



Building Partnerships to Bridge the Transfer Gap and Increase Student Success

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Abstract

Transfer partnerships continue to be one of the most critical elements of student success. The purpose of this paper is to highlight the bridges and transfer gaps from a two-year college to a university and respect the value of the support and knowledge students are currently receiving at their community college, from the context of the practices and experiences of Iron Range Engineering - Bell. The transfer process, after all, can be daunting to some students who plan to transition from a community college to a university to finish a Bachelor's degree. Iron Range Engineering - Bell is a unique, co-op based upper division program that strives to facilitate a positive experience for students undergoing this transition.

The transfer process can be equally as challenging for community college faculty and staff who may feel the need for additional support in their roles. They play a large role in the transfer process and oftentimes go above and beyond their responsibilities to meet with students to determine their pathway forward after spending time at their respective community colleges. This paper proposes unique ways that university faculty and staff can support two-year colleges during the student transfer process, making these partnerships a more positive experience while achieving a shared goal of supporting student success.

Some of the unique ideas include encouraging back transfer to fulfill Associates degree requirements, shared teaching methods, offering bridge courses without two-year colleges changing their curriculum, allowing flexibility for the timing of transfer to meet the needs of students, and active university participation in advising and supporting students. In the end, students who are prepared and have more context tend to perform better and absorb more information sooner in the experience-based learning model that is Iron Range Engineering - Bell.

Introduction

Transfer pathway bridges are often created at the two-year college level from internal faculty or staff as they focus on providing students with the resources necessary to move on to a four-year university [1]. This oftentimes comes with very little support from the four-year universities [2]. It continues to be seen across the country from Iron Range Engineering - Bell staff that academic advisors and classroom instructors at the two-year colleges provide the resources to their students. These resources typically come from university recruiters from the partner universities. Partner universities mainly consist of local universities that the two-year college has an articulation agreement with or have many of their past students transfer to [3].

Among the gaps identified in literature on the phenomenon of students transferring from two- to four-year institutions are those related to academic and institutional policies. In practice, the largest transfer gap that has been recognized is the lack of true partnership between the two-year institution and the transferring four-year institution [4]. University recruiters typically attend transfer fairs or give presentations at the two-year college campus(es) to inform students about their program. No other work is typically done by the university faculty or staff until a student reaches out to schedule an appointment with their university academic advisors, in which they communicate to the students that they have all of the courses needed at the university and to transfer soon. To bridge this gap, four-year universities will need to contribute more to the shared responsibilities of supporting students as well as keeping the interests and needs of the student as their top priority when working with them [1].

Developing a true partnership - Iron Range Engineering - Bell and community college partners

Iron Range Engineering - Bell (IRE-Bell, also known as the “Bell Program” as referred to by college partners throughout this paper) is a unique, co-op based upper division program that strives to facilitate a positive experience for students undergoing the transition from a two-year to a four-year institution. The five-semester program facilitates the final years of a bachelor’s degree in integrated engineering, the first half of which students complete in community colleges across the United States [5], [6]. The Iron Range Engineering - Bell model (Figure 1), delivered through the Department of Integrated Engineering at Minnesota State University, Mankato, consists of faculty and staff engineers - internally referred to in the program as facilitators - who work together to create a welcoming environment for all members of the community, with particular attention given to students. Beyond providing support for students, IRE-Bell strives to ensure that faculty and staff who provide student support at two-year colleges feel valued and respected as they actively engage in the transfer pathways as well. To date, IRE-Bell has established a significant number of partnerships with community colleges across the United States, and this paper highlights some of the best practices and evidence-based strategies that the

program has implemented to both support student success and build robust partnerships with community colleges in the transfer process.



