Engagement in Practice: Exploring Boundary Spanning in a School-University Partnership

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Introduction

We report on a partnership for developing a mutually beneficial *University-K12 Liaison Model* that supports arts and design-integrated STEM connections between a research-intensive higher education institution and local educational systems. Our university has a historical identity as a polytechnical and land-grant university and currently houses a major U.S. engineering college. This institutional identity contributes to a strong commitment to STEM outreach and broader impacts goals. Likewise, the region's school systems are committed to STEM and STEAM education programs, which in our state are also supported by government resources that connect STEM education to workforce preparation.

The *University-K12 Liaisons* are shared positions between both the University and a local educational entity, such as a school system or museum, with the goal of building connections that mutually benefit schools, researchers, and the community. The original vision of one person connecting two institutional entities has grown to a liaison network that spans a variable range of formal and informal educational stakeholders. Along with this growth across diverse contexts and progress in identifying practices that are valuable to a range of participants and organizations, we have also encountered challenges. Stemming from the nature of *boundary work,* these challenges include constructing a consistent model across contexts, translating value in terms of concrete returns on investment, and supporting professional identity of individuals in the role long-term. We also face questions of how to make the model financially sustainable. To better understand these issues, we have conducted an auto-ethnography guided by the theoretical framework of boundary spanning. Building on Jesiek's synthesis of the literature on boundary spanners, we address the following research questions: *Do University-K12 liaisons fit the criteria of a boundary spanner?* and if so*, How are these criteria enacted in context?*

Background

The University-K12 Liaison position largely focuses on all K12 students and teachers across a district, with particular attention to increasing equity of outreach across schools in a largely underserved region. However, our liaisons do not fill positions as recruiters for creating a student pipeline to the University, but are rather based in a center for outreach and engagement. The current study examines the practices of this liaison work through the theoretical framework of boundary spanning developed by Jesiek, Mazzurco, Buswell, and Thompson (2018). Jesiek et al. synthesize 15 years of literature from multiple disciplines to characterize boundary spanning using a range of criteria (see Table 1). They used this meta-analysis to generate an understanding of what boundary spanners are and how they are relevant to the field of engineering. We use this framework to better understand the benefits and challenges of the liaison role being pioneered in our center for STEM outreach and engagement.

Table 1. Four key areas of boundary spanning (Jesiek et al., 2018)

Types of Boundaries	***Definitions and Roles of Boundary Spanners***	***Activities of Boundary Spanners***	***Competencies of Boundary Spanners***
organizational occupational/ functional knowledge individual characteristics time and space	linking pin spanner of structural hole informal versus formal	information and knowledge management coordination building and maintaining networks representing and influencing	no formal categories, but includes skills such as empathy and communication

While Jesiek maps boundary spanning to valued but often implicit roles in engineering workplaces, these skills are likewise valued in education contexts; yet, education literature reveals that the majority of boundary-spanning liaison positions between schools and universities are short-term or project-based (e.g., Castelli, Centeio, Boehrnsen, Barclay, & Bundy, 2012; Hoppey, 2016). In contrast, the role we discuss is a long-term position that spans multiple projects and was constructed explicitly for boundary spanning between the organizations.

Methods

To determine whether the educational liaisons who facilitate partnerships between a research university and formal education sites fit the criteria of a boundary spanner, we designed a qualitative study in which we analyzed documents such as activity reports using *a priori* codes adapted from Jesiek, et al.'s synthesized model. The data originates from our own reflective practice, so we consider this study to be an autoethnography. Adopting this reflexive and subjective method of inquiry is appropriate because the object of study - the boundary spanning work of liaisons - is inherently variable and context-dependent. However, since we wanted to identify both the positive value of the liaison activities as well as the challenges, we considered the complexities of personal research and took measures to reduce bias, including using a rigorous external source for codes (Jesiek's model), using multiple coders and iteratively assessing inter-coder alignment, and obtaining input from additional parties involved in the activities (Sochacka et al., 2016).

Both quantitative and qualitative data were collected as part of the joint relationship between the University and a public school district and include descriptions of the types and frequencies of interactions between the two entities (e.g., field trips, outreach in schools, grants, teacher professional development) that occured in the years 2017-2019. Sources of data include an annual report of yearly interactions between the two entities, weekly email reports of activities that the liaison is conducting, and self-report surveys that were sent to teachers in the district

assessing how often and what types of interactions they and their students had with university faculty and students. In addition, faculty at the university reported about their ongoing outreach, research, and grant funded activities involving the school system. Finally, competencies seen as key to the success of the liaison position were collected via supervisor assessment.

