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Project-based Service-Learning in an Instructional Technology Graduate Program

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Keywords

Service-learning, Project-based learning, Instructional technology, Higher education

Project-based Service-Learning in an Instructional Technology Graduate Program

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The study focused on the critical incidents that occurred to instructional design students when they were involved in project-based service-learning as part of a curriculum that lead to a master's degree. The study provided an illustration that the workplace application of skills, knowledge, and understanding are enhanced through utilization. Students worked with local nonprofit agencies to provide instructional support ranging from needs assessments to delivery of course content. Results indicated that project-based service learning was an effective tool for promoting greater learning. The importance of learning through active participation and reflection was supported, and by extending learning beyond the classroom, students were able to apply their knowledge in ways that transformed their learning experience and fostered a sense of caring about others.

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Introduction

Project-based service-learning (PBSL) offers an opportunity for students to engage in real projects that involve complex social situations and issues. Students are challenged and placed in complex, holistic situations where they must engage in the learning experience. This involves using their functional skills related to technology along with their critical thinking and interpersonal skills to gain an understanding of the problems they must solve in their projects. The integration of technical skills adapting to changing environments creates opportunities for students to immediately apply and make sense of what they have learned in the classroom. The study explored graduate students in instructional technology perceptions of service-learning experiences and attempted to contextualize these findings through relevant critical incidents. Specifically, the study sought to understand the appropriateness of problem-based service learning as an instructional tool in a graduate-level instructional technology program, and to identify the programmatic implications of such a teaching strategy on the program's implementation.

Overview of Problem-Based Service Learning

Like mentoring and other reciprocal learning activities, PBSL integrates learning objectives with service objectives to create an environment where students and service recipients both receive benefit from the experience (National Service-Learning Clearinghouse, 2006). This integrations promotes four distinct areas of outcome, including personal efficacy, awareness of the surrounding environment or world, personal value identification, and a greater engagement with learning content (Astin, Vogelgesang, Ikada, & Yee, 2000).

Eyler and Giles (1999) noted that "service-learning is a form of experiential education where learning occurs through a cycle of action and reflection as students work with others through a process of applying what they are learning to community problems" (p. 14). They later argued (Eyler & Giles, 2002) that service-learning is an especially effective teaching strategy for students to learn about complex issues, their situation in larger environments, and how complex systems are integrated and reliant on each other. Students gain experience and learning transfers because "students apply concepts repeatedly in real or realistic settings" (p. 148). Their research indicated that students who showed gains in the categories of "issue understanding, practical action planning, and critical thinking" (p. 156) were involved in service-learning courses in which "reflection is intense and frequent, and tightly linked to service experience" (p. 156). By helping students use their experience to solve problems, students identified that they were better prepared for making well-reasoned decisions in "the face of doubt" (p. 157).

Wiggins and McTighe (2005) noted that PBSL should be selected as a teaching strategy based on course outcomes and objectives. Once those end of course objectives are identified, determining appropriate assessment can be established, and based on those criteria the selection and use of PBSL can be appropriately justified (Thomas, 2000). As a critical element of PBSL, Astin, Vogelgesang, Ikada, and Yee (2000) wrote that "service-learning courses should be specifically designed to assist students in making connections between the service experience and the academic material" (p. 7). Additionally, Howard (2001) studied service learning and identified ten principles of good practice, providing a general framework for how service learning instruction should be embedded in a course, used, and assessed. Howard's concluding principle was that the service-learning element of the course should be appropriately tied to community responsibility, strongly suggesting that the selection of service learning as an instructional strategy should be matched not only to community need, but desired community functions, roles, and responsibilities.

Service learning mediated courses have consistently reported high levels of student motivation for participation (Turner, 2002), and this level of motivation has been noted to be increased substantially when service-learning was coupled with problem/project-based learning. Turner found that students reported using every level of knowledge from Bloom's taxonomy in problem based service learning courses by being encouraged to think critically to solve problems embedded within their projects.