Figure 1. The Iron Range Engineering - Bell Model

Advising Support

One of the most essential practices that two- and four-year institutions need to implement, in partnership with each other, to ensure a smooth transfer process for students is to provide advising support that caters to students' specific needs [7]. Iron Range Engineering - Bell addresses this need by providing community college partners with customizable advising sheets. We developed advising sheets (see Appendix A) that are customized to each of our two-year college partners, highlighting courses that would transfer from their institution into the IRE-Bell program at Minnesota State University, Mankato. The customization includes specific course numbers and their corresponding descriptions, in an effort to ensure ease of use when these are provided to the faculty and staff who support students at the two-year institution. These advising sheets do not constitute an official agreement between institutions, although in some cases formal agreements have been developed. These advising sheets provide both the advising faculty and students a clear outline of what will be required and options that are available based upon their current academic plan and the academic requirements of IRE-Bell. This provides engineering advisors with the pertinent information about the program and the opportunities the model offers to students, and then provides a roadmap for the transfer process, using easy-to-follow language and providing clear outcomes using their catalog. The sheet condenses and simplifies the complexity of transfer to a two-page clear path to the university. The first page describes the program and interesting aspects while the second page shows the roadmap. By completing this document prior to beginning a relationship between the community college and the university, the university can clearly convey that the team put thought and effort into knowing some background information about the college they are trying to work with.

An example of the value that the customizable advising sheet provided by IRE-Bell brought to a community college partner involves an interaction with East Los Angeles College (ELAC) (Appendix A). The advising sheet facilitated a quick response regarding an action item from an advisor at ELAC, which led to a wider policy and practice-related conversation that involved representation from IRE-Bell, Minnesota State University, Mankato, community college advisors

and professors towards developing a specific transfer pathway. The advising sheet, which triggered an action item and sparked a conversation between the advisor and an IRE-Bell facilitator, helped move the process forward and arrive at a resolution in the soonest possible time.

Professional development workshops and The Bell Experience

A key factor to ensure student success among transfer students is academic integration - ensuring that students are able to seamlessly assimilate into the academic environment of the four-year institution [8]. This aligns with the importance of prioritizing student success in any transfer process [7].

One of the ways that IRE-Bell addressed this need was to design recruitment events and campus visits that go beyond presenting information about the program to establishing relationships within and among members of the community in the two-year institution and providing hands-on experiences. For example, campus visits consist of meeting with the instructors of engineering courses, students inside and outside of the classroom, student organizations, and academic advisors, among others. Dr. David Lin, Assistant Professor of Engineering and Mathematics at Northern Virginia Community College (NVCC), said that class visits and presentations provided by Bell Program facilitators “dovetail nicely with discussion of transfer options in my Foundations of Engineering class.” Dr. Lin adds, “In my other engineering classes, many students are introduced to the Bell Program for the first time. In all cases, students find the presentations to be informative and many are excited to learn that there is an alternative to the traditional transfer pathway.”

Establishing a relationship with members of the campus community allows IRE-Bell and its representatives to better understand the people who work there, what the college stands for, and who the students truly are. Before guiding students in taking the courses necessary to achieving a four-year degree, the first goal is to get to know the students and the people who currently support them. Michelle Millea, a pre-engineering instructor at Ventura Community College, expressed appreciation for the opportunities offered during campus visits, and shared: “I have two students who have so proudly told me they are part of the Bell Program... they both feel such a sense of direction and focus.” Additionally, whether the students opt to transfer to the IRE-Bell program, instructors have commented that there is an increased professionalism and personal ownership of their education for students who have attended these events.

Offering hands-on workshops to students at the two-year colleges is another way to bridge the transfer pathways gap [9]. One focus area for IRE-Bell staff has been to support two-year college students in their professional development and skills training. The university staff will travel to lead onsite workshops or offer remote workshops from a variety of different areas of

engineering. From developing resumes and cover letters to learning how to work on a team of people in industry, all of these workshops provide a unique opportunity for student growth that comes directly from experienced engineers serving as IRE-Bell facilitators. They also serve as activities that prepare students for the academic structure and environment that they will be engaging with when they decide to become IRE-Bell students [5]. Figure 2 provides an example of a remote Bell Experience on a community college campus.

