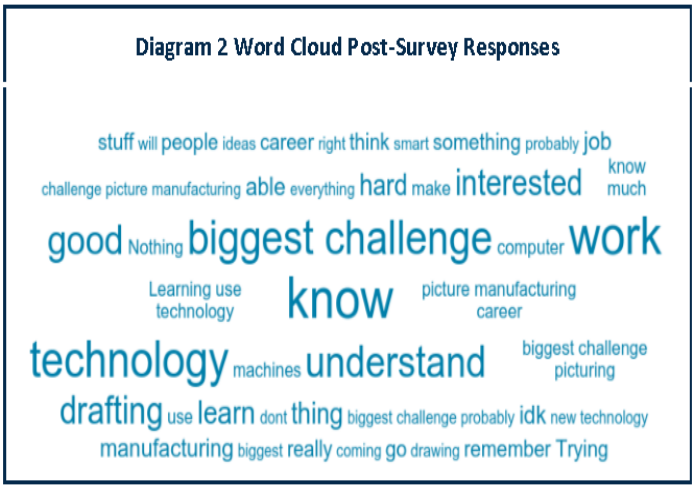


Diagram 2 Word Cloud Post-Survey Responses



Project Evaluation

Nebraska Developing Youth Talent Initiative Grant
Reinke Manufacturing/Deshler Public Schools

Dr. Richard Meyer, Ed.D.
5-31-2019

Project Goals:

The project had two goals:

1) Elevate business/school connections to improve students' awareness of careers and educational requirements in the manufacturing sciences.

2) To improve the skills and knowledge of 7th and 8th grade students (at least 206 students) attending 4 rural school districts in Thayer County in fabrication and technologies used in the manufacturing sciences to advance interests in careers and post-secondary education.

The program evaluation process examined the following questions:

1) To what extent does the project increase student awareness of and interest in manufacturing careers and related training?

2) To what extent does the project increase teacher or community awareness of and interest in manufacturing science careers and training?

3) To what extent does the project result in industry engagement in outreach and education?

4) To what extent does the project prompt manufacturing related education in participating schools?

The evaluator also explored how the grant activities may be modified to increase the impact on the intended outcomes.

Method

To evaluate the program goals, the evaluator created a pre-survey and post-survey for students, parents, and teachers. The surveys were adapted from surveys developed by the Friday Institute for Educational Innovation (2012). The Friday Institute and the survey authors granted the evaluator permission to use, adapt, and modify the surveys to meet the needs of this evaluation. The surveys were constructed in Qualtrics, a secure, online survey software available to the evaluator. Links for all surveys were distributed by e-mail to the school contact. Responses were monitored for completion and reminders to complete the surveys in a timely manner were sent to the school by e-mail.

The student survey included the following demographic information: grade level and gender. The pre and post-surveys included 9 stems that were the same. Stem responses were gathered using a 4 point Likert scale (1=Strongly Disagree, 2=Disagree, 3=Agree, and 4=Strongly Agree). Both surveys also asked if the student knew adults working in manufacturing, if the student was interested in STEM related careers, and the student's perception of their parents' support for pursuing a career in a STEM related field. The post-survey also included two open-ended questions that asked what students had learned through the experience and how the experience might be improved. 22 students completed the pre-survey while 26 students completed the post-

survey. The surveys were not matched, so there is no way to know if students who completed the pre-survey also completed the post-survey. However, given the relatively low number of surveys collected, the differences in the pre and post-survey results may have been influenced by a small number of responses.

The teacher survey included the demographic information regarding gender. The pre and post- surveys included 5 stems that were the same. The stem responses were gathered using a 4 point Likert scale (1=Strongly Disagree, 2=Disagree, 3=Agree, and 4=Strongly Agree). On the pre- test, teachers were asked about what benefits they thought students would gain from the experience and what concerns they had about using the grant related curriculum and equipment. On the post-survey, teachers were also asked two yes-no-not sure questions about the impact of the activities on students. In addition, teachers were asked to respond to two open-ended questions where they were asked to explain what students gained from the experience and how the experiences might be improved. One teacher completed the pre-survey while two teachers completed the post-survey. The surveys were not matched.