Project-based learning and problem-based service learning share many of the same characteristics, including centrality to curriculum, driving or probing questions, constructive and logic-based investigations, student autonomy and independence, and realism and application of content (Thomas, 2000). Project-based learning also has such characteristics as authentic content and assessment, and teacher facilitation (Thomas, 2000). The authentic nature of PBSL adds the real-world complexity that Fraser and Greenhalgh (2001) identified as an unclearly defined, embedded, problem. The referred to this as the "zone of

complexity where relationships between items of knowledge are not predictable or linear, but neither are they frankly chaotic" (p. 800). They argued that this type of learning environment helps learners to move from understanding and basic competence to capability and application. PBSL provides students with an opportunity for this type of application of knowledge by placing them into the "uncertain and unfamiliar in meaningful ways" where learners must "adapt to or co-evolve with new situations" (p. 801).

There is a significant and growing literature base on service learning in electronically mediated instruction that reinforces the strategy's effectiveness in aiding student learning (see for example Carver, King, Hannum, & Fowler, 2007; Donnelli-Sallee & Dailey-Herbert, 2008; and Priser-Houy & Navarrete, 2006). In each of these discussions, the authors validate the use of service learning as an instructional strategy that is well suited for the expansion and application of knowledge in courses and modules taught through electronic sources. The current project seeks to extend these findings by applying PBSL to graduate level instruction in addition to specifically working with learning with the academic discipline of instructional technology.

Research Methods

The current study was designed to be quasi-qualitative, relying on an exploratory Delphi study to identify in a quantitative manner student perceptions of the PBSL experience. The design then provided for the analysis of critical incidents, presented as vignettes, to describe student experiences.

Participants

The criteria for inclusion in the study were that the participants had attended and completed two or more graduate instructional technology (ETEC) courses whose primary method of instruction was project-based service-learning, completed the courses during or after fall semester of 2004, and were either current students in the ETEC program or had graduated from the program after the fall of 2004 (Dalkey & Helmer, 1963). No other factors such as age, gender, race, or GPA were considered, presenting a general limitation on the generalizable nature of the study, but clarifying the exploratory scope of the research. From the initial pool of all students, a purposeful sample of seven (based upon availability), was invited to participate in the first round; five agreed to participate. Students were not compensated in any way for their participation in the study.

Procedures

This study used the Delphi research method, and, after the first two rounds, data indicated that the critical incident method would yield useful results. The Delphi method required a multistage process of data collection and synthesis from a panel of ETEC graduate students at a medium-sized Southern university. The Delphi approach, as described by Van de Ven and Delbecq (1974), is a process of collecting perceptions or judgments about a topic through sequential questioning, with opportunities to change judgments based on the reporting of group data. The power of the method, with its anonymous responses and multiple rounds, is that it permits a group of individuals with expertise in a specific learning environment to learn more about what others in that environment are thinking, develop some common understandings of where strong divergences may exist, agree upon priorities, and revise their early impressions based on feedback from the other participants.

The critical incident vignette qualitative approach was used to show the context and complexity of student service-learning experiences. According to Angelides (2001), critical events are selected because they have the attribute of “surprise, or a problematic situation which stimulates a period of reflection” (p. 429). According to Tripp (1993), critical events can also be commonplace episodes that are representative of other or underlying trends and structures. Howitt (2004) noted that this approach offers the dual perspective of both subject and the researcher and indicates significant moments for a person or phenomenon. Howitt also noted that they are not necessarily reliant on events or related to causation, but may be critical simply because of the importance and meaning attached to them by participants.

In round one of the study, initial open-ended questions related to project-based service-learning were generated by the researchers. Each participant was asked these questions during either a face-to-face interview or a telephone interview. Following the first round of interviews, participants were sent a follow-up e-mail inviting them to add any further comments that they had thought of since the initial interview. No responses were received.

Following round one of the study, initial interview questions were then revised using a seven point survey to elicit prioritized participant judgments about their beliefs about themselves as learners, the effects of PBSL on them and their community clients, how this method differed from other instructional methods, and their success in the real-life settings they worked in during their service-learning projects. Participants were instructed to make their judgment based on their service-learning experiences as a whole in seven identified ETEC courses including Strategic Planning, Assessment and Evaluation, Teaching on the Internet, Performance Improvement, Introduction to Web Design, and Grant Writing.

During the third round of interviews, critical moments were explored through a short-term collaboration between the researchers and each subject. These critical incident vignettes were constructed by the researchers based on important details and justifications reported by the students to explain why their moment was a critical moment. The vignettes were written as a way to “imaginatively describe the process of participating in the experiences of another” and were written in the voice of the student (Howitt, 2004). After each draft of each vignette, a member check was conducted to ensure that agreement on the content of the interviews was reached between the researchers and the subjects. Revisions were made according to student input and were approved in their final form by each student.

