

Characterizing Service-Learning Partnerships in Engineering Through the Experiences of Undergraduate Students

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Abstract

Partnerships are a central part of the service-learning experience. Recent research has focused on partnerships, types of interactions, and relationships across service-learning from various perspectives, yet examinations of service-learning partnerships from the student perspective, specifically the relationship between the community partner and the student, are limited. This investigation answers two research questions: (a) How do undergraduate engineering students characterize the nature of service-learning partnerships? and (b) What factors within service-learning influence student perspectives on partnerships? Focus groups and interviews were conducted with students who engaged in service-related engineering experiences, and the transcriptions of these discussions were analyzed using the transactional, cooperative, and communal framework, a method of thematic discourse analysis. Results revealed that the experiences of undergraduate students in service-learning provide valuable insight for analyzing partnerships, specifically with respect to the following themes: service component, social context, and community interactions. The factors shown to influence students' perspectives of the service-learning partnership include the positionality of the students and the intentionality of the instructors. Our results imply that student experiences hold value beyond what is currently leveraged for research, teaching, and community outcomes. This study provides evidence that service-learning and community engagement efforts benefit when they are designed and evaluated in ways that acknowledge student voices and embrace students as knowledgeable and valuable members of university-community partnerships.

Over the past 2 decades, community partnerships have emerged as a focal point of study in response to a call for new research to examine how different types of service-learning partnerships can affect and add value to the communities with whom they work (Giles & Eyler, 1998). Service-learning partnerships are embedded within complex relationships among students, faculty members, administrators, and residents. It is useful to think of these partnerships as both individual relationships (Bringle & Hatcher, 2002) and relationships between organizations (Janke, 2013). Such partnerships are influenced by many factors, including the type of service, university structure and culture, geographic location, personal background of the individuals engaged in the work, and types of community organizations involved. Most research on service-learning partnerships has examined these programs through the experiences of community and faculty members, as these groups often support educational partnerships longitudinally. Although student participants are more transient in nature, they are nonetheless often deeply invested and immersed in these programs, suggesting that their voices may provide insight into the nature of service-learning partnerships.

In this study, we examined the experiences of students in service-learning partnerships to investigate the student-community boundary. We specifically aimed to answer two research questions:

1. How do undergraduate engineering students characterize the nature of service-learning partnerships? (RQ1)
2. What factors within service-learning influence student perspectives on partnerships? (RQ2)

In the following sections, we briefly review the literature on service-learning partnerships; describe the transactional, cooperative, and communal (TCC) framework in detail as it influences the method of discourse coding; and present a thematic analysis of transcribed focus groups and individual interviews with undergraduate students involved in service-learning partnerships.

Literature Review

Service-learning partnerships and their corresponding personal relationships have been investigated broadly throughout higher education (Barnes et al., 2009; Silka & Renault-Caragianes, 2006), specifically in public health (Drahota et al.,

2016), sociology (Mooney & Edwards, 2001), and STEM fields (Delaine et al., 2019). Research has demonstrated that deep, intentional, and authentic partnerships can produce profound outcomes for those involved, including the development of critical thinking, expansion of love and hope, and support for community-oriented and social justice outcomes (Miller et al., 2011; Miller & Hafner, 2008; Mitchell, 2008). Revealing the dynamics of service-learning partnerships can promote a better understanding of how their respective characteristics impact realized and potential outcomes (Enos & Morton, 2003; Sockett, 1998). Such knowledge can support both researchers' and practitioners' ability to implement service-learning with increased clarity of expectations and outcomes for all participants.

Research that has systematically examined service-learning partnerships has focused on the institutional cultures of the universities and community organizations involved (Clayton et al., 2010; Dorado & Giles, 2004; Dorado et al., 2009; Janke, 2013). Research has also investigated partnerships in terms of individual relationships (Bringle, Clayton et al., 2009; Bringle & Hatcher, 2002; Bringle & Clayton, 2013). Bringle, Clayton et al. (2009) identified five key participant groups in service-learning partnerships—students, faculty, administration, community partners, and residents—and they proposed examining partnerships as relationships among and between these groups. Clayton et al. (2010) expanded on the work of Bringle, Clayton et al. (2009) and developed an instrument that examines the closeness of relationships between faculty members and community partners. Results gathered using this instrument concluded that relationships between these constituent groups can vary in depth.