The parent surveys, pre and post, included 3 stems that were the same. The parent stems focused on their attitudes and perceptions of STEM and manufacturing related careers for their child(ren). The stem responses were gathered using a 4 point Likert scale (1=Strongly Disagree, 2=Disagree, 3=Agree, and 4=Strongly Agree). 15 parents completed the pre-survey, while 9 parents completed the post-survey. As with the other survey instruments, the surveys were not matched.

The evaluator conducted a site visit at Deshler Public Schools on April 23, 2019 to observe the class where the grant funds were being used. The evaluator had an opportunity to visit with Dr. Al Meier, Superintendent of Schools, Ms. Bonnie Noel, Mr. Ron Rickstrew, a group of 8^{th} grade students, and individual 7^{th} grade students in the class. Everyone was friendly and willing to share about the grant and the class.

Student Survey Results

Students were administered a pre-survey and a post-survey to measure attitudes and thoughts regarding STEM, manufacturing, and related careers. 22 student responses were collected on the pre-survey. 26 student responses were collected on the post-survey. Students completing the surveys were enrolled in grades 7 and 8. The distribution by grade level is the following:

Grade	**# Pre** (N=22)	**# Post** (N=26)
7^{th} grade	8	9
8^{th} grade	14	17

The distribution by gender of the student completing the surveys were as follows:

Gender	**# Pre** (N=22)	**# Post** (N=26)
Female	10	17
Male	12	9

Survey Prompts

The mean responses to the student prompts (1=Strongly Disagree to 4=Strongly Agree), as well as the change from the pre-survey to the post-survey, are displayed in the following table.

Student Prompts	Pre-Survey (N=22)	Post-Survey (N=26)	Difference (Pre-Post)
I like to imagine making new products.	3.18	2.81	-0.37
If I learn about STEM (Science, Technology, Engineering, Math) and manufacturing, then I can improve things that people use every day.	3.05	2.96	-0.09
I am good at building or fixing things.	3.27	2.85	-0.42
I am interested in what makes machines work.	2.73	2.38	-0.35
Designing products or structures will be important in my future jobs.	2.59	2.38	-0.21
I am curious about STEM and manufacturing careers.	2.36	2.12	-0.24
I want to be creative in my future jobs.	3.23	3.31	0.08
Knowing how to use math and science together will help me to invent useful things.	3.00	3.15	0.15
I believe I can be successful in a STEM or manufacturing related career.	2.66	2.38	-0.28
My parents would be supportive if I chose to pursue a career in a STEM or manufacturing related career. *(post-survey only)*		3.27	
My parents thoughts about STEM or manufacturing related careers have changed based on my experiences with the activities in this class. *(post-survey only)*		2.19	

Responses to the student prompts were disaggregated by gender to see if there were differences in response rates between females and males. The following chart displays the disaggregated responses:

Student Prompts	Pre-Survey (F N=10/ M N=12)	Post-Survey (F N=17/ M N=9)	Difference (Pre-Post- F/M)
I like to imagine making new products.	3.00/3.33	2.71/3.00	-0.29/-0.33
If I learn about STEM (Science, Technology, Engineering, Math) and manufacturing, then I can improve things that people use every day.	3.10/3.00	2.76/3.33	-0.34/0.33
I am good at building or fixing things.	2.90/3.58	2.59/3.33	-0.31/-0.25
I am interested in what makes machines work.	2.20/3.17	2.24/2.67	0.04/-0.50
Designing products or structures will be important in my future jobs.	2.50/2.67	2.29/2.56	-0.21/-0.11
I am curious about STEM and manufacturing careers.	2.10/2.58	2.00/2.33	-0.10/-0.25
I want to be creative in my future jobs.	3.30/3.17	3.35/3.22	0.05/0.05
Knowing how to use math and science together will help me to invent useful things.	2.80/3.17	3.12/3.22	0.32/0.05
I believe I can be successful in a STEM or manufacturing related career.	2.65/2.67	2.18/2.78	-0.47/0.11
My parents would be supportive if I chose to pursue a career in a STEM or manufacturing related career. *(post-survey only)*		3.24/3.33	
My parents thoughts about STEM or manufacturing related careers have changed based on my experiences with the activities in this class. *(post-survey only)*		2.29/2.00	

Student Pre-Survey Prompt

I know adults who work in a STEM or manufacturing related job.