Results

The results of the second round of surveys showed that students reported an overall positive service-learning experience. They indicated that they would take another service-learning course ($M^1 = 6.4$) and that their experiences made them more productive designers ($M = 6.4$). They agreed that they gained real-world experience from their service-learning projects ($M = 6.4$) and that their service-learning experiences motivated them to be more self-directed ($M = 6.0$). Because of circumstances beyond their control, students felt unprepared at times ($M = 4.4$) but qualified this statement by indicating that prior

¹ M = statistical mean

experience did not make them feel prepared during their service-learning experiences ($M = 4.6$).

Students reported that their service-learning projects were relevant to their goals ($M = 5.6$). They also agreed that their community clients had a genuine need ($M = 5.2$) and felt that they had met or exceeded their client's expectations ($M = 6.0$) and had helped their community client ($M = 5.8$) during their service-learning projects. As a result, they reported a greater awareness of community issues ($M = 5.6$) and felt more inclined to volunteer in the future ($M = 5.2$).

Participants also felt a greater sense of responsibility during their service-learning project than they did for other traditional, nonexperience-based courses ($M = 6.6$). Participants reported being motivated to meet or exceed expectations during their service-learning projects ($M = 6.4$). Some factors that they identified as motivating were using the experience to meet personal goals ($M = 6.4$); obtaining a good course grade ($M = 6.4$), instructor presence ($M = 5.8$), recognizing that their community client needed their services ($M = 5.4$), and receiving positive feedback from community client members ($M = 5.4$). Although students reported receiving feedback from those who received their services ($M = 5.8$) and their community client ($M = 5.4$), they were not motivated by negative feedback from their community client ($M = 4.0$).

When comparing their service-learning experiences to more traditional, nonexperiential courses, the opinions varied on whether or not service-learning courses were more difficult than traditional courses. While the mean score was slightly higher than neutral, ($M = 4.4$), the range of scores on this item was 5. The mean student opinion was that service-learning courses take more time than traditional, non-experience-based courses ($M = 5.2$), but the range of responses for this item was 4, with the lowest response being disagree and the highest response at strongly agree. Among the factors that influenced students were perception of the difficulty and amount of time service-learning courses take. During round one interviews, students indicated that the difficulty of their projects and the amount of time they spent on service-learning courses varied according to their motivation on the project, the requirements of the course, their level of experience with the subject matter, their overall course load, and unforeseen changes in the scope of their project.

Critical Incidents: Trends and Surprise

During round one interviews, several critical incidents emerged from students' service-learning projects. During round three, interviews were conducted to follow up on these incidents to gather important details and reflections about these incidents. A critical incident is recorded for each student that reflects turning points, moments of surprise, or trends that illuminate the authentic nature of service-learning in all its complexity.

Critical Incident 1: Corey Teaching at the Library

"Please don't click the red X," I said to her again. *Can she hear me?* She just stared as if reading the cracks in the wall beyond. With a click, click-click, of the mouse, she had logged off the computer again. I paced between her and another woman who asked, "How can I contact my children?" *I don't know, I'm not teaching that...* I thought. "I just want to get online," said the woman beside her. She sat, squinting at the keyboard, trying to remember her patron number. Her shaking fingers fumbled to 5 and 4 instead of 2 and 7. *Should I help her?*

I looked at the clock. For 15 minutes, a yellow and blue screensaver had slowly bounced across the words on my PowerPoint slide: *Internet Searching Basics*. Web crawlers, meta-search engines, directories, Google features: these ideas no longer mattered. Now, our only task was logging onto the computer. I paced, pushing my hands downward into my pockets, trying not to think, *what's the point?* A man in the corner laughed, he smelled like vodka. *I never want to teach again.....*

Discussion

This incident took place at a local public library. Corey chose the library as his teaching location for the service-learning course. Corey developed a lesson to teach library patrons how to search the library database and conduct basic internet searches. The course required that the lesson be taught a total of three times at the chosen client community site. After each lesson, students used course evaluations and in-class discussions to help them reflect on their experience and find ways to improve the lesson. This incident occurred during Corey's first round of teaching at the library (iteration).

