Chapter 3

A Strategy for the Recruitment and Orientation of High School Students for a Manufacturing Online Program in a Rural Region

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Abstract

This paper describes the model used in the recruitment and online orientation of rural high school students in North Central Idaho and South East Washington for a hybrid technology and engineering education program that was developed and implemented through the partnership and collaboration of several stakeholders. The recruitment model is comprised of the following four stages: 1) sensitizing gate-keepers, which includes introducing superintendents, principals, school counselors, and technology and engineering education teachers to the program; 2) marketing the program to students; 3) obtaining parents buy-in, that is, selling the program to parents of students who showed initial interest; and 4) conducting an online orientation. This recruitment model proved very successful as the number of students targeted for recruitment was reached, with an additional few students on the waiting list. Recruitment events and online orientation activities helped in changing negative perceptions held by parents and students had about careers in the manufacturing industry, boosted their confidence in studying online, while at the same time introduced and reinforced the key goals, objectives, and opportunities of the program.

Keywords: recruitment strategy, online engineering and technology education, hybrid CTE, online orientation

Introduction

In August 2017, the Northwest Intermountain Metal Manufacturers' (NIMM) technician curriculum was implemented. The curriculum originated out of the need to create a talent pipeline for the metal supercluster of companies operating in North Central Idaho. The NIMM Supercluster of companies are tied together by common products, services, supply chains, and workforce needs. The metal supercluster encompasses approximately 20% of the Northwest Intermountain region's manufacturers and includes recreational-technology manufacturing, metal parts fabricators, machine shops, and makers of farm and mining equipment (Tacke, 2015). NIMM Supercluster have a National Location Quotient (LQ) of 1.63. This means that there are proportionately more jobs (63%) in that region than the nation (Tacke, 2015).

Partnership and Collaboration

NIMM supercluster companies have consistently experienced a shortage of skilled workers in engineering technician jobs that involve computer aided drafting, machining, fabrication, and electronics (Frei, 2013). This often hampers productivity and growth. Due to its vested interest in the labor force, the Northwest Intermountain Manufacturers' Association (NIMA) provides industry leadership in addressing the shortage of qualified workers. NIMA works closely with economic development partners and education to identify challenges and find solutions. While individual manufacturers are eager to address the needs of their respective companies, collaborative efforts are currently being applied to systematically address the critical workforce issues. On April 24, 2012, a twenty-four-member manufacturing workforce development council was permanently established in the region. Representatives include industry, government, secondary schools, post-secondary Career and Technical Education (CTE), a community college, a four-year land-grant university, economic development associations, unions, and the Idaho Department of Labor. A project was developed through this partnership and collaboration to:

- Create a sustainable entry-level talent development program for mechanical Computer Aided Design and Drafting (CADD) technicians, and Electro-Mechanical Technicians through the development and implementation of an online and summer skills academy curriculum model which offers high school credits and technical competency credits transferable to regional technical colleges and;
- Recruit and retain students from participating schools to take the manufacturers' endorsed curriculum.

The aim of this paper is to describe the model used in the recruitment and online orientation of high school students for an online technology and engineering education program that was developed and implemented through the partnership and collaboration of several stakeholders. In so doing, the paper provides a potential model that may be of use to others in the field attempting to develop similar technology and engineering education programs.

NIMM Technician Training Program

The team involved in developing and implementing the curriculum was multidisciplinary and included members from a regional technical college, a land grant university, Clearwater Economic Development Association (CEDA), Northwestern Intermountain Manufacturers Association (NIMA), the Idaho Department of Labor, and Idaho Digital Learning (IDL). Two

technician programs were developed and delivered to address entry-level workforce needs: (1) Mechanical CADD technician program; and (2) Electro-Mechanical technician program. Both programs were designed from information obtained through occupational and job analysis that were performed with regional manufacturers. They were to be offered online through IDL and the technical college. Figure 1 outlines the courses offered by both institutions. Students from this cohort also received laboratory/workshop activities in which they participate in project-based activities in machining and electronics at the technical college during the summer. This curriculum was offered concurrent with the high school curriculum, so students would take courses from the NIMM curriculum as electives. Upon successful completion of the NIMM curriculum, students acquire high school credits and technical competency credits that are transferable to a regional technical college.