Student perspectives are underrepresented in research on service-learning partnerships. Of the key participant groups, investigations into service-learning partnerships have leveraged insights from faculty (Bringle et al., 2009; Clayton et al., 2010), community partners (Rinaldo et al., 2015; Sandy & Holland, 2006; Worrall, 2007), and other researchers (Bortolin, 2011) to add to the body of knowledge on the educational value and impacts of these programs. An exception notable for its use of students is Strier (2011), who looked at students alongside other stakeholders and determined that students primarily defined university-community partnerships in educational terms. Prior research has more commonly used student perspectives for gauging the educational value of service-learning

(Bielefeldt et al., 2010; Eyler & Giles, 1999; Simons & Cleary, 2005) rather than for supporting an understanding of these partnerships. In other areas of research, student perceptions have proved to be valuable in promoting understanding of classrooms (Machemer & Crawford, 2007), curricula (Bender & Jordaan, 2007), and education more broadly (Glover et al., 2002). As such, the perspectives that students hold and the language they use to describe their experiences in service-learning are underexplored resources for examining service-learning partnerships. One framework to analyze partnerships is the TCC framework. The following section provides an overview of this framework.

Analytic Framework: The TCC Framework

The TCC framework (Thompson & Jesiek, 2017) was developed through a synthesis of prior research on group and interpersonal dynamics of service-learning partnerships in engineering. The framework can be used to classify a partnership's interactions, activities, and language (i.e., approaches) into one of three categories—transactional, cooperative, or communal—based on the boundaries between the service-learning program (i.e., students, faculty members, and administrators) and the community (i.e., organization staff and residents). This framework is not intended to be hierarchical, as there are benefits associated with each category of interaction and most partnerships will utilize approaches that include at least two categories.

In the *transactional* approach, there are clear boundaries between the different participant groups. Within this approach, there is often a focus on an educational exchange that is intended to provide benefits to the students and the community. This approach emphasizes the differences between stakeholders, creating feelings of otherness or an “us” and “them” mentality. In a *unilateral-transactional* approach, a subset of the transactional approach, only one partner is involved in an exchange or decision.

In the *cooperative* approach, differences among participant groups are acknowledged, yet a focus on togetherness is present. Within this approach, community voices and expertise are integrated into students' service-learning experiences.

In the *communal* approach, participants across groups experience a recognition of shared humanity, and connections between individuals strive for equity, respect, and unity. Boundaries between one person's needs and those of others are acknowledged, yet there is an understanding

of togetherness and oneness and/or a clear recognition of shared humanity that supports transcending these boundaries.

In this paper, the authors focused their research and analysis on the student-community boundary (i.e., the student-community relationship and the student-resident relationship as defined by Bringle and Hatcher [2002]) and used the TCC framework to code and analyze the data that revealed student experiences in service-learning.

Method

The authors approached this research through a social constructivist lens, recognizing that “reality is constructed by individuals interacting in their social world” (Merriam, 1998, p. 6) and “there are multiple interpretations of that reality” (Merriam, 1998, p. 22). According to Merriam (1998), the goal of qualitative researchers is to understand how individuals make sense of the world while acknowledging that the research itself is another interpretation of those realities. The method described in the following sections allowed us to interpret the characteristics of service-learning partnerships through the realities and experiences of students within the partnerships. Our interpretation considered data collection, the background and context of the service-learning cases, the positionality of the researchers, and thematic discourse analysis.

Data Collection

This research leveraged primary data that was originally captured for a separate, six-case study investigating the opportunities for undergraduate engineering students to develop empathy through community-based learning (Carroll et al., 2018; Wang et al., 2018). The data were drawn from focus group and individual interviews that used a semistructured protocol to explore the lived experiences of students within curricular, cocurricular, and volunteer service-learning/ community-based learning efforts. The protocol included six categories, each of which included potential questions that could be asked to probe the service-learning experience. These categories included setting the stage, affective, cognitive, behavioral, interpersonal, and social elements, as shown in Table 1 alongside example prompts.

The first author, with the help of a research assistant, conducted a focus group for each case after the service component had been completed at the end of the semester. After each focus group, with support from the same research assistant, interviews were conducted with one individual student from each focus group to collect more in-depth data. Between three and seven students participated in each of the three 60-minute focus groups, for a total of 17 focus group participants. One student participated in each 60-minute interview, for a

Table 1. Categories of the Semistructured Interview Protocol with Example Prompts in Each Category

Category	Example prompt
Setting the stage	Please tell us about/help us recall your experience in [Case A, B, C].
Affective	How did you feel when you mentioned . . . ?
	Did you find anything challenging during . . . ?
Cognitive	What did you think of yourself after this activity?
	Can you briefly describe the reason why that left an impression?
Behavioral	What did you do in that moment?
	How did you respond to . . . ?
Interpersonal	In what ways did this experience connect you to other people?
	Can you share some stories when you interacted with others during . . . ?
Social	What does this mean to you as an engineering student?
	In what ways did . . . lead to your development as an engineer?

total of three interview participants. The focus group and interview data were transcribed using a professional transcription service.

