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Developing Problems with Strengths in Mind: Problem-Based Learning in Introductory CSD Courses

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Abstract

Instructors in Communication Sciences and Disorders (CSD) have used problem-based learning (PBL) for a variety of purposes across academic levels. Problem-based learning offers a framework for considering and including student strengths. In this paper, the authors describe the development of a PBL with specific utility to an introductory CSD course, explain how student strengths were considered in the problem development, and provide evidence of student strengths in outcomes of the PBL. This investigation followed 70 undergraduate students registered in introductory CSD courses across two universities as they engaged in a semester long PBL. A thematic analysis of 217 student solutions to the PBL was conducted. Evidence of two primary means of strengths inclusion, funds of knowledge and student interests, were found in the students' solutions. The authors provide considerations for designing a strengths inclusive PBL in CSD.

Keywords

problem-based learning, strengths perspective, diversity, recruitment

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The undergraduate Introduction to Communication Sciences and Disorders (CSD) course presents unique opportunities and challenges. With two professional scopes and related concepts to introduce, introductory CSD courses cover an extensive and diverse range of topics. Additionally, students enrolled in this course often arrive with a limited understanding of concepts related to speech-language pathology (SLP) and audiology (AUD). As instructors, authors one and two found that a steadying through line connecting these varied topics provides structure to the course. This through line can be a topic that is considered throughout the semester (i.e., using lived experience as a concept to consider each disorder addressed) or a semester-long project. In this paper, the authors demonstrate the utility of problem-based learning (PBL) as a strengths-oriented learning activity used to anchor introductory CSD courses.

As invitations to the major, introductory courses offer an opportunity to learn about the fields and also introduce a way of learning that is relevant to future clinicians. Students who move into autonomous healthcare professions will be required to be self-directed, lifelong learners (Burda & Hageman, 2015; Mok et al., 2014). SLP and AUD are dynamic fields where clinicians frequently find themselves faced with complex situations. The ability to develop novel solutions to clinical, professional, and social issues requires critical reflection, creativity, and problem-solving. In order to prepare students to be successful future clinicians, CSD instructors need to purposefully assist students in developing these critical abilities (Burda & Hageman, 2015). A potential beneficial approach to developing such student abilities can be found in the strengths orientation. A *strengths-oriented* education is one that focuses on purposeful inclusion and development of student strengths (Lopez & Louis, 2009). Strengths-oriented education, centered around discovery and empowerment, holds great potential for CSD instructors. Pairing a strengths orientation with a pedagogical tool such as PBL that can shift focus to discovery and problem-solving is a beneficial approach to introductory CSD courses.

This paper will make a case for use of PBL in introductory CSD courses as a beneficial strengths-oriented teaching practice. The authors will describe how a PBL topic specifically useful to introductory CSD courses was selected, explain how strengths were purposefully woven into the PBL, and consider the common themes developed from student generated solutions to demonstrate evidence of student strengths in outcomes from PBL. Relevant background literature on strengths-oriented education and PBL will be provided.

Strengths-Oriented Education

Strengths-oriented education has foundations in the clinical movements of social work's strengths-based perspective (SBP; Saleebey, 2000; Weick et al., 1989) and positive psychology (Peterson & Seligman, 2004; Seligman & Csikszentmihalyi, 2000). Strengths-orientations shift focus away from deficit and toward ability (Saleebey, 1996). Abilities are the primary focus from this perspective as they offer the best potential investment for growth. Saleebey's (2009) principles of SBP include the recognition of individual, group, and community strengths, acknowledgement that challenges and opportunities can spring from the same place, and acceptance that upward limits of growth potential are neither finite nor known. The SBP is founded on a belief in possibilities, capacities, and resources (Saleebey, 2000). These principles hold great utility for CSD education.

If a purpose of education is to amplify the powers of a culture's members (Bruner, 1973), instructors cannot primarily be providers of information. Instead, a central role of instructors is

constructing learning environments where students can develop into life-long learners (Grabinger & Dunlap, 1995). These learning environments consist not only of the course concepts, but of pedagogical practices and the beliefs and attitudes of the course community (i.e., instructors and students). Strengths-oriented instructors purposefully create discovery-oriented pedagogical practices where students are empowered to seek and develop their strengths (Lopez & Louis, 2009).

Lopez and Louis (2009) highlighted individual tailoring to student needs and interests and deliberate application and development of abilities as principles of strengths-oriented education. While much of the research on strengths orientation in higher education has focused on use of structured programs (e.g., Anderson, 2005; Stebleton et al., 2012), a strengths-oriented education can include any practice purposefully inclusive of strengths. Strengths-orientation can be implemented and studied through authentic coursework experiences. Wick and colleagues (2019) demonstrated how a strengths lens was able to illuminate the unique benefits college students' cultural and linguistic knowledge brought to their study abroad learning experiences. The authors highlighted students' experiential knowledge and lived experiences as valid sources of strengths.

Strengths-orientation is not a theory nor a pedagogical methodology. It is a lens. As such, this lens must be applied to the pedagogical practices instructors construct. In turn, instructors wanting to operate from a strengths-orientation should select pedagogical tools that align with this orientation (Wick et al., 2019).

Problem-Based Learning

Experiential learning approaches offer students the ability to learn through experiencing, seeking, considering, and doing (Peterson & Kolb, 2018). The active methodologies found within experiential learning are contrasted with traditional receptive-based classroom approaches (e.g., lecturing). PBL is one experiential learning instructional method that situates students to learn content as they collaboratively investigate and develop solutions to relevant issues (Hmelo-Silver, 2004; Whitehill et al., 2014). A significant difference between PBL and other experiential learning methods is the use of a complex problem students work together to address (Barrows & Tamblyn, 1980). The problem anchoring PBL offers intentional complexity that allows for students to grapple with multiple questions, experiment collaboratively with a variety of solutions, and learn to tolerate the shades of gray that exist in real-life scenarios (Whitehill et al., 2014).

This pedagogical tool was initially developed for medical students, born from recognition of the lifelong, self-directed learning needed in diagnostic healthcare professions (Barrows & Tamblyn, 1980). There is a rich history of PBL use in healthcare education across disciplines (Liu, et al., 2019; Shin & Kim, 2013) where complex clinical cases have frequently served as anchoring problems. PBL has a growing body of literature in CSD education (Amster, 2008; Magaldi & Victorino, 2022). This growing body of evidence demonstrates diverse applications of PBL for a variety of purposes. PBL has been used to address critical thinking (Mok et al., 2014), approach evidence-based practice (Raghavendra, 2009), and teach research methodology (Greenwald, 2006) in CSD. While these studies have largely focused on application with graduate students, PBL with undergraduate CSD students is an emerging area of focus (Keegan et al., 2017; Ng et al., 2014; Visconti, 2010).

Theoretical Alignment. Use of experiential learning approaches broadly, and PBL specifically, aligns with education from a constructivist theory of learning (Keegan et al., 2017). From this perspective, learning is an active process of making meaning of the world (Bruner, 1990). Knowledge is personally constructed within the mind of the learner (Piaget, 1970). Social-constructivism highlights the collaborative nature of learning (Vygotsky, 1934/1986). Andragogy, the study of adult learning, offers relevant insights into CSD education. Knowles (1980) highlighted principles of adult learning and their implications for teaching. Of specific interest are the importance of well-designed learning environments and methods that make use of adults' problem-centered orientation to learning and vast background knowledge (Knowles, 1980; Merriam & Bierema, 2014).