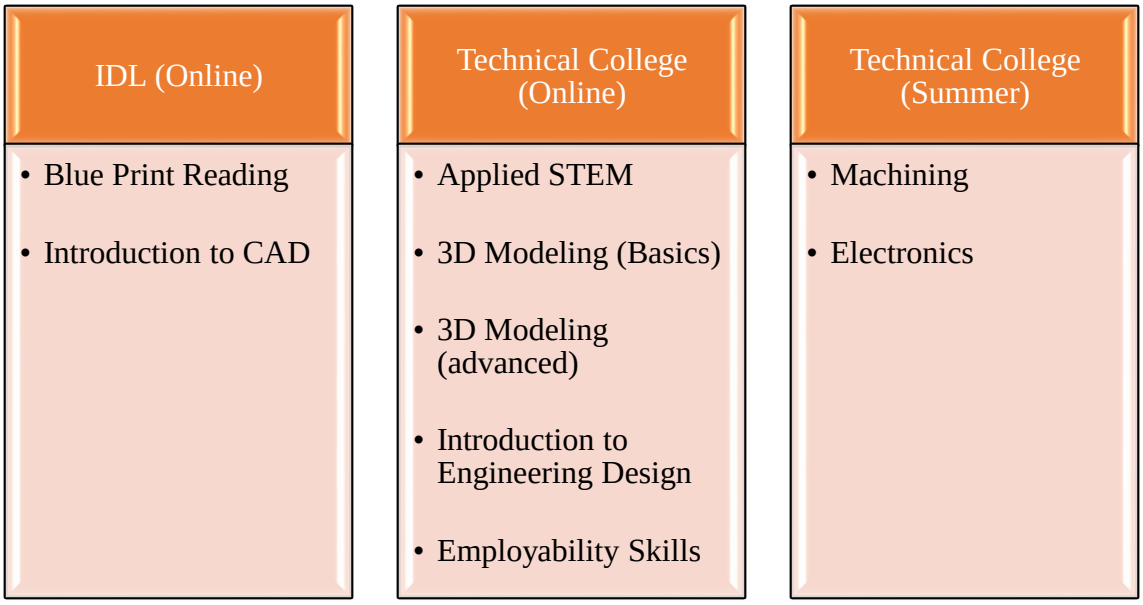

Figure 1. NIMM Program courses

Recruitment Challenges

Filling manufacturing workforce needs for entry-level technician jobs proves to be difficult due to: negative perceptions of the manufacturing industry among some parents and students; a lack of knowledge of the industry; and a lack of educational resources in rural areas to equip students with the requisite technology and engineering skills (Jones, 2018; Frei, 2013). Students are often unaware of the rewards, higher wages, training opportunities, and work-related benefits that careers in manufacturing afford, and so they often "fall through the cracks" or migrate to urban areas in quest of better job opportunities (Jones, 2018). In fact, many students currently perceive jobs in manufacturing as hot, dirty, and physically demanding, with low salary and few real long-term benefits (Jones, 2018). In a recent report (Giffi, Rodriguez, & Mondal, 2017), less than 5 in 10 Americans believe manufacturing jobs to be more interesting and rewarding, clean and safe, and stable and secure than in the past. Also, less than 3 in 10 Americans surveyed indicated they would encourage their children to pursue a manufacturing career. Modern manufacturing, however, has changed dramatically due to automation and new innovative technology (Jones, 2018), and parents who are familiar with the industry are nearly

two times more likely to encourage children in pursuing a manufacturing career than others (Giffi, Rodriguez, & Mondal, 2017). The negative perception of manufacturing by parents and students inadvertently affects the level of interest shown by students to pursue careers in manufacturing, and this is particularly evident in the lack of interest shown by students in manufacturing jobs in rural areas. Geographic challenges, limited school resources, and scarce population density are factors which significantly impact the educational system's ability to educate students and provide access to CTE programs. As a result, it can be challenging to recruit students to take manufacturing courses because of the absence of technology and engineering programs in rural areas, as well a lack of financial resources to find and employ CTE instructors and school counselors within the region's twenty-two school districts (Frei, 2013).