Service-Learning Cases

Because the context of each service-learning experience is unique and complex, multiple service-learning partnerships were included in this study to account for the inherent nuances that exist from case to case. The authors purposefully selected three contexts (referred to as cases) from the larger, six-case study among engineering students (Carroll et al., 2018; Wang et al., 2018). Cases were chosen for this study based on the first author's direct experience with and associated understanding of the overall dynamics within each partnership (further described in the Positionality of the Authors section).

Case A was an international partnership with a Central American children's shelter in which student service was part of a credit-bearing course. Students worked on the project domestically, with minimal direct communication with the community, prior to traveling internationally for engagement and project implementation at the end of the semester. This programmatic structure correlates with those that prioritize transactional interactions.

In Case B, engineering students worked on design projects for a local community garden and interacted/communicated with the community partner and residents throughout the design and implementation process. Case B was selected because the professor intentionally supported reciprocity as a central component of the student-community boundary, representing a potentially cooperative approach.

The Case C partnership occurred within a non-credit-bearing, cocurricular activity in which underrepresented minority student clubs organized and led an educational activity to introduce underrepresented minority youth in the local community to engineering. Case C was selected because it prioritized an intentionality of partnership based on the identities of the students and community members rather than an intentionality centered on the boundary between them.

Each of the three cases involved undergraduate students at the same large, Midwestern university (Table 2). Case participants included both interdisciplinary engineering students and a few student participants from nonengineering majors. Certain demographics (Black, Latinx, Native American, and women engineers, among other groups) are substantially underrepresented in the

engineering fields (Ohland et al., 2011; Yoder, 2014). As each study case included approximately 50% women, women were overrepresented with respect to their demographics in engineering more generally. The student participants in Cases A and B were primarily from majority backgrounds in engineering (White), while student participants in Case C were primarily from underrepresented backgrounds (Black and Latinx). Cases A and B were for-credit curricular activities that supported the direct advancement of students toward degree completion. The service-learning effort in Case C offered no credit to the participating students. Case C aimed to provide a platform for undergraduate engineers to support the identity of younger students of color who are demographically underrepresented in engineering as a result of systemic marginalization.

This research was performed under protocols approved by the university's institutional review board for human subjects research, and each student in each case consented to the study. Consent was collected at the beginning of each focus group and interview, aliases were used, and all data maintained confidentiality. All students self-selected for enrollment within each service-learning case, and all students who enrolled in / volunteered for each case were eligible to participate in the study. In all cases, all eligible students elected to participate in the study. Focus groups were incentivized with a meal, and interviews were incentivized with a \$25 gift card.

Positionality of the Authors

Both authors have backgrounds in engineering, educational research, and service-learning (through research and practice). They were not involved in a leadership capacity in implementing the service-learning experiences considered in this investigation. The first author, a Black, cisgender male with a Latinx background, interviewed the students and ran the focus groups with a graduate research assistant. This was of primary importance for Case C, in which the student participants were primarily of Black and Latinx backgrounds. The first author interacted with each case as an assistant professor at the same university at which the cases were implemented. In Case A, he served as a service-learning resident adviser; though he was not the course instructor, he provided support on the trip and traveled to the international location with the students. In Case B, he personally mentored the service-learning instructor on community engagement

Table 2. Descriptions of Three Service-Learning Cases Purposefully Selected for This Study

	Service-learning students	Service-learning description	Service-learning structures	Author rationale for selection
Case A	Fourteen undergraduate students from multiple majors in engineering; nearly all students were from predominantly majority populations in engineering.	A long-running international service-learning for-credit course in partnership with an international children's shelter (ICS) in Central America	Students work in the United States on engineering design projects for the ICS. Toward the middle of the course, students travel abroad to implement their designs in the community.	International context where students design projects prior to going onsite, aligns with transactional
Case B	Eleven undergraduate students from multiple majors in engineering; nearly all students were from predominantly majority populations in engineering, with some students from underrepresented groups.	A recently established service-learning for-credit course embedded within a partnership with a nonprofit organization that supports food security within the city of the university that implements the course	Students iteratively work on designs with the community organization both on campus and at the local site multiple times throughout the semester to advance the engineering design projects.	Partnership explicitly developed to center relationship, aligns with cooperative
Case C	Approximately 30 students from underrepresented backgrounds (Black and Latinx) from two student organizations that support the success of underrepresented groups in engineering	An event that seeks to broaden participation in engineering among K-12 students by promoting awareness and interest in engineering through the delivery of hands-on activities by near peers	The event is created by university administrators but organized and run by student volunteers. The students plan and prepare for the event on campus and implement it within a local high school.	Shared identity between the university students and participating youth, aligns with communal