In adult education conducted from a social-constructivist theoretical orientation, the instructor's role shifts to facilitator (Keegan et al., 2017). Instructors facilitate active knowledge construction, rather than transferring it to students. A significant way instructors facilitate students' knowledge construction is by developing rich, social learning environments (Grabinger & Dunlap, 1995). PBL projects offer abundant building materials to instructors in their construction of these rich environments. The complex, authentic issues anchoring PBL experiences provide students with opportunities to immerse themselves in meaningful contexts (Savery & Duffy, 1995). The nature of problems used in PBL invite uncertainty, a requisite for reflective learning (Whitehill et al, 2014). The small learning groups often used in PBL activities provide dynamic social learning environments (Visconti, 2010).

Problem Development. Problems anchor PBL activities. Given their centrality to the PBL process, these problems require thoughtful development (Schmidt et al., 2011). For problems to hold value, the process of solving or attempting to solve them needs to be just difficult enough. While straightforward problems with simple solutions hold little utility for students or instructors, complexity and ambiguity provide value (Burda & Hageman, 2015). The problems anchoring PBL activities are often referred to as ill-structured to denote their value to learners (Barrows & Tamblyn, 1980). Jonassen (2000) provided descriptors of ill-structured problems that hold relevance to PBL problem development. Ill-structured problems have elements that are unknown, have multiple (or no) solutions, have multiple pathways to solutions, invite uncertainty through how solutions are evaluated, and require students to make judgements.

The utility of a problem lies in its purpose and context (Savery & Duffy, 1995). In classrooms, students are a central aspect of the context. As such, students should be a primary consideration in problem development (Schmidt et al., 2011). For problems to provide the appropriate level of challenge, student characteristics- who students are, what they bring, and what they need- must be considered in the development phase (Burda & Hageman, 2015). In PBL, students create both their solutions and their approach to constructing solutions. These pathways to solutions should be difficult to construct, allowing room for students to grapple with challenging aspects (Hmelo-Silver, 2004).

Assigned Problem. For this application to undergraduate introduction to CSD courses, the central problem needed to serve additional, course-specific functions. The problem needed to hold relevance to CSD professions, encompass a range of CSD content areas, and be inclusive of student strengths. A potential problem topic was found in American Speech Language Hearing

Association's (ASHA) strategic plan, *Strategic Pathways to Excellence*. Springing from the core value of diversity, ASHA's sixth strategic objective was to "Increase Diversity/Equity/Inclusion within the Association and the discipline" (ASHA, 2021). This initiative held immediate potential for the introductory course given its relevance and importance to the field and those it serves. From this ASHA initiative, the initial problem centering the PBL activity became, "*How can we increase diversity in the professions of CSD?*"

Relevance to CSD. In the CSD fields, data paint a picture of vast underrepresentation within the profession. AUD and SLP are among the least racially and ethnically diverse healthcare fields (Snyder et al., 2018), with a recent survey finding only 8.9% of CSD professionals identify as racial minorities (American Speech-Language-Hearing Association [ASHA], 2023). While women are well-represented in SLP (96.4%) and AUD (86.9%; ASHA 2023), men are underrepresented in both fields. Additionally, we do not have an accurate understanding of actual representation of other relevant groups, including disability, LGBTQ+, or socioeconomic background (Donaldson, 2021; Roberts, 2023).

Diversity is inherently significant to a field centered in social phenomena. In professions serving the public, the impact of diversity is felt both within and outside of the profession (Hall et al., 2015). A considerable concern when professions lack diversity in their membership is the potential for cultural incompetence to adversely affect clients served by the professionals. Negative impacts relating to lack of diversity have been identified in both primary systems CSD professionals work within, healthcare and education (Ellis & Jacobs, 2021; Farrugia-Bernard, 2018; Hall et al., 2015). Lack of diversity is seen as a problem of great relevance to the professions of CSD and those they serve; therefore, meeting the initial course-specific requirement.

Encompassing a Range of Content Areas. Given the broad range of concepts introduced throughout the introductory CSD course, the problem centering this activity needed to be something that could be incorporated across highly varied topics. Problems related to singular clinical areas would have provided meaningful information; however, they would not have carried students across the variety of topics addressed over the semester. Instead, a problem impactful to a broad swath of the field was needed. Because diversity relates to the professions and those served by the professions, it potentially relates to every content area addressed in an introductory course. Therefore, it can consistently be returned to as new content areas are introduced, allowing for the PBL to serve as a through line for the course. For example, discussions regarding the value of diversity of accents and dialects are naturally woven into sections on developmental speech and language disorders. Diversity is invited into swallowing disorders as a community of learners considers the cultural aspects of food in a section on dysphagia. Deaf culture provides important understandings of who determines disability. Importantly for the context of this research, diversity discussions could serve as a tie binding each content area covered in an introductory course.

Inclusive of Student Strengths. As discussed earlier, problems are intentionally complex in PBL. This complexity requires students to grapple with solutions. In doing so, complex problems invite uncertainty into the learning environment. While uncertainty and confusion are positive aspects of a learning activity, they are not always experienced positively by students in the process. In anticipation of these unsteady moments, the instructors aimed to develop a problem purposefully considerate and inclusive of student strengths. Strengths were included in the problem

development in two significant ways: building from students' collective funds of knowledge and allowing room for students' interests.

Knowledge is constructed from what students already bring to the classroom. Students may arrive at introductory courses with very little knowledge of CSD content; however, they do not arrive as blank slates. Undergraduate students have collected a reservoir of useful background knowledge. One means of orienting PBL to strengths is ensuring solutions can be aided by the funds of knowledge students bring to the process. Considering funds of knowledge is a strengths-oriented practice of recognizing the utility of background knowledge as resources for learning (Moll et al., 1992; Smith & Lucena, 2016). Students' collective funds of knowledge are an important consideration when developing a singular problem for a course. As a strengths-oriented practice, these collective funds of knowledge were considered and invited into the PBL during problem development.

A significant collective fund of knowledge for students in an introductory course included their journeys to the course. The pathways students tread (i.e., interests, opportunities, barriers) to arrive at specific courses and majors are salient to these students due to their recency. Many undergraduate students have extensive student-specific knowledge of university and high school structures and systems. That collective fund of knowledge holds great utility to the topic of diversity. Recruitment is a significant aspect of diversifying a field (Bellon-Harn & Weinbaum, 2017). Recruitment of students from backgrounds of underrepresented groups can serve as an important initial invitation to the fields. Focusing on this recruitment allowed students to pull from their background knowledge of systems of education.

A second means of orienting a PBL activity to student strengths is by allowing students to follow their interests. Including, following, and developing interests are strengths-oriented practices (Arrington, 2019; Lopez & Louis, 2009). Interest generated by interacting with novel problems is a motivating force for students participating in PBL (Schmidt et al., 2011). For this application, a singular problem was selected for students to consider: increasing diversity in CSD. While singular, diversity is also an exceptionally broad topic. Diversity as it relates to CSD is an expansive area where students could move solutions in a myriad of directions, allowing students to work toward their individual and collective interests. In this application, it was the space provided by the expansiveness of the topic that allowed students to learn more about their specific areas of interest while still addressing the larger topic. The present study focuses on the thematic analysis of student solutions to the PBL problem, "*How can we increase diversity in the professions of CSD?*," to investigate the following research question: How was purposeful inclusion of student strengths in a PBL evident in student solutions?