The literature on recruitment strategies for students are limited, and those that exist focus on the recruitment of undergraduate students (Shadding, Whittington, Wallace, Wandu, & Wilson, 2016). In a study of the Research Experiences for Undergraduates (REUs) program sponsored by the National Science Foundation (NSF), principal investigators across 106 REU sites were asked to report measures of success of the participants, which included graduate school attendance, participant co-authorship, and participant satisfaction (Beninson, Koski, Villa, Faram, & O'Connor, 2011). The mechanisms used to recruit were the Internet (email, website), direct mailings, media, conferences, the campus recruitment office, and other methods, with the majority of participants recruited by internet or conferences. Shadding et al. (2016) also reported that low cost recruitment mechanism (e.g., email, events, referrals, website) were as effective as high cost mechanism in the recruitment of underrepresented minorities for STEM (science, technology, engineering, and mathematics) research summer programs.

Martin et al. (2011) lay out a strategy developed by the Midwest Alliance, an NSF-funded endeavor to increase the number of individuals with disabilities in STEM. Issues identified that are at the core of the recruiting of students with disabilities in STEM include the lack of data on recruitment of students with disabilities; need for systemic and institutional support; and the influence of guidance counselors, secondary teachers, and postsecondary faculty. Their model includes three sequential steps that can be instructive to general recruitment strategies for students in Advance Technological Education programs: 1) Finding students, 2) Reaching students, and 3) Assisting students.

Finding students involves gaining access to several key stakeholders. The first key point of access that needs to be gained are school districts (Fairweather & Shaver, 1990). Project staff need to take steps ensuring that school districts are familiar with the organization attempting to recruit its students. Second, staff need to cultivate "word of mouth" support from students who have participated in activities provided by the organization (Martin et al., 2011). There is also the need to enlist the support of key gatekeepers, which could span a wide range of individuals, such as various types of teachers, local boards of education, and educational administrators. Finding students also include meeting with parent groups face-to-face and online. Participating in professional conferences and workshops, transition conferences and targeted recruitment of students involved in special programs, are other avenues to find students that are being targeted for the educational program.

Once students have been identified, steps need to be taken to reach students. These include multiple means of dissemination such as email, social media, newsletters, and then sending information or messages to key stakeholders. The final stage involves assisting students who have shown an interest in the STEM program. Assistance can be in the form of creating a community that offers mentoring and answering students' questions; offering career guidance;

having opportunities for exploration; and providing guidance and/or direct financial support (Martin et al., 2011).

NIMM Recruitment Strategy

The first step in recruitment was to decide from where students were to be recruited and whether or not there would be any special interest groups. Based on the project proposal, students were recruited from 22 school districts between North Central Idaho and South East Washington. The program set out to recruit a maximum of ninety (90) students: sixty (60) students for the Mechanical CADD Technician Training Program, and thirty (30) students for the Electro-Mechanical Technician Training Program. The target population was 10th grade students who would cover the NIMM curriculum over a two-and-a-half-year period. Special emphasis was made to not overlook minority and underrepresented groups, including females and students from the Native Nez Perce Tribe.

CEDA spearheaded the recruitment strategy because of its marketing expertise that existed in the organization and the professional alliance between CEDA and the manufacturers. The model for recruitment which is summarized in figure 2 included four stages: 1) introducing and sensitizing school administrators to the program (sensitizing gate-keepers), 2) marketing the program to students, 3) selling the program to parents of students who showed an initial interest (obtaining parent buy-in), and 4) conducting an orientation.