Sample Community College Bell Experience Schedule:

10:30-11:30 am: *Welcoming Session + Starting with Why*

11:30-12:00 pm: *Design Activity (Targeted to meet needs of the Two-Year Institution)*

12:00-12:30 pm: *Learning at Bell (Technical Learning at Bell & Learning about Learning)*

15-Minute Break: Lunch During Professional Session

12:45-1:15 pm: *Professionalism Session (Working as an Engineer)*

1:15-1:45 pm: *Working while at Bell + Co-op/Current Student Panel Q&A*

1:45-2:15 pm: *Closing Session (promote joining rocket team and becoming a bell scholar)*

2:15-2:30 pm: *Final Activity Related to the Design Project*

Figure 2. The Remote Bell Experience

The Minnesota Bell Experience is an event hosted on the Iron Range Engineering campus in Virginia, MN. The focus and main goal of this two- to three- day social event is to build a sense of community with prospective students as they immerse themselves in the inclusive culture at IRE-Bell, in keeping with addressing the need to ensure a smooth transition into the program and foster academic integration [8]. An example of this are the many messages prepared and delivered by current students in the program that explain their perspectives and personal experiences with improving time management skills, the community and culture, working as an engineer, and inclusivity, to name a few. During the welcoming session, participants are posed with questions to get them reflecting on a deep level. They are asked questions like why they are pursuing engineering as a career and how their current educational trajectory or pathway is going to prepare them to become working engineers within the profession. The faculty and staff then explain why this unique program exists and how it accelerates a pathway to thrive as a working engineer in industry. This sets the stage for participants to begin looking for ways that their goals align with the values of the program throughout the rest of the event.

Food and games are also great examples of how this social event allows participants to network with faculty, staff, current students, and other participants from around the country. Local small businesses provide catering for most of the events while the faculty and staff do some cooking of their own for all participants. After all, networking is a large part of career development when it comes to finding internship, co-op, and entry-level engineering jobs. Career development sessions are delivered to help set expectations of creating and improving resumes, cover letters, and professional social media accounts such as LinkedIn. Practice interviews are then conducted in an effort to get to know the students better while they also gain insight into the interviewing experience.

Another aspect of this event is to allow participants to work on small teams to build an understanding of the design realm of engineering. A local Makerspace is utilized for this event to immerse them in an environment with industrial tools and equipment. Students work on an optimization project with design constraints from an internal client while learning how to work through an iterative design process. The end of the design session ends with each team presenting their work to the entire group. In reference to the traveling Bell Experience from Figure 2, one two-year institution has used the design project as a recruitment and outreach tool to meet the demands of the First Nations Launch Competition. Another has used the design project to recruit to work in their open lab spaces on campus.

The last two sessions focus on technical learning and reflection. A unique aspect of the IRE-Bell model is the student-led advanced (SLA) courses, which allow students to take control of their learning and pursue areas of engineering that they are most interested in or most pertinent to their work once they are in industry. This fosters a sense of autonomy among students, an important value for motivating students to learn [10], [11]. A session is delivered for participants to begin building their very own SLA. This also helps the faculty and staff get to know each student and where their interests lie.

The final session is then spent working on a learning journal entry to practice their written reflection abilities. Reflective judgment is a valuable trait for students to have as they engage in the learning process, as well as when they embark upon engineering careers that require working on complex, ill-defined problems [12], [13]. This activity thus adds value to the participants as the learning achieved during the event is documented for them to revisit at a later time. It also allows for faculty and staff to address any remaining questions and continuously look for ways to improve the event for the future.

Dr. Justin Starr, Endowed Professor of Advanced Technologies at the Community College of Allegheny (CCAC) - one of IRE-Bell's community college partners - highlighted the value brought by the Bell Experience to CCAC, saying that students who attend the workshop: "came

back to campus with more poise and professionalism than their peers, and quickly differentiated themselves.” In addition to providing a space for IRE-Bell to reach out to its students, CCAC has begun to integrate key components of the Bell philosophy, as well as select assignments, into their Engineering Seminar course, according to Dr. Starr. He adds: “By viewing themselves as ‘student engineers’ rather than engineering students, individuals who have been exposed to the elements of the Bell Program consistently rise above those who go through a more traditional approach.” The last two Minnesota Bell Experiences had a total of 25 participants where 56% of the group is now enrolled in courses at IRE-Bell, and 32% are planning to attend in the fall of 2022 or spring of 2023.