Methods

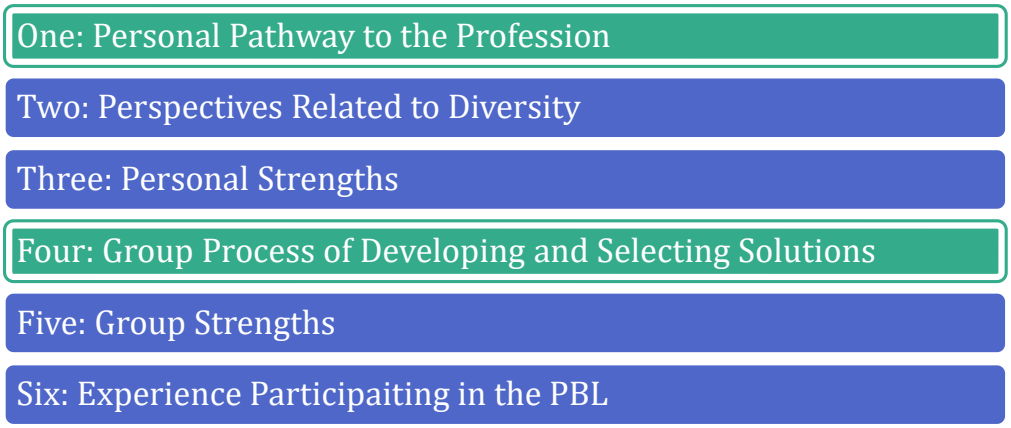
This exploratory, qualitative investigation followed four cohorts of students registered in undergraduate introductory CSD courses across two universities as they engaged in a semester long PBL. An Institutional Review Board (IRB) at the university of record found the investigation exempt from IRB requirement. Students were informed their coursework products would be used for this investigation.

Research Approach & Rationale. Qualitative research methodologies capable of managing complex, authentic, situated data hold utility to fields such as CSD where there is an orientation to social phenomena (Damico & Simmons-Mackie, 2003). This study required an interpretation of the meaning of student data that was collected in the context of a college course. This data was developed by participation in an authentic pedagogical practice. Although the instructors co-developed the PBL, differences naturally arose as each cohort and small group completed the process. Qualitative research provided a framework particularly capable of managing this data.

Once a qualitative framework was established as the most appropriate approach, a thematic analysis (TA) was selected as the data analysis method. Thematic analysis is a systematic process of coding data that allows researchers to develop and interpret patterns from a data set (Braun & Clarke, 2022). The data analyzed for this paper come from a larger study inclusive of data from focus groups interviews and additional artifact analysis. Data from group essays and individually completed Reflections One and Four (see Figure 1) were used in the lamination process as they provided deeper information for researchers to compare their interpretations against. In this investigation, the researchers primarily focused on developing themes from student solutions. Thematic analysis provided a systematic means to organize and understand the student solutions.

Figure 1

Titles of Topics Assigned for PBL Course Reflections

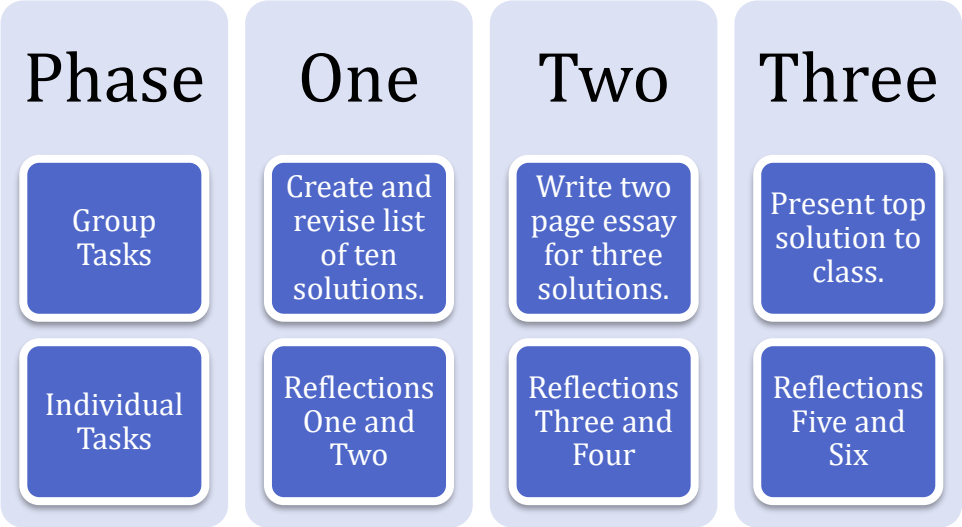


Participants & Contexts. Student participants were 70 undergraduates registered in one of four introductory CSD course sections. As these courses were open to all undergraduate students, participants included declared CSD majors, undeclared students, and students with declared majors outside of CSD. Further demographics were not collected. The first two authors were instructors in these courses. Authors three and four had no relationship with the participants. Two sections each were held at two universities, one public and one private, in southern states. One of the universities is designated as a Hispanic-serving institution. Of the four sections, three were held in person and one was a synchronous remote learning course held over Zoom. Within each course section, students were randomly placed in small learning groups, forming a total of 21 groups comprised of three to five students each.

Description of Project & Data Collected. For each cohort, the PBL was conducted in three phases over the semester they were enrolled in the introductory course: introduction to the project and divergent solution creation, solution development, and presentation to peers. Appendix provides assignments and prompts for the project. Additionally, students completed six independent reflections woven throughout the phases over the course of the semester on a range of topics (See Figure 1). One cohort did not complete Reflection Five. Each phase resulted in specific data sets (See Figure 2). While the PBL group solutions serve as the primary data set for this investigation, examples from individual student Reflections One and Four and group final essays will be used to provide supporting evidence of findings.

Figure 2

Individual and Group Tasks for Three Phases of PBL



Phase One: Introduction & Divergent Solution Creation. The activity was initiated through discussion of the PBL process and an overview of the ASHA strategic initiative centering the project. In their small groups, students were tasked with creating 10 solutions to increase diversity in CSD professions. Students participated in regular small group discussions to devise their initial solutions. These solutions were reviewed by their instructor. Ideas were further developed through group and instructor/group discussions. Instructors aimed to provide students with great flexibility in solution development. However, students were provided with guidance to maintain focus on the primary topic at hand. A common discussion held at this phase was to return focus specifically to the problem of increasing diversity in the fields as many solutions began to focus on related but varied topics. The product created by each group during Phase One was a written list of their solutions. With 21 total groups creating 10 initial solutions, this resulted in an initial list of 210 solutions. However, through the process of revision, seven new solutions were created. The additional seven solutions came from solutions students initially included before replacing them with new solutions. This process of creating and revising resulted in a data set of 217 total solutions. For research purposes, all solutions were kept in the data set and analyzed as the researchers felt they were equally of value. These 217 solutions serve as the primary data set for this article.