theory, particularly regarding the importance of reciprocity, though the students were not aware of this relationship. Furthermore, he has participated in the community-academic partnership at the core of Case B. Though this partnership was a key component of a credit-bearing course, the first author did not teach the course or interact directly with the students outside of data collection. Regarding Case C, while he did not work directly with the students, he had personal experience with organizing and participating in similar events as a graduate student.

The second author, a White, cisgender female, became involved with the study after the data collection stage and assumed primary

responsibility for the analysis. She is a faculty member at a small liberal arts school where she manages a service-learning program. Identifying as an outsider to all the cases, she is the primary developer of the TCC framework (Thompson & Jesiek, 2017). This dynamic allowed the second author to analyze the data while engaging in conversations with the first author that informed the contexts and nuances of the partnerships.

Data Analysis

This study utilized a thematic discourse analysis to gain insight into how the students in all three cases experienced and socially constructed an understanding of service-learning

partnerships. Phillips and Hardy (2002) have stated that discourse allows researchers to correlate an individual's lived reality to the language they use. Essentially, language becomes a tool used to understand a person's perceptions and experiences. We utilized a sociolinguistic analysis lens: an approach that focuses on specific text from the interview transcripts to highlight power dynamics and to understand how language constructs a given phenomenon (Potter & Wetherell, 1987). In this study, the dynamics that we highlighted were student-community interactions, and the phenomenon was the nature of the relationship described through the student experience.

The second author analyzed the interview and focus group transcripts from the three cases following the protocol described by Braun and Clarke (2006), paying particular attention to the language and syntax that students use to talk about partnerships. Braun and Clarke's approach includes six specific phases intended to guide researchers through analysis. In the first phase, *familiarizing yourself with the data*, the second author read through the transcripts of each case, highlighting and making notes on specific language used in connection with the partnerships. In the second phase, *generating initial codes*, the TCC framework was used to deductively code short sections of the transcripts (Thompson & Jesiek, 2017), and students' descriptions of meaningful interactions during their work with partners were inductively coded. For example, if the students described the service component of their experience with the community partner in ways that included a sense of "other"—that is, if their language distinguished the students, "us," from the community, "them"—the student was describing a transactional approach. That code would include "service," which was inductive, and "transactional," which was deductive.

These first two steps were conducted for each of the three cases individually.

In the third step, *searching for themes*, the second author identified similarities among the inductive codes across the cases and identified three unifying features for each case alongside corresponding excerpts. In the fourth step, *reviewing themes*, both authors reviewed these excerpts and interpretations with iterative discussions through the lens of the research questions. In the fifth phase, *defining and naming themes*, the authors reviewed the excerpts, wrote up a detailed analysis of each theme, and discussed the essence of each theme until consensus was reached. The authors then reviewed the agreed-upon interpretations and specifically examined commonalities in how students' language emphasized the nature of partnerships across topics. In the final step, *producing the report*, the finalized themes were described in this paper (Table 3).

Research Limitations

While this study sought to leverage student descriptions to characterize service-learning partnerships, this research was limited by its exclusive focus on student experiences. The community was not interviewed. Furthermore, the service-learning program instructors were not consulted to determine whether they approached the partnerships in any particular way. Beyond the interpretation of the authors, the partnership types as presented were not verified through any additional sources outside of the descriptions provided by the students in the focus groups and interviews.

Findings

Three themes emerged from students' discussions of their service-learning experiences that characterized the nature of the student-

Table 3. Analytic Framework Detailing the Benefits of Service-Learning Partnerships Based on the Themes That Emerged from Student Perspectives Across All Cases

Themes	Description
Service component	The ways in which the "service" that is offered within the course is perceived by the students
Social context	The ways in which the context and social relevance of the setting is perceived by the students
Community interactions	The ways in which students perceive their direct interactions with nonuniversity partners within the context of the service-learning course

community boundary, which addressed the first research question: (a) service component, (b) social context, and (c) community interactions (Table 3). Further analysis of student discussions in the context of these three themes produced several factors that were shown to influence students' perspectives of the service-learning partnership, which addressed the second research question: (a) the identity/positionality of the students and (b) the role of the instructor.