In addition to bringing value through student-focused hands-on workshops, IRE - Bell also provides opportunities for professional development among instructors in the community college partner through workshops related to evidence-based teaching strategies and pedagogy. IRE-Bell faculty developed a series of teaching-focused workshops that created a supportive community during the early stages of the COVID-19 pandemic, and this practice has continued to be a place of shared learning and growth. The sharing of best practices among instructors in IRE-Bell and its community college partners is another effort towards ensuring a seamless transition for students through shared teaching practices and academic experiences, to address the need for academic integration in ensuring student success [8]. Dr. Lin of Northern Virginia Community College explains his experience in this way: “Dr. [Ron] Ulseth’s [Director of IRE-Bell] Professional Development Workshop Series in the spring of 2020 have had a strong impact on my teaching, especially in the virtual classroom setting. The strategies that I learned to engage and empower students (e.g., giving them a say in assignments and grading schemes) have been invaluable in maintaining high levels of attendance and successful learning outcomes.”

Provide clear and flexible curricular pathways to degree completion

An important point for discussion and contributor to potential transfer students’ decision-making process is the pathway and time to degree completion [14]. There are a number of factors that can influence the time that a student may take to complete their degree, such as how and when courses are offered; the availability of prerequisite courses needed for transfer at their home community college; and courses that are not transferable to the four-year institution, among others [14]. This reality highlights the need to provide students with clear curricular pathways to degree completion - and the flexibility to accommodate unique needs and circumstances to achieve this goal [4]. Dr. Frankie Wood-Black of Northern Oklahoma College, another IRE-Bell community partner college, has incorporated exploration of goal planning, degree pathway, and career planning into their Introduction to Engineering Course, which is offered during the student’s first semester. This allows the student to understand the pre-requisite course schedules and timing, so that the student understands the potential consequences of individual actions, and what roadblocks might be encountered if courses are not completed or taken at a specific time.

One of the most impactful ways to bridge the gap of transfer pathways from two-year colleges to four-year universities is a process that IRE-Bell has internally termed as back transfer. Back transfer of completed courses from the four-year university to the two-year colleges provides a way for students to have flexibility in the timing of transfer to meet their particular needs. If a student was only one or two classes away from completing a degree at their two-year college before transferring, IRE-Bell will work with students to ensure they have an opportunity to take those remaining courses and back transfer them to complete the degree, all while continuing to make progress towards their four-year degree.

Another way for four-year universities to assist each two-year college is to identify and better understand all of the required university courses that are unable to be offered at the two-year college level due to various reasons [4], [7]. An example of this would be Direct Current (DC) Circuits with a Laboratory component, a 3-credit course requirement of the IRE-Bell program that is not consistently offered at some two-year institutions due to various state requirements and varying enrolment demands. Although transfer students are required to complete DC Circuits Lecture and Laboratory before transferring and taking the advanced Circuits courses at the university level, IRE-Bell offers and works with other partner two-year colleges to offer these courses to students in need of them. This level of support continues to be a gateway to a true partnership between the two-year colleges and four-year universities as the colleges don't need to change their entire curriculum to meet all of the specific requirements of the transfer institution.

Liz Cox, Director of Innovation and Engagement at Red Rocks Community College, summarized their experience as follows: “The Iron Range Engineering-Bell philosophy of project-based learning works well with the approach that Engineering at Red Rocks Community College has adopted, providing students who prefer learning by doing a transfer pathway to an engineering degree. Our students benefit from acclimation into the transfer community through the Bell Experience, the focus on advising, and associate degree completion through back transfer, all high-impact practices that strengthen the transfer process but are not usually included in transfer partnerships. Iron Range Engineering-Bell has created something unique to enhance engineering degree completion.”

Conclusion

The transfer process can be much less challenging for community college faculty and staff who feel supported in their roles by people from the university level [7]. Two-year colleges play a large role in the transfer process, and more broadly in providing access to, and a viable pathway for, a diverse group of students towards earning STEM degrees [15]–[17]. Oftentimes, faculty and staff at two-year institutions go above and beyond their responsibilities to meet with students to determine their pathway forward after spending time at their respective community colleges .

The unique ways mentioned in this paper for university faculty and staff to support the folks at two-year colleges instead of creating additional work for them will change the way partnerships are built and sustained.

These unique methods are what makes these partnerships between two-year colleges and four-year universities more enjoyable while successfully achieving a shared goal of supporting student success. In the end, students who are prepared, feel supported, and have more context, tend to perform better and absorb more information sooner in the experience-based learning model that is IRE-Bell. All partnerships are carefully established at IRE-Bell in the beginning so we can better serve our students and guide them to a successful education in the end.