Phases Two & Three: Solution Development and Solution Presentation. For Phase Two, groups were tasked with selecting three solutions from their group solution list and collaboratively writing a two-page essay for each of these three solutions. Essay writing provided students with opportunities to further develop their solutions and to consider how their solutions directly addressed the problem. The data set produced in Phase Two were 63 two-page essays. Finally, in Phase Three, students were tasked with selecting a single solution and presenting it to their cohort. In keeping with the student-led focus of PBL, strict criteria were not included with the instructions for the presentations. Instead, prompts were purposefully open-ended to allow for student choice. For example, students were asked to create a presentation of the group's favorite solution and explain how it addresses the problem of a lack of diversity in the professions. However, they were not provided with specific time limits or formats. Twenty-one presentations outlining the relevance and utility of a single solution were produced in this phase. The data sets from Phases Two and Three provided richer descriptions of three solutions from each group's solution list. As these descriptions provided greater detail of the solutions, researchers were able to compare these coded solutions with the essays and presentations produced in Phases Two and Three to verify interpretations of codes.

Data Analysis

Data were analyzed through six increasingly abstract phases using procedures of TA outlined by Braun and Clarke (2022). As a methodology, TA provided the researchers with procedures to develop themes from the data set. To determine evidence of strengths in the student solutions, researchers first needed to gain an understanding of the solution data set. This was accomplished by developing themes from the student solutions. Solutions were de-identified of student names and compiled by group into a single file. Each student group was given a letter name (e.g., "Group A") and students were provided with pseudonyms. Solutions were moved into a password protected shared file accessed only by the authors and two research assistants.

Data were analyzed primarily by the first three authors. Authors one, two, and four are qualitative researchers who have each published at least one peer-reviewed qualitative study, presented qualitative research at national conferences, and completed doctoral coursework on qualitative research. Author three was a second-year graduate student and a novice qualitive researcher who was mentored throughout the analysis by author one. The researchers individually read through the solutions multiple times prior to coding. To reduce the impact of researcher bias, researchers used discussions prior to data analysis and used bracketing and discussions throughout data analysis. After familiarizing themselves with the data set, researchers coded individual solutions by participant group. In keeping with TA procedures, no a priori codes were created. All codes were developed from the researchers' interactions with the data set. Initial coding sessions were conducted with the first three authors and subsequent coding sessions were conducted individually by authors one or two or in pairs including author three. Coding was conducted solution by solution without the use of qualitative software. For the initial analysis, solutions were coded with a guiding question of, "What are students demonstrating through their solutions?" Researchers aimed to understand the meaning of each solution and to determine how student strengths were evident. Each solution was coded using brief descriptive labels developed during the analysis process. Supplemental checks and researcher discussions were used to ensure all codes were considered

and understood across researchers. Group essays provided a secondary data set to compare researcher interpretations against. Coding was conducted cyclically, with researchers returning to earlier themes for analysis of discoveries made later in the process. Researchers met to discuss potential patterns discovered in this initial coding process and then began systematically searching for themes. Researchers met via video conferencing or in-person weekly to review and discuss potential themes. Through these discussions, themes were named and refined.

These themes provided the researchers with an understanding of what students demonstrated through their solutions. Once these themes were understood, the researchers could consider how student strengths were evident in the themes. Reflections One and Four provided insight into students' individual pathways to the profession and their group's processes for developing solutions. Excerpts from these artifacts provide lamination to the findings of how the solution data set provides evidence of student strengths.

Results

The research question asked, "*How was purposeful inclusion of student strengths in a PBL evident in student solutions?*" Themes developed from student solutions will be discussed first, to orient the reader to the data. Following this, considerations of the findings as they relate to strengths will be discussed. Analysis of 217 solutions to the PBL created by students enrolled in an introductory course revealed several findings relevant for consideration. Three primary and eleven subthemes were developed from the student solutions (see Table 1).

Table 1

Themes and Subthemes Developed from Student Solutions

Themes	Subthemes
Knowledge of university structures	Events
	Social structures
	Course credit
	Programmatic
	Financial
	Registration
Recognition of needs	Increased exposure to and awareness of fields
	Support
	Broader solutions to related concerns
Varied Areas of Focus	Specific groups
	Moments along the pathway

Theme One: Knowledge of University Structures. The initial theme developed from the solution data set was students' knowledge of the structures within and surrounding their university. Of the 217 solutions analyzed, 62 total solutions made use of existing structures. Because multiple aspects were included within single solutions, university structures were highlighted a total of 71 times. For example, Group H highlighted two university structures in their singular solution (Example 1). In this solution, a university social structure (National Student Speech Language Hearing Association [NSSLHA]) is paired with a university event (orientation). Further analysis of these solutions revealed six primary university structures highlighted in student solutions: events, social structures, course credit, programmatic, financial structures, and registration.

Solutions leading to this theme demonstrated students' use of their own situated contextual knowledge and background experiences. Undergraduate students are exceptionally close to the immediate structures for finding courses and majors. Students put these structures to work to address diversity recruitment. Students were savvy with their use of the structures already provided by university settings. By hooking into established programs and routines, students found ways of creating solutions that could be implemented without needing to construct supporting structures. Within this theme, students used a broad array of university structures, demonstrating their knowledge of the varied structures at universities that provide utility to those seeking to address diversity in the fields.

> Example 1: Solution 78, Group H
> NSSLHA can meet with incoming freshmen at orientation to advertise the major and explain what it's all about, as well as have monthly meetings available to any student who is interested in the field of exploring their options.

Events. University events were capitalized upon in 15 solutions. As one of these solutions highlighted three distinct events, university events were highlighted a total of 17 times. Students highlighted a range of events present at most colleges/universities. Student solutions related to events were primarily aimed at increasing awareness of CSD fields by promoting them through a variety of means. The majority of solutions hooked into established events such as preview days and freshman orientation to provide information to new and incoming students about CSD. Inherent in these solutions was the belief that student populations were more diverse than the population of students already majoring in CSD fields at a given academic institution. As such, these structured annual events were used as a means of exposing the general student population to CSD majors. Students used familiar college events, orientation (Example 2) and scheduled college tours (Example 3), as tools to expose incoming and potential students to the major.

> Example 2: Solution 93, Group J
> Speakers at an student orientation. A booth can be set up with the clubs and greeks in the ballroom for student orientation in order to get students who are interested in the field, or did not know that they were interested in the field. Speakers can talk about the major, what you can do with it, and what the university has to offer for that major.

> Example 3: Solution 64, Group G
> Inspire/ advise: College Tour (Target: high schoolers, mid-schoolers, incoming freshmen) expose non-college students to speech pathology.

Social Structures. Students used existing university social structures to address diversity in 16 solutions. Included in this subtheme are organized student and alumni clubs and university social communication structures. Students employed social structures for a variety of uses. Solutions in this subtheme centered around use of university social structures to increase awareness of the CSD professions, to provide education related to both the CSD professions and those they serve, and to highlight the importance of diversity within CSD. In Example 4, students highlight student clubs with interests related to CSD, such as American Sign Language and Autism, as settings to introduce the major.

> Example 4: Solution 95, Group J
> We can advertise more to students in the clubs that already exist that may intertwine with [CSD] as a major such as the ASL club, the NSSLHA, and students for the Autism Society. In these clubs they could advertise the major to introduce it to people. Due to these clubs' ties in the major the students in these clubs who may not know much about [CSD], may have an interest in it once they learn what it is

Course Credit. Course credit was a university structure used by students to increase diversity in the field. Eleven solutions centered around new means of providing course credit. Student solutions related to course credit demonstrated their recognition of a need for increased access to CSD academic programs and course content. There was great variety in how students aimed to provide this access. Solutions in this subtheme included offering dual credit for CSD high school courses (Example 5), using general education requirements as a means to increase awareness of CSD majors, improving opportunities for credit at community colleges, using leveling courses for post-bachelor students (Example 6) and providing credit for related work experience.