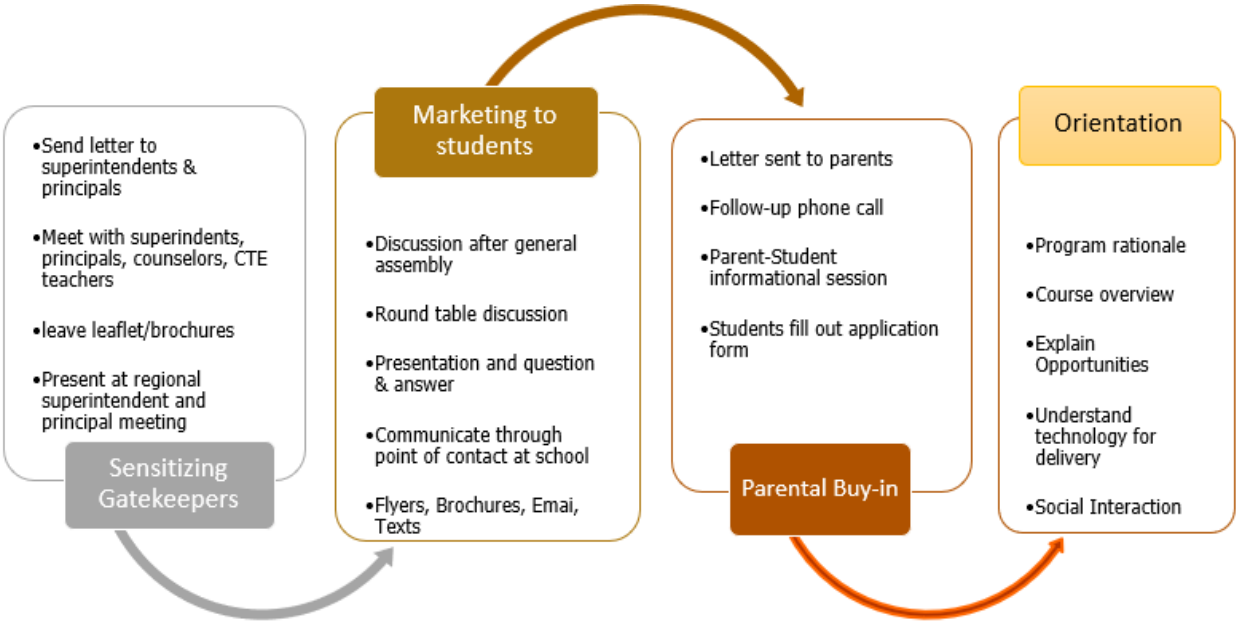

Figure 2. Recruitment Strategy

Sensitizing Gatekeepers

Superintendents, principals, and guidance counselors are often unaware of the career opportunities that exist in manufacturing. A school's size and administrators not having a background in Career and Technical Education (CTE) may influence how they see the relevance of students taking technology and engineering courses (Shanklin, 2014; Malik, 2005), which are often offered as electives in order to pursue STEM degrees in college. Gatekeepers and key stakeholders include superintendents, principals, school counselors, technology and engineering education teachers. Letters endorsed by the manufacturing association were sent by CEDA to superintendents and principals in each school district to introduce the program. These letters

were followed-up by CEDA with phone calls and face-to-face meetings with principals and counselors to explain the program. Leaflets explaining the program were left with the schools after these meetings. The director of CEDA also conducted a presentation at the regional meeting of principals and superintendents to make a major pitch about the importance of such a course for regional economic development, the retention of workforce within the region when students decide not to go on to college immediately after completing high school, and the provision of livable wage jobs at the entry level in manufacturing.