Response	All %	Female %	Male %
Yes	68.2	100.0	41.7
No	4.5	0.0	50.0
Not Sure	27.3	0.0	8.3

Student Post-Survey Prompt

I know adults who work in a STEM or manufacturing related job.

Response	All %	Female %	Male %
Yes	80.8	94.1	55.6
No	7.7	0.0	22.2
Not Sure	11.5	5.9	22.2

Student Pre-Survey Prompt

I have thought about pursuing a career in STEM or manufacturing.

Response	All %	Female %	Male %
Yes	22.7	10.0	33.3
No	77.3	90.0	66.7

Student Post-Survey Prompt

I have thought about pursuing a career in STEM or manufacturing.

Response	All %	Female %	Male %
Yes	22.7	5.9	44.4
No	77.3	94.1	55.6

Student Pre-Survey Prompt

My parents would be supportive if I chose to pursue a career in STEM or manufacturing.

Response	All %	Female %	Male %
Yes	68.2	70.0	66.7
No	0.0	0.0	0.0
Not Sure	31.8	30.0	33.3

Student Post-Survey Prompt

My parents would be supportive if I chose to pursue a career in STEM or manufacturing.

Response	All %	Female %	Male %
Strongly Agree	34.6	35.3	33.3
Agree	57.7	52.9	66.7
Disagree	7.7	11.8	0.0
Strongly Disagree	0.0	0.0	0.0

Student Post-Survey Prompt

My parents thoughts about STEM or manufacturing related careers have changed based on my experiences with the activities in this class.

Response	All %	Female %	Male %
Strongly Agree	3.8	5.9	0.0
Agree	30.8	29.4	33.3
Disagree	46.2	52.9	33.3
Strongly Disagree	19.2	11.8	33.3

Comments from students about what they learned

Students were asked to respond to the following prompt with an open-ended answer:
What was the most important idea you learned from this class?

The student responses were overwhelming positive about what they had learned. 25 of 26 (96.2%) students responded to this prompt. 2 (7.7%) of the students either didn't like manufacturing jobs or indicated that they wanted to pursue an unrelated career. The following comments are typical comments made by students on the post-survey.

I learned how to code and use the CMC Mill.

That people that invent things in manufacturing make things in life way easier.

You can't get frustrated when it doesn't work, because most of the time you will not get it on the first time. If you just stick with it and keep working you will figure out your mistake.

That with these machines you can create really cool things. That

manufacturing plays a big part in life.

That manufacturing is involved in most of all the jobs now days.

The most important things I learned in this class is that it is important to learn how to use these materials for everyday lives if you're involved in manufacturing.

One little thing can mess up the entire code.

That there are many jobs in manufacturing and is pretty easy to get a job. How

the machines work.

That you get to make cool stuff and if you mess up it is ok. You can redo it. How I

can make a difference in the world.

Student Discussion Summary

Students in the discussion group were asked to share what they learned from their experiences with the activities related to the class and grant. The comments were overwhelmingly positive and primarily focused on what they had learned about coding, about using the simulator to see where they had errors in the coding, and the preparation that was necessary before they used the CNC mill. Students were excited to share what they had learned and created in the class. This included notebooks which contained their coding and aluminum blocks with designs created by the students using the CNC mill.

Teacher Survey Results

One teacher response was collected on the pre-survey. Two teacher responses were collected on the post-survey.

The mean responses to the student prompts (1=Strongly Disagree, 2=Disagree, 3=Agree, and 4=Strongly Agree) are displayed in the following table.

Survey Prompts

Teacher Prompts	Pre-Survey (N=1)	Post-Survey (N=2)	Difference (Pre-Post)
I know about current STEM and manufacturing careers in the area.	4.00	4.50	0.50
I know where to learn more about STEM and manufacturing careers.	4.00	4.50	0.50
I know where to find resources for teaching students about STEM and manufacturing careers.	4.00	4.00	0.00
I know where to direct students or parents to find information about STEM and manufacturing careers.	4.00	4.00	0.00
I encourage my students to consider careers in STEM and manufacturing related fields.	4.00	4.00	0.00

Teacher Post Survey Questions

The grant activities had an impact on students' awareness of STEM and manufacturing related careers.

Agree	2
Disagree	0
Not Sure	0

The grant activities had an impact on students' awareness of the educational requirements for STEM and manufacturing related careers.