> Example 5: Solution 49, Group E
> Provide an SLP or Audiologist course in high school just as medical and business courses are optional as a course in high school/dual credit.

> Example 6: Solution 151, Group P
> offer short course that lets people with BA degrees in biology (or other medical related) fields qualify for speech path masters program; attracting health related bachelor's degree graduates as SLP and AUD Master's degree students to increase gender diversity

Programmatic. Students used programmatic structures to increase diversity in 11 solutions. Interdepartmental collaborations were central to most of the solutions in this subtheme. Students used the power of interdepartmental collaborations, academic support programs, and on campus CSD clinics. Students used these programmatic structures not only as vessels to expose new students to the major, but also as avenues to provide opportunities for students to gain experience. Additionally, students demonstrated strategic targeting of potential students who may be in a major with related content to CSD. Group J's solution (Example 7) used required language courses as a

setting to expose more students to CSD. Group G's solution (Example 8) offers a view of students focusing on using university programs to provide opportunities for relative experience.

> Example 7: Solution 96, Group J
> We can put speakers from the major, whether that be students or professors into language classes to give a brief overview of the major. This would allow someone who may have an interest in the major once finding out what it is and have never heard of it before to know that it exists. It would greatly increase the reach, as every student at [university name] has to take a language course. The only students who would end up bypassing this are transfer students who likely already know and are comfortable with what they want to major in.

> Example 8: Solution 66, Group G
> Inspire/Advise: Sharing and/or gaining real world experiences (Experiences with those with Autistic kids, Stroke patients, etc.) via conventions, website videos, volunteer work (similar to [university academic support program])

Financial. Students used financial structures in 10 of their solutions. Solutions in this subtheme addressed diversity by focusing on funding and financial accessibility of CSD programs and research. Solutions in this subtheme demonstrated student recognition that lack of exposure to CSD is not the singular barrier to a career as an SLP or AUD. Students addressed the need for financial accessibility to CSD in considerably different ways. Solutions included providing financial support (Example 9), geographical accessibility of programs (Example 10), and decreasing costs associated with pursuing CSD degrees.

> Example 9: Solution 42, Group E
> Scholarships for students from diverse backgrounds who want to give back to their community.

> Example 10: Solution 43, Group E
> More undergrad programs in areas where there are BIPOC communities.

Registration. Finally, course registration was the central feature of six solutions. Solutions within this subtheme were entirely centered around the belief in a need for increased understanding and awareness of CSD courses. Students used advising and descriptions in course catalogs as tools to increase student awareness of CSD and to increase student understanding of the topics covered in CSD courses. In Example 11, members of Group K not only highlighted course descriptions as a beneficial source of information, but also provided specific information they felt would be meaningful to potential students. Students also developed solutions using university advisors as potential tools in spreading awareness and understanding of the CSD major, as in example 12.

> Example 11: Solution 104, Group K
> Add more detail in class description on introduction courses. (Saying what careers you can have with this degree. (ex. Give examples of the disorders of hearing, speech, and language. How the course will be taught. Give more detail of the profession. Give detail about who you will be working with)

> Example 12: Solution 99, Group J
> Advisors informing people of all possible majors in their profession. A lot of students have no idea how many different majors are included in their college (especially liberal arts) so this would include the advisors informing students (mainly freshman) of every possible major in the college they wish to attend. Also they can make sure students understand what each major is by providing in depth explanations for each.

Theme Two: Recognition of Needs. The second theme developed from student solutions was recognition of needs. In the initial coding process, via constructed solutions, students demonstrated their beliefs about the kinds of support needed to address diversifying a field. Included here are three areas of need: the need for increased exposure to and awareness of the fields, the need for varied types of support, and needs found in broader solutions to related concerns.

Increased Exposure to and Awareness of the Fields. The most consistent aspect of all themes is found in Subtheme Two A: a need for increased exposure to and awareness of the fields. Students highlighted this need in 134 of the 217 solutions. Although it was a common area of focus, there was great variety in how students addressed this concern. Means of increasing awareness was recommended through exposure aimed at specific underrepresented groups (i.e., Black, Indigenous, and other People of Color [BIPOC], men, individuals with lower socioeconomic status [SES]). In Example 13, students in Group A created a solution aimed at a specific group, individuals with low SES, by tying their solution to a geographical area. This solution aimed to increase awareness of the professions through the provision of local, free SLP and AUD services. Additionally, broad groups inclusive of underrepresented groups (i.e., student populations, students in related majors, service members) were targeted in multiple solutions. Examples 1- 3 are solutions aimed at diversifying CSD by spreading awareness of the professions to large groups (i.e., incoming freshmen, high school seniors). In addition to the multiple pathways of increasing exposure to the field, experience through work and internships was highlighted as a means to increase awareness of the field (Example 14). Increasing visibility of CSD students and professionals from underrepresented groups was explored as a means of recruitment in multiple student solutions (Example 15). Overall, the number of solutions aimed at increasing exposure to and awareness of the professions demonstrated the students' belief that SLP and AUD are not universally known or understood professions. Additionally, the great number of solutions aimed at increasing exposure and awareness of the CSD professions demonstrated the students' belief that decreased awareness of SLP and AUD is a significant barrier to be addressed in diversifying the field.

> Example 13: Solution 6, Group A
> Community centers in low-income neighborhoods that provide free SLP/AuD services and education

> Example 14: Solution 142, Group O
> have internship opportunities for upperclass high school students

> Example 15: Solution 9, Group A
> Annual magazine/insta/channel that highlights SLPs and Audiologists of color and their accomplishments

Support. Exposure to and awareness of CSD has been a feature of many solutions previously discussed. However, even if everyone had equal exposure to and awareness of the professions, we would likely not see equal representation of all groups in the CSD professions. Barriers to entering CSD careers arise from multiple factors at multiple points along the many potential pipelines to the profession (Bellon-Harn & Weinbaum, 2017; Richburg, 2022). Included are systemic barriers affecting recruitment in pre-college pipelines; those impacting K-12 students, their families, and their communities; and those affecting graduate students and professionals, such as admission barriers. Student solutions demonstrated a recognition of the multitude of moments, populations, and systems required to address increased diversity in the field. This recognition was primarily found in the students' inclusion of a broad range of support, from financial to mentorship, in their solutions. Of the 217 total solutions, 42 specifically related to support provision. A singular solution addressed three distinct ways to provide support; therefore, there were 44 total support provisions in the data set. Of these 44 total ways of providing support, 38 addressed four broad areas of need (Mentorship, Financial, Access, Experience), demonstrating the students' recognition of the variety of needs to support a growth in diversity. Mentorship was an aspect of 13 solutions. Within these solutions, students used professionals and CSD students to provide mentorship to potential and current CSD students. In Example 16, Group L created a graduate student organization aimed at mentoring upcoming college freshmen by providing tutoring, answering questions, and providing general help. Twelve solutions focused on financial needs. Example 9, highlighted for the students' use of financial structures of the university, is an example of a solution addressing financial areas of need through creation of scholarships. Students created eight solutions aimed at increasing access to either academic programs (Example 10) or CSD services (Example 13). The remaining four support-oriented solutions were individually creative. They consisted of four distinct identified needs: career counseling in high school, creation of a minority union, increased research funding, and ongoing education between CSD and international students. Student solutions demonstrated a recognition of the need for increased support related to successful diversity measures.