Marketing to Students

After the stakeholders in the districts and at the schools were given detailed information about the curriculum, authorization was then given for marketing the program to students in grade 10. CEDA coordinated with the school counselors to arrange face-to-face meetings with students throughout the participating school districts. Representatives from CEDA, manufacturing, the technical college, and the university participated in the informational sessions. The format included slide presentations, round table discussion, and a question and answer session. Information was also disseminated to students through brochures and flyers. Brochures provided students with information about key components of the NIMM program and included questions and answers that the recruitment team expected would be the most frequently asked questions. Flyers mapping the sequence of courses for each career track were also handed to students. Handouts gave students the opportunity to review what was discussed in the presentation and provided information for them to take home to parents.

Schools decided the duration of the presentation —which sometimes were as short as fifteen minutes and as long as one hour—and who was invited to the presentations. Presentations were done before entire junior assemblies or selected groups of students by school counselors and teachers. The recruitment team established a point of contact at each school and this point of contact coordinated and communicated with the recruitment team on behalf of the schools. In some cases, the point of contact may be a school counselor or a CTE teacher. This contact passed on information to interested students, and students could raise concerns or queries through the point of contact. CEDA also communicated directly with students by sending follow up information via email and text. Texting proved to be much more effective.

Figure 3. Director of CEDA in a round-table recruitment session with students

Figure 4. Manufacturer participating in recruitment session with students.

Parental Buy-in

Parents supporting such a curriculum was key to recruiting students into the program. It was determined by the team spearheading the marketing that parents generally need answers to the following:

- Will students gain high school credits from participating in the curriculum?
- Will the course allow for matriculation to college?
- Will students get a certificate that will be recognized by manufacturers?
- Will students be able to get jobs in the region after graduating from high school?
- Will jobs provide good wages and benefits?

Figure 5. Parent-Student Night

In order to inform parents about the program, answer their questions, and gain their buy-in, five parent informational sessions were arranged by the marketing team at hotel venues in the region. These sessions were called "Parent-Student Night." The names of students and their contact information were obtained during presentations to students by the marketing team. Their parents were contacted through letters sent home with students and follow-up reminders about the day and time of the Parent–Student session was done through phone calls. At the Parent-Student Nights, meals and refreshments were provided, and presentations were made by the director of CEDA, representatives from local manufacturers, the technical college and university, and the Department of Labor. This event allowed parents and students to get the opportunity to ask questions about the program. At the end of the Parent-Student Night, applications were given to students to fill-out.

Online Orientation

The NIMM training program required students to complete several courses over two and a half years in order to acquire skills for entry-level technician jobs. Students enrolled in the Mechanical CADD Technician track are required to complete seven (7) online courses, while students in the Electro-Mechanical Technician track are required to complete a hybrid program consisting of five (5) online courses and face-to-face practical classes in machining and electronics during the summer months. From the recruitment sessions, parents and students expressed several concerns. Apart from wanting to know the general details about the program, some concerns expressed were the manageability of the online courses, the technical skills required to work online, anxieties of students working solely online, and the resources that would be required.

Based on the concerns and questions raised by students and parents at the recruitment stage, it was evident that there was need for an orientation program to address a general understanding of the program and consider the concerns raised by parents and students. We also had to take into consideration that many students had only recently chosen manufacturing as their career path. Therefore, the orientation program had to provide students with information about the manufacturing industry and the various career track options; this gave students the opportunity to decide whether the program was right for them, and whether they had the dedication and motivation required to study online.

Several studies have been published about online orientation programs. Robinson, Burns, and Gaw (1996) suggests that orientation for online courses serve the same objectives as orientation for college, in that it can facilitate academic and social interactions, increase students' involvement, enhance the sense of belonging to a virtual learning community, and help retention (as cited in Scagnoli, 2001, p. 20). According to Phipps and Merisotis (2000), students should be fully advised about the online program prior to starting in order to determine if they possess the self-motivation and commitment to learn online and if they have access to the minimal technology required by the course. Advising students about online programs prior to starting is but one of twenty-four benchmarks developed by the National Education Association (NEA) and Blackboard Inc. that are considered essential for quality Internet-based education. Another benchmark for quality online learning was the provision of detailed instructions regarding the electronic media used and practice sessions prior to the beginning of the course. Successful orientation programs should provide learning experiences that help students understand and make adaptations to change (Robinson et al., 1996).