For Corey, this moment was a surprising turning point in his service-learning project, because it caused him to challenge assumptions he had made about his target audience. As a graduate teaching assistant for an instructional technology course, Corey had experience teaching strategies for basic internet searches to undergraduate students. Corey had observed that his undergraduate students often seemed bored by the lesson and already seemed to understand the basics of how to conduct an internet search. Corey reported spending 8 hours revamping the lesson, adding more detail and advanced features in case his audience already knew how to conduct an internet search. Corey was very excited about the product and felt that it reflected his best work and was a great improvement over his usual lesson.

During his first iteration, Corey was both shocked and surprised at the difference between the library patrons (many of whom were elderly and did not understand basic computing concepts) and his undergraduate learners. He reported spending about 20 minutes of his first 1-hour lesson just trying to help library patrons log onto the computer and understand the function of a mouse. During this experience, Corey felt a loss of control over the lesson and a sense of frustration and failure, because the lesson he had felt so proud of did not meet the needs of diverse learners. Through reflection, embedded course assignments, and classroom discussion, Corey was able to learn from the community and extract insight into teaching diverse and elderly learners.

Corey was extremely motivated to create a revised lesson with obtainable objectives. During his third iteration at the library, Corey reported that patrons were able to get online and use the library database. He was also excited by the opportunity to help two repeat students from iteration one achieve personal goals of getting online and using a mouse. In accord with service-learning research, Corey's experience contributed to an increased sense of self-efficacy, an increased awareness of the world, and increased engagement in the classroom experience (Astin et al., 2000). It also renewed in him an interest in teaching as a profession.

Critical Incident 2: Eugene - Strategic Planning

I nod my head at him as we walk. I smile as he speaks, "LaCie External, Linotype-Hell Flatbed... Nuance OmniPage, Adobe After Effects... RoxioToast Titanium, Digital Non-Linear..."

I hear the English staccato of words instead of meaning. I am tempted to stop him and ask, "What is LaCie or Linotype?", but instead, I settle for generalizations: graphic design, scanner. I know that I do not have an "iron face," as do those who refuse to feel shame. I remember my assurances from our first meeting and my definitions of evaluation—memorized the night before. Did I really say, "It can work...I will help you"? *What am I going to do? This is real; they believe in me.*

Discussion

This incident was a critical moment of surprise, because Eugene felt unprepared by the diverse technologies at her client location. As an ETEC major, Eugene was familiar with many types of software and hardware but was not well-versed in the specialized technologies used by her client's customers. As a strategic technology planner, Eugene felt that her client viewed her as an expert. Although she derived some motivation from this sense of recognition, she was also afraid that she would not meet their expectations. Eugene's initial feeling of being overwhelmed is best described by Fraser and Greenhalgh's "zone of complexity" in which relationships between knowledge are not predictable or linear (2001). Eugene reported being caught up in circular thinking in which all her attempts to identify her client's functional needs led her to try to articulate technology solutions instead. The problems embedded in this authentic project were challenging to Eugene and served to encourage constructive investigation by her. Since the course was tightly linked to the service experience, Eugene took advantage of one-on-one meetings with her instructor, in-class reflective discussions, and course assignments to help her organize information and seek insight to areas of misunderstanding. She reported being motivated by the complexity of strategic planning and trying to make sense of the problem, her client's expectations, a desire to help her client, and the need to feel academically successful.

Eugene attributed her reluctance to ask her client clarifying questions in part to her cultural background. She explained that she came from a shame culture in which it is important to succeed and save face. She felt that admitting her lack of expertise would bring shame upon herself and her academic department.

This moment emerged as a critical moment for Eugene because of its coupling and contrast with her eventual moment of *ihhada*, or "understanding," in Korean, when key obstacles to her understanding were overcome and she was able to generate new knowledge to solve the problem. Eugene's moment of true victory came during her final project meeting, which she vividly remembered. Her client, when presented with identified functional needs, began to list appropriate technology solutions that would meet each need Eugene had identified. This experience taught her that that people closest to the problem are often most qualified to determine its solutions. The greatest thing she took away from the experience was an increased self-efficacy: a belief that she had grown in her ability to solve complex problems, a knowledge of self that only experience can teach.