> Example 16: Solution 116, Group L
> Create an organization of grad students who can serve as mentors to the upcoming freshmen. They can answer questions, tutor, and help as needed.

Broader Solutions to Related Concerns. Opportunities for students to revise their solutions were built into the PBL process. Though most groups made small revisions to existing solutions, some students chose to completely replace initial solutions with new ideas. When groups opted to replace solutions, the previous solutions were kept in the data set as they remain indicators of what students found to be important. As previously stated, many student solutions addressed problems related to yet distinctly different from the anchoring PBL problem. Of the 217 solutions, 24 addressed solutions related to broader concerns. Among these were solutions aimed at improving caseloads for CSD professionals (Example 17) and improving academic access through accommodations for students with disabilities. Additionally, although many solutions related to diversifying the profession through recruitment of a more diverse professional body, some solutions also explored retention. Elements related to retention included developing a more culturally competent workforce and ensuring opportunities for CSD professionals from underrepresented groups to hold decision-making positions in professional organizations. Solutions highlighted the opportunities

and provided specific roles all CSD professionals have in increasing and retaining a diverse profession.

> Example 17: Solution 166, Group Q
> Reduce workload to improve the quality of care the patients receive

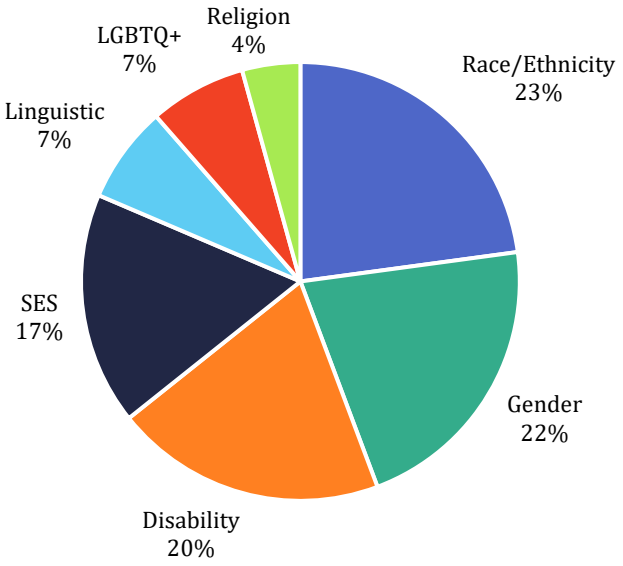
Theme Three: Varied Areas of Focus. The final theme developed from the students' solutions was the great variety groups had in their approach to creating solutions. All groups addressed the same problem. Yet, students constructed invitations to the field in vastly different ways. In the initial coding process, solutions were coded based upon aspects of their focus. Through this process, two specific areas of variety within the data set developed as areas of interest: (1) the specific groups the students chose to include in their solutions and (2) the moments along the pathway where students chose to focus their solutions.

Specific Groups. The CSD fields need increased representation from a number of populations. Students were tasked with solving the problem of how to increase diversity but were purposefully not guided toward specific underrepresented groups nor were they limited to singular or specific areas of focus. When students constructed solutions for increasing diversity, they were creating targeted invitations to the profession. Given the open but complex nature of the tasks, students had the freedom to develop solutions that invited multiple populations. Of the 217 solutions analyzed, 60 solutions mentioned specific groups. Because singular solutions addressed multiple groups, there were a total of 70 specific group mentions. These 70 specific mentions were grouped into areas of focus. As indicated in Figure 3, seven areas of focus were identified: (1) race/ethnicity, (2) gender, (3) disability, (4) SES, (5) linguistic diversity, (6) LGBTQ+, and (7) religion. Special consideration was given to the two solutions targeting increased representation of transgender CSD professionals. These solutions were counted both in gender and LGBTQ+ categories as the researchers felt this best captured the students' intent. Example 13 is a solution with a focus on SES while Example 15 is a solution with a focus on Race/Ethnicity.

Moments Along the Pathway. In addition to which underrepresented groups the students chose to target; a second aspect can be explored to demonstrate variety within solutions, *when* along the pathways to the profession the solutions were aimed. Of the 217 solutions, 128 were specifically designated toward specific times. Again, when multiple moments were addressed in singular solutions, they were counted in each group, resulting in a total of 144 specific temporal aspects. Student solutions demonstrated recognition that invitations to the profession can be acted upon throughout a person's academic and career pathway. Of the 144 specific mentions of moments along a pathway to the profession, two were aimed at career professionals, two at post-bachelor students, 80 during undergraduate years, 45 during high school, four during middle school, and five during elementary school. Two solutions highlighting community college were included with undergraduate in this count. Considering solutions already introduced, Example 5 is a solution aimed at high school, whereas Example 6 is aimed at post-bachelor.

Figure 3

Specifics Groups Mentioned in Student Solutions by Percentage



Evidence of Collective Funds of Knowledge from Themes One and Two. Themes one and two demonstrated evidence of the specific student strengths instructors prioritized when developing the PBL. A significant means of including strengths in the PBL was considering collective funds of knowledge for students in introductory courses. Evidence of collective funds of knowledge was found in two distinct ways: university structures and pathways to the course. All participants were current university students and their knowledge of university structures was evident in the solutions they constructed. Students' knowledge of the university system was an important foundation for their solutions. The framing of the specific PBL task allowed them to draw upon this knowledge and experience. Second, all participants were enrolled in an introductory course to the CSD fields. Their knowledge of their personal pathways to that course were also evident in the solutions. Additionally, students applied this knowledge to the problem centering the PBL: "How can we increase diversity in the professions of CSD?" by identifying needs along potential pathways.

Considering the solutions developed by a single group, evidence from additional artifacts including student reflections and group final essays were used to demonstrate students' application of background knowledge. Group P devoted seven of their 10 solutions to diversifying the field by increasing the number of male CSD professionals (Examples 18 and 19). Remy, a member of Group P, provided insight into how the students created their solutions. Using excerpts from Remy's reflections and Group P's final essays, we can consider how he used knowledge of his own pathway to the profession to develop solutions aimed at difficulties he experienced along the path.

> Example 18: Solution 154, Group P
> Rewrite or reframe the imagery used by Speech path institutions to be more gender neutral.
>
> Example 19: Solution 156, Group P
> Using Celebrities, Professional Athletes, or Persons of Authority as Spokespersons for the Field of Speech Pathology to Increase Gender Diversity

These solutions (Examples 18 and 19) are two from Group P specifically aimed at increasing representation of males in CSD. In Excerpt 1, Remy identifies himself as the only male in his cohort and links this to his group's decision to focus their solutions on increasing males in the field. Later in his reflection (Excerpt 2), Remy highlights a relevant aspect of his own pathway to the profession- hesitancy to join a female-dominated field. In their essay (Excerpt 3) related to solution 154 (Example 18), the students of Group P identified their personal sources for information about the fields- a Google search for "speech pathology" and their own institution's CSD department website- and highlighted both sources as lacking visuals of men in the fields. Using the information Remy provided in his reflections, we can see his recognition of the difficulty he had seeing himself represented in the profession. Two of Group P's solutions (Examples 18 and 19) aimed at increasing inclusion of men in sources of information about the field. Remy's concerns of not seeing himself in the field are evident in the solutions he and his group constructed.