Case A: The International Children Shelter

In the international children shelter (ICS) case (Case A), students described the nature of the partnership through the service component within the United States (unilateral- transactional), the service component at the ICS (transactional), and community interaction (communal).

Service component within the United States. University students stated that there was minimal communication with the community partner before they traveled abroad. The students researched the technical aspects of the design projects and planned to install a water catchment system. However, just before their scheduled travel, they learned that the roof system at the ICS was lined with asbestos, a toxic substance that is unsafe for consumption.

We were defining the problem, gathering all the information, researching and everything, and we had actually designed a solution. Up until when we needed to get measurements, then we got information that the roofs . . . were made of asbestos . . . so we actually couldn't implement any of that. I think it was 2 weeks before the trip we had to switch projects completely to aquaponics

[The organization] had asked for [aquaponics] a couple years ago, and that system had failed. That was kind of like a request that they had a couple years ago and when our rainwater collection system idea fell through, our professor asked us what else we were interested in, and one of the girls on the team was really interested in the aquaponics system, so that's how we ended up taking that project on.

By stating that an aquaponics system was "kind of like a request," the interviewee expressed uncertainty about the community's need or desire for the

aquaponics system. Yet, the student clearly stated that another student on the team had a high interest in aquaponics. Overall, the decisions were made solely by the students, correlating to a unilateral-transactional interaction within this partnership.

Service component at the ICS. Once the students arrived at the international service-learning site, they built the aquaponics system with some support from the boys at the ICS. The interviewee described the boys in the community using "us" and "them" language, highlighting transactional interactions. The following excerpt highlights the work of the university students and how they described the contributions of the boys.

Well, it was really nice because the boys were there the whole time, like for hours every single day that we were building the aquaponics system, and they were really interested. They were asking questions about how the system works, and it was clear that they were taking ownership of the system because they were helping put it together. Yeah, they helped us put a lot of it together, and after it was built, they helped us set it up with putting the fish in and going to get water to fill up the system, and we had them help with planting the seeds and everything. So they knew where everything was because they helped put it together and we saw, like, the boys had taken care of it the last day when we just went to go, I think we went to check the temperature of the water on the last day or something, and they had actually watered the seeds.

It was clear [the boys] had been paying attention to it and protecting it actually, even when we weren't there. So, that was really great to see that they actually have an interest in something that we built for them in mind.

This university student may have been seeking a more cooperative approach, as they highlight the boys' interactions, engagement, and ownership. It is important to point out, however, that this same interaction could have been coded as cooperative if the interviewee had described the boys as working alongside the university students. The fact that the interviewee did not place the boys within "us" and rather described the boys as a separate entity ("them") helping the university students highlights

the transactional nature of the relationship within the context of the service component.

Community interactions. The students described their interactions with the community outside of the design project with a sense of togetherness and shared humanity that correlates to a communal approach. Below is an excerpt that emphasizes the feeling of family that the students experienced in the community.

We were working in their homes and living in their homes, and we went into the kitchen of the woman who was cooking, and everyone called her “Mama,” and she showed us how to make tortillas. So, it was like going to your grandma’s house and she teaches you how to make one of her homemade recipes so that you can pass it on later on. And then when we would play with the kids, that just felt like playing in a big family, like everyone is back from school and it’s like a summer day.

The students described deep emotions and a sense of family. These descriptions highlight meaningful connections with the community while on-site at the ICS. In the focus group, all students concurred that it was hard to leave the community because of the new relationships they had formed. This highlights a communal approach in the non-project-related interactions with the community.

Case B: Engineering for Food Security

In the engineering for food security (EFS) case (Case B), students described the process of project contextualization in terms that identified both transactional and cooperative interactions. Specifically, students focused on aspects of listening and adapting to what community partners expressed. Below we highlight student descriptions of the partnership within three themes: service component (transactional-cooperative), social context (transactional-cooperative), and community interaction (transactional-cooperative).

Service component. In the EFS case, the students described the importance of communicating with the community and integrating community perspectives into the design (cooperative), and they situated themselves in a client-oriented dynamic (transactional). Below is an excerpt in which a student reflected on the decision to build a pathway in the design solution (i.e., farming robot) to accommodate the community.

We could easily just go in and say, “Here, we’re gonna build you this [farming robot], we’re gonna give you this solar power, you can do what you want with it.” But through conversations [we learned] . . . that a lot of members of the church are older and . . . a lot of them would have trouble reaching into it and trying to walk around it.

So, after that we decided, “Okay, we’re gonna build a pathway in between the [farming robot] to allow the members to have easier access.” . . . What you might think [is] the best solution might just inhibit the community in the long run. You have to take their needs, you have to listen to them, because at the end you’re working for them.