The qualitative data were also collected via self-report methods and then thematically coded using Jesiek's categories as *a priori* codes. Using a spreadsheet system that mapped the categories into a codebook, two researchers separately coded two years of weekly activity recorded in emails, and compared their findings by reviewing the data through the organizational structure of the codes. In these discussions, the researchers noted salient events that did not match the existing codebook, and grouped their reflections in a new section of the codebook. Finding that most characteristics of boundary spanning work clustered with one or more characteristics, the researchers then generated 10 scenarios that exemplified characteristics from the codebook. From this collection of scenarios, the researchers selected three examples that signified patterns of activities that are consistent across contexts in the liaison network. The researchers then summarized the scenarios with reference to the codes and shared them with other liaisons in the network to measure the trustworthiness of their analysis. In this process, the three other liaisons were asked if they had experienced or witnessed similar experiences. This feedback helped the researchers reduce their own biases and strengthen the credibility and dependability of their analysis. The input of the other liaisons, who worked in different boundary spanning contexts, also provided a measure of transferability across similar situations (Leydens, Moskal, & Pavelich, 2004). Following these guidelines, we were both "making" data and handling data while attending to the quality of the research in terms of theoretical, procedural, and communicative validity (Walther et al., 2017).

Results

Using Jesiek et al.'s model to reflect on our experiences of connecting a polytechnical land-grant university with its local community via STEM outreach, we were able to answer our original research questions, *Do our University-K12 liaisons fit the criteria of a boundary spanner?* and if so*, How are these criteria enacted in context?* In terms of criteria, the liaison position fits all four categories of types of boundaries, roles, activities, and competencies:

1. *Types of boundaries.* Liaisons spend part of their time at the university and part of their time in a school or museum setting, spanning organizational and space boundaries. While all of the university-school-museum partners are focused on co-developing value in terms of broader impacts, liaisons serve as translators across boundaries that involve different functional and knowledge cultures, with variables that involve individual characteristics (particularly in less served populations).
2. *Roles of boundary spanners.* All boundary spanning activities are conducted through a formal position explicitly created for the purpose of facilitating networks and relationships. Liaisons perform roles as "linking pins" in connecting people within organizations, and they "identify and address structural holes" when connecting people

across organizations. In some cases, the liaisons also address structural holes within organizations. For example, liaisons are often able to connect individuals in different units at the University who are conducting similar activities toward broader impacts but do not have knowledge of each other's efforts.

3. *Activities.* The liaison activities also align. For example, a central goal of the liaison network is to create and sustain knowledge resources informed by and accessed by all entities. Liaisons collect knowledge (through conferences, research, enrolling in training workshops, etc.), create knowledge (through research papers/conferences/grants/training workshops), and build knowledge resources (via websites, training workshops, and evaluation reports). The liaisons also coordinate activities such as field trips, and produce evaluative reports on benefits and ways to improve.
4. *Competencies.* Supervisors at each of our organizations collaborate to establish criteria for the position, updating the criteria each year. These include the ability to:
    - communicate effectively with educators PK-20
    - evaluate next steps in managing projects
    - recognize barriers and address them
    - identify problems and develop action plans
    - redirect efforts to create win-win opportunities for both organizations
    - comfortably join large groups of strangers (e.g., staff meetings at schools)
    - meet with many different people to discuss ideas
    - communicate goals and progress to both organizations.

One of the most significant examples of liaison work - in which a liaison increased equity of STEM outreach to less visited schools in the district - demonstrates how the combination of the capabilities listed above can increase the effectiveness of partnerships between organizations. After collecting data to determine how schools were being differently served, the liaison helped school administrators determine that schools with the lowest levels of outreach were to become target schools with the goal of increasing the outreach these schools received. The liaison implemented this decision by encouraging university faculty and students to place newly created STEM activities in less served schools in the districts. Within one year, the liaison was able to increase outreach to these underserved schools by 21% without taking outreach away from other schools. This action crossed organizational, functional, and knowledge boundaries, with the liaison engaging in roles of spanning a structural hole and acting as a linking pin. The liaison was engaging in the boundary spanning activities of creating and sustaining networks, and influencing (by "encouraging" activities in these directions).