> Excerpt 1: Reflection 4, Remy
> Luckily, our group contained the only male in the class, and that happened to be me, which made pinpointing areas of interest regarding the assignment much easier. Being the group with the only male pursuing speech pathology, we decided to concentrate our focus on addressing the issues that can sometimes dissuade males from entering the field or the problems the field faces with equal gender representation.
>
> Excerpt 2: Reflection 4, Remy
> Together as a group we've decided to each choose an area of focus, mine being the alteration of imagery. Personally, as a male trying out the field, I was hesitant to join at first because of how dominantly female the field is. Although I finally made up my mind, the same cannot be said for the majority of males who don't make up the measly two percent of the field.
>
> Excerpt 3: Essay 1, Group P
> Even on the surface level, a simple google search of "speech pathology" displays the statistics perfectly, the mass majority of the imagery being female individuals on the job or feminine lips and mouths. Similarly to the stock imagery or workplace photos, most images or symbolism regarding speech pathology programs on a college level are also disproportionately female. For example, on the University of Louisiana website domain, the Department of Communicative Disorders' page contains no male representation throughout its imagery, solely displaying female students and professors.

Use of background knowledge can also be seen in Group Q's solutions. In Example 20, the group suggested use of on campus job fairs as a means to increase awareness of the field. In their group essay, the group highlighted their personal connection to job fairs and the influence these events

had on exposing them to the CSD fields (Excerpt 4). Group Q also created a solution (Example 21) centered around job shadowing as a means to give students an understanding of the CSD careers. In their essay (Excerpt 5), the group introduced the solution by discussing one student's experience with job-shadowing a related health care field. The group highlighted the agency one student experienced in selecting a healthcare major after gaining experience through a high school program. This group connected lack of opportunities and exposure to decreased agency in their career selection (Excerpt 6). Group Q member Vero reflected on the group's use of members' personal experiences in her reflection (Excerpt 7). She highlighted the personal experiences group members had that were meaningful to their decision to enroll in an introductory CSD course.

Example 20: Solution 171, Group Q
Job fairs on university campus and high schools

Excerpt 4: Essay 3, Group Q
Our final solution felt like the right choice for us being that it was a more personal experience that few of us encountered. A couple of us felt heavily influenced by the field of Speech Pathology and Audiology when we went to the job fair that our high school offered.

Example 21: Solution 173, Group Q
Have SLP centers or businesses offer an SLP job shadowing program for high schoolers.

Excerpt 5: Essay 3, Group Q
Being able to shadow the field and connect with others provides more insight to others when making a decision on whether the field is truly for them. In high school we had the opportunity to participate in the EMR Licensure program where we had the opportunity to ride in the ambulance, visit fire stations, and go to different medical centers.

Excerpt 6: Essay 3, Group Q
Most high school students don't have the opportunity to visit and or shadow workers because they simply don't have the resources. Which leads them into exploring and or letting a friend, family member or somebody make the decision about their career pathway. In connection with this, some high schools are surrounded by many medical facilities which partnered with my highschool and it became a class that we could take to get hands-on experience and informative information.

Excerpt 7: Reflection 4, Vero
For these ideas, we based some of it on our own experiences. The first one came after Audrey and Charley went to the career fair on campus and did not find anything about this major. The first one was also inspired by a speech pathologist talking to my class at a career event in high school because this solidified that I wanted to major in Speech Pathology.

Evidence of Student Interest from Theme Three. The second significant means of purposeful strengths inclusion in the PBL was developing a problem broad enough for students to work toward their individual and group interests. Increasing diversity in professions whose membership radically differs from the population it serves is a complex endeavor. One that would undoubtedly require progress on multiple fronts. The expansiveness of this problem allowed students to address solution creation in highly varied ways. Evidence that students worked toward their interests was seen in the great variety found within the data set. Additionally, in their discussion of solutions found in both group essays and individual reflections, students provided further evidence of how they included their own interests in their solutions.

Group M included community college as a location to implement a solution. Example 22 below provides one of the solutions Group M set at community colleges. Although the solution appears to be set in community college to reach a more diverse student population, evidence from a group member's reflections shows the group's focus on a specific aspect of diversity- socioeconomic status. Within Group M was Will, a student returning for a second career after obtaining a bachelor's degree in business. In his reflection on his own pathway to the profession, he discussed the difficulty he experienced finding a steady, financially stable job (Excerpt 8). Financial stability was a primary reason for Will to pursue a degree in CSD. In his reflection four (Excerpt 9) group process of developing and selecting solutions, Will connected centering his group solution in community college to his consideration of financial accessibility.

> Example 22: Solution 122, Group M
> Offer it as an elective course to take in more community and online colleges in order to reach students of all backgrounds.

> Excerpt 8: Reflection 1, Will
> When I graduated, I had a challenging time finding a really good job during the beginning of the Covid-19 crisis, and the job market was in chaos. There were many scrubby little jobs I had to work along the way until I could find a good job that will stick, which has not yet happened till this day…In the back of my mind, I knew I had to come up with another career path to follow so I can have a for sure steady career paying job that will set me up for success financially. Going through these things in the past had really got me to thinking what kind of career I want to pursue.

> Excerpt 9: Reflection 4, Will
> The third idea was to have the communication disorders course offered at community colleges as well and not just at universities. We all agreed that not everyone can not afford going to public or private university and that's okay, so why not have the course offered at a community college.

Group N centered all their solutions on increasing representation of individuals with disabilities (Example 23). In their reflections, Group N members Daphne and Clarice discussed their selection of disability as a focus. Both Daphne and Clarice highlighted group members' personal involvement with and interest in the disabled community. Clarice highlighted her own personal experience as a caretaker and discussed her excitement with the group's decision to focus on disability (Excerpt 10). Daphne indicated that half of their group members had a personal

involvement with the disabled community and explicitly provided the group's "collective interest" as the reason they focused on disability (Excerpt 11).

> Example 23: Solution 133, Group N
> Create an ad campaign centered around those with disabilities in the field of speech pathology.

> Excerpt 10: Reflection 4, Clarice
> I love that my group decided to focus on trying to encourage those with disabilities to join speech pathology. I have been a caretaker for many years for different children with Down's Syndrome and have been a [Program name redacted (University program for adults with ID)] mentor for almost three years, so this topic is very close to my heart

> Excerpt 11: Reflection 4, Daphne
> With this assignment, my group chose to find solutions around helping disabled college students get interested in being a Speech Pathology major. We chose this topic because of a collective interest in how ASHA, the national organization of Speech Pathology, would handle trying to increase the number of disabled CODI students nationwide. As there is no concrete number for how many disabled Speech Pathologists there are in the field, we were excited to develop some solutions. Also, half of our group members are somehow involved with the disabled community, so it seemed like a good topic to pursue.