Agree	2
Disagree	0
Not Sure	0

Comments from teachers about what students gained from the grant's activities.

They gained knowledge in how to put coding to work on the CNC mill.

Awareness about manufacturing process.

Comments from teachers about what could be changed to make the grant's activities more beneficial for students.

Everything was great.

Nothing at this point.

Teacher Discussion Summary

During the site visit, the evaluator had an opportunity to visit with the instructors who were using grant equipment in class. Ms. Noel had worked with instructors on the Milford Campus of Southeast Community College to develop a curriculum for the class. The curriculum focused on the application of math and science related to coding and use of the CNC mill. The curriculum developed by Ms. Noel was impressive and very well organized. It was apparent that students in the class were aware of the class objectives, knew what they were supposed to accomplish, and were accustomed to an orderly environment. The evaluator was impressed by curriculum, organization, and learning spaces used by the instructors for the class.

Parent Survey Results

15 parent responses were collected on the pre-survey. 9 parent responses were collected on the post-survey. All parents had students in grades 7 and/or 8.

The mean responses to the student prompts (1=Strongly Disagree, 2=Disagree, 3=Agree, and 4=Strongly Agree) are displayed in the following table.

Survey Prompts

Parent Prompts	Pre-Survey (N=15)	Post-Survey (N=9)	Difference (Pre-Post)
I am aware of STEM (Science, Technology, Engineering, Math) or manufacturing careers available in the area.	2.67	3.33	0.66
I have encouraged my child(ren) to consider careers in STEM or manufacturing related fields.	2.40	2.89	0.49
I would support my child(ren) if he/she chose a career in a STEM or manufacturing related field.	3.07	3.22	0.15

The post-survey also asked parents to respond to an open-ended prompt: *What did your child learn from participating in this STEM related class?* All 9 parents submitted responses to the question. One response was "unsure" and another respondent said "he didn't say much about it. The other seven responses are listed below.

How to work in a manufacturing company.

Working with wood and other materials. New

machines.

The basics to the CNC machinery.

Science and how things are used and development of.

Other jobs around our area and state that he is interested in because he wants hands and mind careers.

That he likes to use his hands and his brains.

Conclusions

It is clear that the goals of the grant, except for the numbers of schools and students involved, were met through this project. The teachers and students were all engaged in the class and grant activities. All evaluation measures, except for the student pre-post surveys, showed a positive effect of the grant on students' thoughts regarding STEM and manufacturing careers. The student survey results may have been impacted by the small numbers of respondents to the surveys. In addition, there was a considerable difference in the number of female respondents between the pre-survey (45% female) and post-survey (65% female). However, an interesting result on the surveys was the change in thinking by female students on the prompt *"Knowing how to use math and science together will help me to invent useful things."* The change for female students was +0.32 and +0.05 for male students. This would suggest that the impact of

the grant activities related to the practical application of math and science on female students in particular, was significant. The parent surveys indicated a much more positive attitude towards careers in STEM and manufacturing related fields. This is significant as parent views on careers play an influential role for students as they make career and post-secondary education decisions.

Qualitative data collected on the student surveys, teacher surveys, parent surveys, student discussion group, and teacher discussion group, were overwhelming positive about the impact of the grant activities. The impacted areas included soft skills such as problem solving and critical thinking as well as an increased awareness of manufacturing and technology related careers. There was also evidence that teachers may have thought differently about how to use instructional strategies to increase student engagement, problem solving, and critical thinking because of the grant. There were few negative comments or feedback related to the project. It was also clear through the qualitative data that the project helped to create a positive view of the
business partner in school, had a positive impact on the relationship between the business partner and the school, and increased the collaboration between the business partner and the school.

Recommendations

While the project was successful in meeting the program goals, I believe the following suggestions may help to increase the impact of the grant on student' views towards STEM and manufacturing related careers.

1) The business partner was extremely helpful and valuable in setting up and maintaining the CNC mill and simulators. This commendable! In addition to this assistance, I would suggest that the business partner also provide employees to visit with students and teachers about their jobs/careers and how they use STEM related fields in their work.

2) I would encourage Deshler PS to explore the potential for creating a high school curriculum to build on the student' learning from the grant and use the grant equipment. Doing so would provide additional opportunities for students to explore manufacturing and STEM related careers.

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