Critical Incident 3: Rebecca – Teaching Microsoft Word to Elderly Learners "Thank you so much for coming today. The lesson was great, we really appreciate it," she said, floppy disk in hand. She had been reluctant to try; "I'd rather just watch you do it," she'd said earlier. I encouraged her, "You can do it; I'll show you how." I smiled, expecting a hard face, maybe, or a passive smile. To my surprise, she turned the Herman Miller chair slowly around to face the computer. She wanted to try! "Now, then, do you see the blue 'W' on the screen...." I spoke slowly, "see when you move the mouse, the arrow on the screen moves, too."

She wasn't the only one who didn't know how to use a mouse. I hadn't factored this in when I imagined my audience before; tried to anticipate the easiest path to the floppy drive, had carefully chosen a recipe to type: something fun. An elderly lady with brown hair sat to her right. She brought her face low, stared at the crack between left-click and right, pushed them really fast. I put my hand over hers, moving the mouse, pressing her finger down to practice a left-click as I had done with my daughter when she was three.

Discussion

Rebecca described this as a moment of surprise in which she realized that her students at the public library did not all have the prerequisite skills needed to accomplish the objectives of the lesson. Rebecca was a community college instructor who taught AutoCAD. Students in her college courses were required to have a basic level of computer skills before attempting her course. This incident was very insightful to Rebecca, because she reported having done her best to consider her learner's needs in advance but felt that her experience with more tech-savvy students may have clouded her perspective. Rebecca expected to have a range of students with different skill levels in Microsoft Word but ended up with adult students in their later years. Rebecca reported feeling surprised by the passivity of elderly learners towards doing the project. She was also surprised that, with some encouragement, her elderly learners were willing to attempt the lesson, although they did not even have an understanding of basic computing principles such as how to use a mouse.

This incident revealed the value of authentic service-learning to Rebecca. The difference she found between her service-learning project and other traditional, non-experiential courses she had completed was that she was able to test her project to see if it would really work. Because of the structure of the service-learning course, she was also asked to reflect on her experience and revise her lesson according to course evaluations, her observations, and in-class discussions.

Critical Incident 4: Larry – An Adult Service-Learning Student

I circled the McDonald's twice before deciding to go in; workmen with hardhats roaming the parking lot convinced me that plastic tarp over the playground was construction and not dilapidation. At 5 a.m., it was difficult to tell the difference. I had barely made it here this morning; knowing I would have to work from 6:30 to 4:00 (in order to get in my 48 hours this week). Then, I would rush across town to attend a 3-hour night class; dinner would have to wait. *Why did I take three classes this semester?*

The day before, I had suggested to my client that we schedule a 2 p.m. meeting, but she wanted to be flexible, insisted that I not miss work "just to meet with her." So at 5 a.m. this morning, she wiped crumbs off the table as she told me about the people who might take my class. They were interested in using Microsoft Word to do things like write letters to their grandchildren, type recipes, write papers for school, and gain computer skills to get a better job; they were as young as 10 or as old as 75, "and only some of them speak English."

Discussion

The student chose this incident because it reflected his experience throughout the service-learning project. Larry's experience is common among adult learners for whom school may be a second or third job. When given a choice of a community client, Larry chose a local nonprofit agency that offered evening computer courses. This would allow him to work around his job and class schedule. Larry was surprised by his client's understanding and willingness to accommodate his busy schedule to meet him before most people are even awake. He noticed an attitude of generosity and kindness that made him feel comfortable

and strengthened a collaborative relationship between him and the client. Larry showed the same consideration for the client when he offered to develop training on whatever they needed most.

Larry reported being motivated to serve, because he realized that many of the students would not be able to receive this training if they had to purchase it. Larry was also motivated by his students' genuine need and interest in his subject matter. He admitted that, although his first class was only supposed to be 1 hour long, he extended it to 2 hours because the students had many questions related to the subject matter and their personal goals. This incident showed the power of meaningful service: Larry went beyond what was required by the course structure, despite the fact that he had been working since 6:30 in the morning.

Critical Incident 5: Amanda's Needs Assessment Committee Meeting

We all sat around a wooden conference table: the reference manager, a librarian, a library patron, and myself (the needs assessor) - all major library stakeholders were represented. We discussed the kinds of questions we would ask in our survey. Someone volunteered, "Do patrons prefer large or small group training?" I interjected with another question, "Which software programs do they need?"