Elements of Orientation Design

According to Scagnoli (2001), when designing orientation for online distance learning, the following considerations should be addressed: the program, the courses, the technological applications used in the program, the social interaction in the virtual learning environment, and the students' location/background. As described below, all of these elements were considered when designing the online orientation program for the NIMM technician training program.

A. **The program.** Students were introduced to the NIMM program. This included the rationale of the program, the goals and objectives, description of the program, and the partnering organizations that are involved in making the program possible. Students were also provided with information about the manufacturing industry, its general job opportunities, average earnings, and job benefits in the manufacturing industry.
B. **The courses.** Students were provided with a description of what each course would entail. General objectives of each course were provided and the general skills they would attain from learning each course. Resources such as software requirements needed for each course was also stated. Students were also provided with a schedule outlining when each course would be offered and whether or not they carry dual credits.
C. **The technological applications used in the program.** The Blackboard Learning Management System (LMS) would be used for online courses. Students were exposed to key features of this LMS and shown how to navigate the system. This was done by watching a series of Blackboard orientation videos.
D. **The social interaction in the virtual learning environment.** A key aspect of any online learning program is social interaction. The orientation offered students the opportunity to communicate amongst their peers and with a facilitator. At the beginning of the orientation, students were asked to introduce themselves on a discussion board. Students would provide general information about themselves and why they chose to enroll in the program. Students were also provided with discussion activities in each module and asked to respond to at least two other student's comments.
E. **The students' location/background.** One important aspect of the orientation was to introduce students to the manufacturing companies in their communities that are in need of skilled workers and those local companies that will provide them with apprenticeships and job opportunities upon completion of the program. Therefore, each module included videos introducing local manufacturers. Videos often included a virtual tour of processes involved, and the products manufactured.

Organization of online orientation content

Open Education powered by Blackboard was the online platform used to develop the NIMM orientation. Open Education powered by Blackboard is a free, fully supported cloud offering for Blackboard customers who are interested in offering Open Online Courses to the public. The layout of this learning management system is similar to the Blackboard platform used by all NIMM courses. The curriculum for the online orientation was divided into weekly modules. Each module covered a general topic, and subtopics were organized into separate folders. Content was presented through a variety of means including, text, videos, images, PowerPoint presentations and links to relevant websites. Each weekly module ended with a task that allowed students to interact with each other on a discussion board. Activities were often in the form of discussions or research.