Discussion

The aim of this paper was to demonstrate the utility of problem-based learning (PBL) in introductory CSD courses as a beneficial strengths-oriented teaching practice. Previous research has demonstrated how PBL can been implemented throughout a CSD undergraduate curriculum (Visconti, 2010; Whitehill et al., 2014) and the specific usefulness this experiential learning tool may offer undergraduate students (Keegan et al., 2017). This paper adds to this body of research by demonstrating a strengths-oriented PBL developed specifically for an introductory course and supports the need for further inquiry. Through our discussion of the process of topic selection, the authors provided central considerations for instructors as they develop problems specifically useful to introductory courses. Through our consideration of the problem development process, the authors demonstrated ways instructors can include student strengths in PBL.

Additionally, this paper adds to the body of research into strength-oriented teaching in higher education. In this area, much of the previous research has relied upon use of structured programs (e.g., Anderson, 2005; Stebleton et al., 2012). By providing a demonstration of how strengths-orientation can be embedded into authentic coursework activities, this paper adds to the work of researchers studying strengths-orientated experiential learning in higher education (e.g., Weik et al., 2019). In this paper, two means of including student strengths in the problem development were highlighted- through consideration of student interests and through inclusion of collective funds of knowledge. Evidence of the strengths instructors purposefully wove into the problem were evident in the student solutions. Diversity in CSD professionals as a topic offered students expansive space to work toward their individual and group interests. Evidence of students working toward their interests was seen in the variety of ways they attempted to address the problem.

Evidence of students' use of their collective funds of knowledge was seen in their recognition of the needs of potential students to access pathways to CSD courses and in their use of the resources situated along their own pathways to the introductory CSD course. Through the analysis of student solutions to the PBL, the authors demonstrated evidence of the strengths instructors purposefully considered as they developed PBL for an introductory CSD course.

Utility for Introductory Courses. As undergraduate students acquire greater knowledge of CSD concepts through their coursework, PBL tasks can increase in both complexity and in use of knowledge of previously learned CSD concepts (Visconti, 2010). Concepts introduced in CSD coursework is not an available source of shared background knowledge for instructors to use as they develop PBL activities for introductory courses. Instead, instructors will need to consider novel ways to include students' background knowledge.

The instructors found the problem centering this PBL- "*How can we increase diversity in the professions of CSD?*"- to be particularly useful to introductory CSD courses. This problem was selected for its relevance to the professions and connection to the broad topics covered in the introductory CSD course. Diversity was a topic that could be consistently included in discussions and lessons related to a variety of content areas throughout the course. Additionally, in attempting to create solutions aimed at increasing diversity in the fields, students were led to considerations of the opportunities and barriers they met along their own pathways to the profession.

Implications for Strengths-oriented CSD instructors. Operating from a strengths-orientation requires an acknowledgement that all people, groups, and communities have strengths (Saleebey, 2000). Instructors operating from a strengths-orientation purposefully include and aim to develop student strengths (Lopez & Louis, 2009). As a learning activity, PBL offers a framework beneficial to strengths-inclusion. When developing PBL problems, strengths-oriented instructors should ensure they are considering what students bring to the course alongside what students need to obtain from the course. Because all students have strengths, these strengths can be considered and included in PBL activities at all levels of CSD education. All CSD students arrive at courses with useful background knowledge and interests that can be included in learning activities. Instructors can include strengths by considering the individual and collective funds of knowledge students and student groups bring to each course. Broad PBL problems may be particularly useful to instructors as they leave room for students to work toward specific areas of interest.

Limitations. Methodological decisions were made thoughtfully and purposefully. However, all research methodologies have strengths and limitations. A strength of this research design was its use of authentic student products as data; however, using narrative data required a limitation in study size. This study was limited to two universities. It is likely that extending the study to wider student bases would deepen and expand current findings. Demographic information for the student participants was not collected. This information could have provided additional context for the group solutions.

The PBL learning activities were conducted across four sections, two sections each with two different instructors. The learning activities were purposefully responsive to and changed by the students' engagement. While both instructors were experienced with experiential learning, this investigation marked their initial use of PBL. The instructors became more adept at using PBL as

the study continued. These changes undoubtedly resulted in differences both within and across courses. While the qualitative methodologies selected for this study can manage these contextually bound differences, it is important to acknowledge the differences.

Future Directions. This study focused on the solutions generated by small groups of students participating in the PBL. Future research will consider themes from individual student reflections and focus group interviews to investigate student perspectives on the PBL experience and their growth in understanding of diversity and the CSD professions. Future plans related to this research also include the use of student solutions to drive undergraduate research. This PBL holds great potential to serve as a foundation of undergraduate research. The problem centering this PBL resulted in university-centric solutions that could be implemented and studied by students throughout the course of their undergraduate years.

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Appendix

Assignment Prompts

Introducing the problem

As a group, please create 10 solutions to the following question: "How can we increase diversity in the professions of CSD?"

Essays

As a group, select your group's top three solutions and write a two-page essay for each solution. It can be tempting to each take a solution and write an essay. Instead, write each essay as a group.

Presentation

As a group, select your group's top solution and create a presentation explaining the solution and how it addressed the PBL. You will present this information to the class. You can select the format for your presentation.

Reflections

Students were asked to write six, one and a half page reflections over the course of the semester. Students were given potential prompts with each topic; however, they were not required to use the prompts. Reflection Two was the only exception as instructors wanted students to think broadly about their strengths. Statements accompanied the remaining reflections reminding students they were able to write about anything related to the topic:

> You can reflect on this however you would like. Below you can find prompts to get you thinking about writing this reflection from several different lenses but make sure you write a cohesive reflection. The reflection should not simply be your answers to the following prompts. The prompts can be starting off points and you might focus on one or two ideas that resonate the most with you.

Reflection One: Personal Pathway to the Profession

Write a reflection about what led you to register for this course.

> How did you hear about the field?
> What brought you to this field?
> Why did you decide to take this course?
> Describe any past experiences that relate to you choosing this major.

Reflection Two: Personal Strengths

Write a reflection on your personal strengths. Please provide at least three strengths you have and discuss how they will be beneficial to your group members.

Reflection Three: Perspectives Related to Diversity

Write a reflection about diversity. Below you can find prompts to get you thinking about writing this reflection. The prompts can be starting off points and you can focus on ideas that resonate the most with you. If you need additional guidance, here are some ideas you can think about as you write:

Reflect on your own diversity.
What is diversity?
Why do you think the topic of diversity would be included in an introductory CSD course?

Reflection Four: Group Process of Developing and Selecting Solutions

Write a personal reflection about the process your group went through to arrive at your final 10 and top 3 solutions.

Reflect on the process and timeline of how your group worked together.
What roles did group members take on (setting up shared document, sharing screen)?
What were your conversations like?

Reflection Five: Group strengths

Reflection Five will be on the topic of your group's strengths. If you'd like, you can include the strengths you think your group developed, how they were useful to the project, and how you noticed those strengths.

How was your group able to collaboratively take on different roles?
How did your group successfully handle conflict?
What did your group do well?

Reflection Six: Experience Participating in the PBL

For our final reflection, I'd like you to reflect on your experiences working on a problem-based learning assignment. If you want, you can compare it to a more traditional approach like exams or discuss what worked well in the project and what could be done to improve it.

What were your initial expectations when PBL as a group project was introduced?
Has participating in this PBL been helpful in learning content related to this class?
What suggestions would you have to make a PBL experience better for future students?
Were your initial expectations correct?