This survey was critical. I was waiting on this data to tell me what types of training to develop. I imagined an online survey: library patrons would open their e-mail; click on the survey link. I would watch the data collect, view up-to-the-minute results, see the trends change as each new survey was electronically collected. I remembered what it was like to sit for hours at the computer typing... hands cramping, looking back and forth to relax tired eyes, shoulders becoming tight. Not this time! Well...these were my thoughts in the moments before the librarian said, "I don't think online surveys will work for us; we can't e-mail patrons...don't collect identifying information."

This was unexpected. I sat quietly making mental lists: ten times more work, static deadlines, 300 surveys to print, data analysis tool, and two people to enter data. We needed volunteers!

Discussion

This experience was significant to the participant, because it was a major unexpected turning point in the project. The student reported having a great deal of motivation to complete to meet the expectations of the client, because the project was closely related to her personal learning goals, and it was a self-designed, service-learning project in which she felt highly invested. This moment was significant to the student, because she saw the power in having a strong collaborative team. Although the change in the direction of the project would cause ten times as much work, the student's community partner recruited volunteers to help with survey distribution and collection. She reported that the library patron on her needs assessment committee also volunteered to do half the data entry and helped her design a data analysis tool. This experience taught Amanda how to adapt to new situations and contributed to her understanding that authentic projects are subject to change as variables change. She reported this experience as being especially meaningful due to the positive nature of working with professionals who were equally invested in the project and dedicated to its success.

Discussion

According to Eyler and Giles (1999), one characteristic of authentic service-learning experiences is that “they offer opportunities to engage in problem-solving by requiring participants to gain knowledge of the specific context of their service-learning activity and community challenges, rather than only to draw upon generalized or abstract knowledge such as might come from a textbook” (p. x). Each of the vignettes shared a common element of being appropriately context driven and challenging to the students. Participants reported feeling that their projects were real, and they were consistently motivated to succeed at their project, because there were real consequences for themselves and their clients. Although each participant was challenged, each one still reported enjoying service-learning, because they felt that they made a difference with their community client.

Instructional technology programs traditionally receive requests from nonprofit, as well as for-profit, entities to provide support with design and development of websites, training, and other technical tasks. While providing students with valuable workplace experiences in and of themselves, those service experiences are enhanced by reflection and application of what is learned in the classroom. By focusing on the learning aspects of the service experience, instructional designers and other educators can provide students with transformative experiences such as the students in this study experienced.

One of the most successful elements of these PBSL experiences - reported for all participants - was the opportunity to participate in structured reflection by first writing about their experiences and then discussing them in class. These reflections often brought students to an understanding of instructional design issues that would have been presented in previous classes but not internalized emotionally. Guided reflection made it possible for other students to benefit from each student's experience, as well as their own. Presenting their reflections in class allowed students to present their experience in a context that revealed the power of instructional design, as well as service learning. Students were able not only to present their reflection on their work, they were also obligated to defend their actions and design strategies to improve their instruction in future iterations.

The real-life nature of these service learning experiences provided the students with valuable opportunities to actualize concepts and theories that they had studied in previous courses. The important lesson of taking the learning into consideration before designing instruction while being presented many times in other classes was forcefully brought home by these service learning experiences. Students often designed instructional packages using themselves as model learners rather than seriously analyzing the prospective learners. Even in cases where a needs assessment had been completed, students failed to take the learner into consideration. Thus, the need for instruction in presentation software led to development of classes that, while focusing on presentation software, were looking at high-end, sophisticated functions. When the learners turned out to be unable to even open the software without extensive assistance, the need to take learners into account was forcefully brought home to the student.

These PBSL experiences gave the students opportunities to take their skills, knowledge, and understandings into the community. In each case, they were working with nonprofit institutions that had serious needs for their support. Often the service they provided would not have been offered without the presence of these students. In most cases, students were able to choose which agency they would work with from a list provided by the instructors.

This allowed them to choose to have their PBSL experience where the students believed in the mission of the institution. Commitment to the mission of the organization allowed the students to quickly bond with the community organization. This bond led to the students working harder and reporting that they learned more from these experiences. Undoubtedly, there was peer pressure at work when students were presenting and defending their reflections; however, their own reports emphasized the importance of their commitment to each nonprofit. Finally, this caring for others, was a key element in the cycle of presenting and reflecting designed into the courses and resulted in improved learning for the instructional design students.

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