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Appendix A- Sample Curriculum page of an advising sheet, East Los Angeles College

SAMPLE CURRICULUM (intended to show pre-requisite courses counting for IRE-BELL)

<p>Attending East Los Angeles Community College (ELAC)- A minimum of 2.5GPA in Mathematics, Science, and Lower Division Engineering courses is required, based on earned credits. This document is not intended to be an official agreement, but a tool for advising students.</p>	
<p>Math/Science Courses at East Los Angeles College</p>	<p>Econ/ General Ed Courses at East Los Angeles College</p>
<p>MAT 261 Calculus I (5 units) MAT 262 Calculus II (5 units) MAT 263 Calculus III (5 units) MATH 275 Ordinary Differential Equations (3 Units) CHEM 101 General Chemistry I (5 units) CHEM 102 General Chemistry II (5 units) PHYSICS 101 Physics for Engineers and Scientists I (5 units) PHYSICS 102 Physics for Engineers and Scientists II (5 units)</p> 	<p>ECON 001 Principles Of Economics I (3 units) Humanities Elective (4 credits) Humanities Elective (3 credits) Social Science Elective (3 credits) Social Science Elective (4 credits) Depth Requirement: Either 2 Social Sciences or 2 Humanities must come from the same department. Example: Macro + Micro-Economics would fulfill both the Economics and Depth transfer requirements. History can count as either a Social Science OR a Humanities class, but not both.</p> 
<p>Engineering Courses at East Los Angeles College</p>	<p>Communications Courses at East Los Angeles College</p>
<p>ENG GEN 101 Introduction to Engineering and Engineering Technologies (3 units) ENG GEN 220 Electrical Circuits I (4 Units) ENG GEN 131 Statics (3 units) ENG GEN 231 Dynamics (3 units)</p> 	<p>COMM 101 Public Speaking (3 units) ENGLISH 101 College Reading and Composition I (3 units) ENGLISH 102 College Reading and Composition II (3 units)</p> 
<p>1st IRE-Bell Semester: The Bell Academy</p>	<p>2nd IRE-Bell Semester: While in Internships/Co-ops</p>
<p>ENGR 299 Bridge to ProjectBased Engineering (3 credits) ENGR 492 Seminar (1 credit) ENGR 3XX Engineering Core Technical Competencies (7 1-credit courses) ENGR 3XX or 4XX Engineering Elective (1 credit)</p> 	<p>ENGR 492 Seminar (1 credit) ENGR 311W Professionalism I (3 credits) ENGR 301 Design I (3 credits) ENGR 3XX Engineering Core Technical Competencies (4 1-credit courses) ENGR 4XX Advanced Technical Cores Competencies/Electives (2 1-credit electives)</p> 
<p>3rd IRE-Bell Semester: While in Internships/Co-ops</p>	<p>4th IRE-Bell Semester: While in Internships/Co-ops</p>
<p>ENGR 492 Seminar (1 credit) ENGR 312W Professionalism II (3 credits) ENGR 302 Design II (3 credits) ENGR 3XX Engineering Core Technical Competencies (3 1-credit courses) ENGR 4XX Advanced Technical Cores Competencies/Electives (3 1-credit electives)</p> 	<p>ENGR 492 Seminar (1 credit) ENGR 411W Professionalism III (3 credits) ENGR 401 Capstone Design I (3 credits) ENGR 3XX Engineering Core Technical Competencies (2 1-credit courses) ENGR 4XX Advanced Technical Cores Competencies/Electives (4 1-credit electives)</p> 
<p>5th IRE-Bell Semester: While in Internships/Co-ops</p>	<p>FOR MORE INFORMATION, CONTACT Andrew Hanegmon, Engineering Facilitator 218-966-1192 Andrew.hanegmon@ire.mnstate.edu 1001 West Chestnut Street, Virginia, MN 55792 Program Website: www.ire.mnstate.edu/bell Program Course List: https://mankato.mnsu.edu/academics/academic-catalog/undergraduate/integrated-engineering#CourseList</p> 

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 (Click on Resources and then Graduate Statistics)