In the above example, the student described a cooperative approach in which conversations with the community led to modifying the designs. The student’s framing of the overarching relationship as one in which the students were “working for” the community also signaled a transactional approach.

It is important to note that the student explicitly distinguished their approach from a unilateral-transactional process—that is, one in which the students would have made design decisions without community input. In this excerpt, the student stated twice that they could have come in and just built the farming robot or designed the “best solution,” but without community input, the solution may have failed. The student’s emphasis on listening to the community and integrating their input suggests that this is a new approach, possibly linked to the intentional lessons by the instructor. As a result, the student reinforced their own understanding of a cooperative dynamic.

Social context. In the data, EFS students referred to themselves as “outsiders” in relation to the community, which was language that the professor emphasized in the course. This language implied an “us” and “them” dynamic (transactional). However, the students regularly described “otherness” as a way to honor the differences of community members’ thoughts and lived experiences as well as a lens through which they recognized their responsibility to consider others’ point of view (cooperative). In the following example, a student described the outsider perspective used in the course.

I think the biggest thing for me is that, as an outsider, I may not have all the answers to whatever the community's problem is. And through a lot of our reading we learned about the kind of steps you need to take, and really the kind of mindset you need when coming into these communities. I've never really thought of that before. I would volunteer at soup kitchens or other communities around where I lived, and I never really thought these people may have better solutions than we do because they've lived through this experience. And just having an open mind and being able to listen to everyone that's involved in this situation is really important.

This student actively recognized that the lived experience of the community provided expertise (cooperative) while acknowledging that there was an otherness inherent to it, specifically that community members' mindsets were different (transactional). Holding both of these approaches, the student identified the importance of having an open mind and listening to the community.

Community interactions. Students described the community partner as a teacher with vast knowledge of the community and context that was critical for the project's success (cooperative). At the same time, they situated the relationship in terms of a give-and-take dynamic (transactional). In the following example, the student described the educational value of working with the community partner.

[The community partner is] teaching us so much and we'll talk to her about our farming robot. She'll talk to us for 20 minutes about the interactions between gardening and socioeconomic issues and the impact that has on city councils and legislation. So, it's a win-win situation, 'cause we're helping her to garden and she's teaching us so much more about her experiences. Which I think is something that you can't necessarily learn in school These are people who have lived this. This is their everyday lives. This is something that they've gone through. And that's not something that you can just learn on a test or in a class. You have to meet people, form those relationships, and go forward from that.

Similar to the first two examples within this case, the student coupled a transactional approach, this time describing a "win-win" solution, with the cooperative approach of honoring and incorporating the knowledge of the lived experiences of the community. This student appreciated the knowledge that the community partner brought from her lived experience, which is a core value of a cooperative approach.

Case C: Service-Learning Led by Cultural Student Organizations

In the service-learning case led by cultural student organizations (CSO; Case C), three themes emerged from the data: service component (cooperative), social context (communal), and community interaction (communal).

Service component. The students designed and implemented a series of activities to teach local K–12 youth basic engineering concepts. The children participated in the activities to design engineering solutions, while the service-learning students reflected on what that meant to them.

We had the kids making catapults, and it was pretty cool just to see the different designs that the kids came up with. We gave them one basic concept and they saw that their initial concept didn't work, so we let them use their creativity and their problem-solving skills to come up with a better idea, and we saw some interesting designs that developed from that.

For us, you're so used to going to all these rigid classes, you're just so used to thinking about how to solve these problems, so everyone usually takes the same path, so when I was peeking at other people doing their activities, it's so cool seeing little kids come up with ideas that didn't even cross your head. You know what I mean? They are able to deviate and there's so many different designs, so many ways people figure out how to make their ice cream quicker.

In this excerpt, the interviewee highlighted the creativity and problem-solving abilities of the K–12 children. They compared the children's thinking and problem-solving approach to his own, which he described as being set in the context of "rigid classes." This implied their personal respect and admiration for the children's approaches. This

excerpt highlighted a cooperative approach, as the interviewee both recognized differences and was inspired by and valued what the children contributed to the experience.

Social context. The service-learning students in the organization linked their personal interactions with the children to the context of systemic change (communal), specifically in the form of a desire to increase the participation of people from demographics underrepresented in engineering. The following excerpt highlights this connection.