Figure 6. Welcome page of orientation

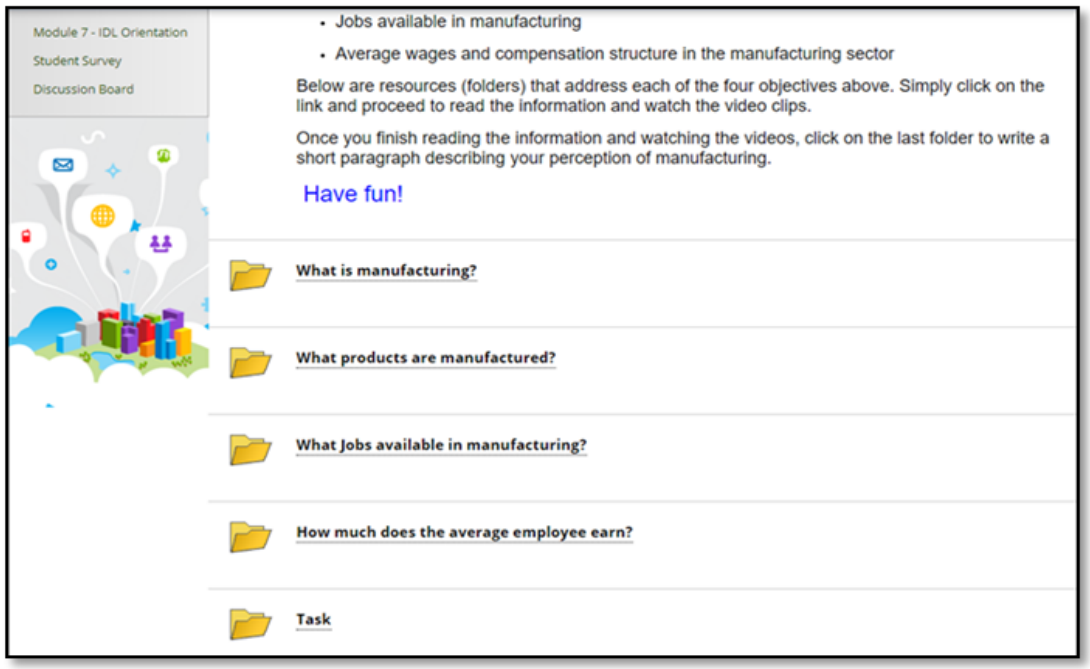

Figure 7. Module 1 of NIMM orientation.

The content covered in each module is outlined below.

1. **Module 1** was designed to give students a general overview of the manufacturing industry. General topics covered were an introduction to manufacturing; products manufactured in the Northwest Intermountain Metal Manufacturing (NIMM) Supercluster; jobs available in manufacturing; average earnings and benefits in manufacturing.

2. **Module 2** was designed to provide students with a better understanding of the program and its various components. Topics covered were an overview of the NIMM program, which included information about the current expansion of manufacturers in the NIMM supercluster and the challenges employers have in finding skilled workers. NSF's role in the program was also discussed, as well as the role of collaborating organizations in the development of the program.

3. **Module 3** was designed to give students a more in-depth look at the two possible career tracks the program focuses on. The role of the electro-mechanical and mechanical CADD technicians were discussed, as well as the skills required for each job. A description of each course offered in the program was also provided.

4. **Module 4** provided additional information about other key components offered within the program. Information was provided on the summer skills academy hosted by the local technical college which offered a hands-on component in machining and electronics; paid apprenticeships; access coaching to support students; field trips to visit local manufacturers; and mindfulness sessions.

5. **Module 5** was an activity session where students did readings on the benefits of the manufacturing in the US and reasons why it is great to work in the manufacturing industry. Students made blog entries based on the required readings and were encouraged to respond to at least two of their peer's blog postings.

6. **Module 6** was designed to give students the opportunity to fully consider their chosen career path and decide if they were making the right decision. This involved doing research using online job boards or interviewing people working in the field. Students were provided with guiding questions to get information such as the skills required, the educational requirements, the earnings, benefits, the working conditions, the working hours, advantages and disadvantages.

7. **Module 7** provided an orientation of the Blackboard Learning Management System.

Conclusion

By all measures the model used for the recruitment of students in the NIMM project proved to be very successful. The number of students targeted for recruitment was reached, with a few students on the waiting list. The model used some low-cost mechanisms such as email, websites, and social media, reported by Shadding et al. (2016), which were important for maintaining contact with students who showed initial interest. Sensitizing gatekeepers in order to gain access to students is critical to the initial stage of the model, and using agents that are in-

tune with the economic landscape and who interface with the manufacturers —the industry that was targeted by this curriculum —adds credibility and was key to properly sensitizing the gatekeepers. Higher cost activities such as Parent-Student Night are very important when recruiting students because even when students express an interest in a curriculum after the marketing stage, it is not necessarily a good predictor of students will be given the greenlight by their parents— especially if parents have a negative perception of the job area and the work that is required in pursuing the curriculum is viewed as "extra."

Completing online courses is uncharted territory for many high school students. While college students will have more experience doing online courses, high school students (along with their parents) may be skeptical about their ability to complete such a program and also whether those programs can achieve their stated objectives. The Parent-Student Night allowed these questions to be answered in a relaxed, unpressured environment. Equally important was the orientation process that allowed students to be immersed in an online environment where they could build their confidence, while at the same time reminding and reinforcing the key goals, objectives, and opportunities of the program.

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