In terms of the second research question, the ways that boundary spanners enact their roles in a STEM education context are complex. For example, the competency of being able to "comfortably join large groups of strangers" aligns with the work of Jesiek et al. (2018), especially as the ability to interact with large groups of strangers may facilitate the collection and dissemination of information across sites. The liaisons engage in these kinds of activities on a

very regular basis. However, while this competency fits the theoretical framework, enacting it over time may not be without potential negative consequences for the boundary spanner. Being able to present to large groups may be an enjoyable process or may be uncomfortable, and repeated over time it may even be exhausting.

Although there are key ways in which the liaison position fits the theoretical boundary spanner framework, the framework neglects challenges related to the agency of liaisons and the consequences that engaging in boundary spanning activities may have on the boundary spanners. For example, all of the activities of the liaison boundary spanners involve "representing and influencing" (Jesiek et al., 2018), which includes "ensuring legitimacy" and "ambassadorial activities" (Ancona & Caldwell, 1992, cited in Jesiek et al.). One key aspect of boundary spanning that was discovered during the coding process was that the boundary spanner was often seen as representing the other entity and perceived as being an outsider, despite being paid by and having access to both institutions. For example, when needing to collect a form from K12 school personnel, one liaison was perceived as being solely from the University - despite wearing a school system ID and initiating email contact with a school email. The idea of the boundary spanner as "other" is something that is lacking from the Jesiek et al. (2018) framework. A prerequisite of a boundary spanner is the ability to interact with both groups to represent both interests and to do so with the appearance of confidence. However, the ongoing performance of walking the middle line between both groups means that the boundary spanner is often alone. Because the boundary spanner may always be seen as representing the other side in interactions, they may personally feel without a true home base.

Discussion and Conclusions

The University-K12 liaisons are boundary spanners and play impactful roles in working toward the combined goals of partnership across institutional contexts. However, the unique nature of this position can also pose challenges for the individuals who enact connections across a range of activities and relationships.

Our next step is to use these insights to better articulate how these boundary spanners are valuable to other contexts as we expand the liaison program. Challenges we will face include attracting consistent funding streams for the positions and clearly demonstrating return on investment, as well testing different levels of distance models to see how geographically dispersed networks may change the type of liaison relationship needed. However, the greatest challenge we found lies in the personal and professional identity of boundary spanners.

A key finding of this research was that boundary spanners often find themselves in a middle ground between the entities they are connecting. They are able to speak to and influence both entities but, in order to be successful, must also retain a level of impartiality that means they can never fully support one entity over another. At some point, each entity may not receive their ideal outcome or may need to compromise, and the boundary spanner is the agent who may need

to orchestrate and negotiate this compromise. Navigating this "between worlds" position (Said, 1998) is both a necessary skill of a successful boundary spanner but also a skill that may come with a cost. Lacking professional identity associated with an organizational home base can be a stressful and lonely existence. For short-term positions, this stress may be only a minor inconvenience or even lack prominence if the identity is aligned with a project; however, for long-term positions this lack of identity may begin to take a toll on the emotional and mental health of the boundary spanner.

In order to develop the most successful boundary spanners, we may consider the option of creating a third entity as a mutually-invested home base that could provide identity in the form of shared resources as well as personnel. In addition, building this third entity could then create a neutral space for the university and multiple school districts to interact and work as a team in a shared location. Both shared investment and independence, as well as clarity of roles, are needed for the boundary spanner to be successful. This approach departs from the perspectives theorized in engineering education studies, where the flexibility and adaptiveness of boundary spanners are increasingly desired and needed skills for 21st century workplaces.

In his work on geographically dispersed knowledge workers, Johri points out that *defining characteristics of boundary work* is important, a step we have taken in this study by building on Jesiek et al.'s framework. For training future engineers, Johri suggests training students not only in cultural awareness but also in knowing how boundaries emerge. Although firms increasingly advertise positions calling for skills characteristic of boundary spanning, the skill-set and the problem area is often not explicitly recognized. On this point, we would recommend that organizations increase awareness of their boundaries and structural holes and become more cognizant of how to support the valuable workers who do the spanning work for them.

Our suggestions for universities and school systems working with liaison positions to increase STEM broader impacts and outreach include:

1. Provide training in how to successfully identify, sustain, and evaluate mutually beneficial partnership opportunities.
2. Support liaisons in the creation of a professional identity that allows for a clear role as well as opportunities for professional development and advancement.
3. Clarify the competencies required for a professional liaison, and recognize that different competencies will be required in different contexts.

Finally, we also have learned that educational boundary spanners perform work in diverse cultural and disciplinary contexts that require skills not easily recognized by the teachers, faculty, administrators and students they support. Their activities require fluency in different disciplines - even across the STEM/STEAM spectrum - that should be professionally recognized and supported.

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