The draw for me is just being able to impact the next generation of future engineers. . . . If you look at the percentage of African Americans in society versus the number of African Americans in engineering, there's a disparity. . . . I feel as though being able to get in front of the kids and let them see, "Hey, this guy's doing it. I can do it," and spark that interest, I feel as though that's important. . . . For a lot of them, it's their first time experiencing anything engineering. Now their first associations with engineering are going to be Black people and Latino people. In a field where there's not that many minorities, the first thought of engineering is minorities. I think that's pretty important because they can see themselves in that position instead of seeing themselves as someone who shouldn't be there.

This student linked larger systemic trends of African American and Latinx representation in engineering directly to the service work. In this process, the interviewee identified the social context of being African American in engineering. Being Black and Latino students themselves, the

university students were positioned as role models for a younger generation with the specific goal of increasing representation. Since this social context was grounded in shared lived experiences, it was situated within a communal approach. The service-learning students were participating as a way of giving back to the next generation, which embodied elements of shared responsibility and created a platform for a communal relationship.

Community interactions. In the CSO case, the service-learning students described emotional connections with the children (communal) and reflected on their own lived experiences.

There was one kid, and I feel like I felt him. We were making ice cream and he was shaking his ice cream for the whole session and his could not work. His was not turning into ice cream and I felt that because I had a really stressful week. . . .

He was just showing his frustration and then the kids would console him . . . and he expressed himself. I shook his ice cream for another hour and then gave it to him, and he lit up and gave me a hug—that really touched me. I still think about that.

In this example, the student empathized with the child and established a strong connection. The student perceived the child's frustration and focused on their shared humanity, which distinguishes a communal approach. The interviewee took it upon themselves to support the child by shaking the ice cream for an hour. Based on the exchange of a hug, it appears that the child was just as touched. The reciprocity and shared humanity within this experience indicated a communal approach to the partnership.

Table 4. Overall Thematic Analysis through Emergent, Service-Learning Elements as Interpreted through Student Discourse in the Context of the TCC Framework

	Service component	Social context	Community interactions	Overall student trend
Case A	Transactional-unilateral	Not described	Communal	Primarily transactional
Case B	Cooperative and transactional	Cooperative and transactional	Cooperative and transactional	Primarily cooperative
Case C	Cooperative	Communal	Communal	Primarily communal

Discussion

The goal of this research was to explore how students characterize service-learning partnerships (RQ1) and the factors that influence these characterizations (RQ2). In this section, we discuss our results for each research question and integrate our findings into the existing body of work on service-learning partnerships.

Students tended to characterize service-learning partnerships in terms of three emergent themes (Table 4). As presented in the findings, these themes emerged from students' experiences of student-community boundaries. The intention of this research was not to characterize students' experiences or the nature of their partnerships in a positivistic manner that assumes an absolute truth. A different group of students, interviewers, or researchers may have identified other trends. Nonetheless, characterizing service-learning partnerships can support a deeper understanding of their dynamics, strengthen intentionality, and enhance outcomes within these partnerships (Maurrasse, 2002).

When students are engaged in a service-learning partnership, our study shows that the approach to partnership will impact the students' language, which reflects, essentially, their lived reality. In Case A, the students interviewed did not discuss the social context of the partnership at any point. This absence implies that students did not consider the deeper social context of the partnership. This finding was likely influenced by the factors of the second research question: the positionality of the students and the faculty role within the partnership. This is discussed with more detail in relation to RQ2 below.

The TCC framework analysis identified that, in all three cases, student language consistently included at least two different approaches to the partnership. This supports the idea that students experience the complexity of service-learning partnerships (Mitchell, 2008; Strier, 2011). For example, in Case B, the students described all three of the themes in terms of transactional and cooperative concepts as they transitioned from a frame of reference centering the community as a client to one that imagined the community as a collaborator. This finding corresponds with the work of Strier (2011), who examined the experiences of different service-learning stakeholders and found that students described partnerships through an educational lens. Our research shows that through the student lens, it is

possible to understand the depth and nuance of the student-community boundary.

The interpretive analysis that addressed RQ2, which focused on the factors that influenced students' characterizations of the partnerships, revealed the strong roles of student positionality and instructors' approaches to partnership. Positionality can be defined as social and political context in terms of race, class, gender, sexuality, and ability status (Berger, 2015). It highlights any potential bias that one may have while examining partnerships (Morrison, 2015). Through our interpretation of the themes, we observed positionality in student responses, specifically that of identity, to be associated with how students characterized partnerships. The contrast between Cases A and C highlights the significance of positionality at the student-community boundary. In Case A, students did not share racial, geographic, or class identifiers with the project community, and they often used "us" and "them" language when discussing the community partners. This lack of shared identity may have promoted students' use of transactional or unilateral language and perceptions of the partnership. On the other hand, in Case C, when students shared a cultural and/or racial background with community partners, they saw their own lived experiences reflected in the experiences of the community, and they relied on shared roots, stories, and histories that enabled "we" language. Students tended to demonstrate more of a cooperative and communal approach with a sense of ease. They did not need to intend to be cooperative or communal, since the shared identities associated with their positionality put them in a situation that created a sense of shared humanity.

However, we noticed that when a faculty member intentionally established and emphasized the importance of mutuality in the partnership, cooperative interaction emerged even when students' positional identities did not overlap with those of the community. In Case B, students used both transactional and cooperative language while repeating and emphasizing the cooperative approaches reinforced by the instructor, highlighting that this approach was learned through the course. Mitchell (2008) noted that authentic partnerships, a central element of service-learning, require those who participate to be self-aware and to recognize who they are and the biases that shape their interactions. Furthermore, service-learning instructors have been shown to be able to center positionality to support deeper outcomes in service-learning (Latta et al.,

2018). Our work extends the efforts of Latta et al. by highlighting how students may similarly be able to learn to approach partnerships differently based on instruction. As shown in this work, an instructor who is self-aware and prepares students for an outsider perspective (Cruikshank, 1990) through readings and/or discussions can promote student self-awareness and promote acknowledgment of the student-community boundary in meaningful ways.

Implications

This study has implications for service-learning research in regard to partnerships, student learning, and pedagogical approaches. Service-learning and community engagement efforts can leverage the method used in this research alongside other approaches that recognize student voice to embrace students as knowledgeable and valuable members of university-community partnerships. Students are often viewed primarily as beneficiaries of service-learning, but students' ability to perceive differing approaches to partnership indicates their potential to be more actively involved as leaders and contributors to research and practice. Student perspectives carry value in that students can recognize both the intentional and unintentional impacts that partnership type can have on practice. Students' views of service-learning practice can be used to create more equitable partnerships (Dostilio et al., 2012) and partnerships that challenge the status quo (Mitchell, 2008).

In addition to its inquiry into how students characterize service-learning, this investigation indicates that how instructors frame learning affects student recognition, interpretation, and understanding of the different types of partnerships. Data suggest that students may enter service-learning with one understanding of community and leave with a different perspective. Pedagogy can be tailored for the students to learn, practice, and embody a new way of approaching partnership (Latta et al., 2018). This suggests that how partnerships are taught can serve as a platform for student learning and action.

Instructor influence on students' experiences of partnership can potentially be leveraged to improve service-learning partnership outcomes and the impact of these partnerships on student learning. For example, the use of transactional language in courses may influence students to interpret expected professional behavior as that of an "expert"; they may embrace this "expert" role within the workforce instead of leveraging deeper connections with clients, customers, or colleagues. If a student experiences the community as an

"other," the student may not be furthering the sense of shared humanity that a communal approach could offer and may not embrace opportunities to strengthen engineering deliverables.

Advancements within community-university engagement are likely to emerge when the nature of partnership is investigated in the context of service-learning outcomes for students, such as the outcomes related to participants' citizenship (Bielefeldt & Canney, 2014), critical thinking (Mitchell, 2008), love and hope (Miller et al., 2011), and empathy (Carroll et al., 2018; Wang et al., 2018). Future work on the impacts of student approaches to partnership is warranted.

Conclusion

While it is known that service-learning partnerships can be implemented through various approaches, students have rarely been leveraged as a means to characterize partnership. Because students and community members are often the central figures in service-learning, analysis of partnerships in terms of the student-community boundary can provide a strong basis for understanding the ways in which service-learning is practiced. Through the TCC framework and systematic analysis of the language that students use to describe their experiences with service-learning, the student voice is leveraged in this work to determine how partnerships are implemented in practice. Our work has shown that student descriptions of the service-learning experience provide a valuable platform for analyzing these partnerships. Descriptions of the service that students offered, discussions of the context and social relevance of the efforts, and students' perceptions of their direct interactions with nonuniversity partners provided relevant opportunities to examine the student-community boundary. It was shown that students can interpret partnerships in a variety of ways and may interpret the same service-learning experience differently. This implies that the ways in which students are approaching these partnerships may affect not only the programs' community impact but also the student learning outcomes. The findings of this work also demonstrated that language and the TCC framework are appropriate tools for analysis of the student-community boundary. Future work that seeks to interpret community perceptions and support advancement in service-learning can leverage students as increasingly active contributors to establish partnerships, pursue outcomes, and investigate the impact that partnership approaches have on both student and community stakeholders.

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