Encouraging Cross-Curricular Integration in Communication Sciences and Disorders

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This paper examines the effectiveness of a cross-curricular, integrated project completed by graduate students in communication sciences and disorders. Student perceptions of preparedness to practice clinically were collected for 18 variables at pre- and post-project intervals. Students indicated that integrating material across courses was helpful in understanding the interrelationship between the content taught in separate courses. Implications and applications of these findings are discussed as next steps for clinical training programs.

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Description of the Teaching Problem

Disciplinary context

The fields of speech-language pathology and audiology together comprise the discipline of communication sciences and disorders (CSD). As with many other educational and allied health fields, both CSD disciplines are practiced across the life span, with practitioners working in medical, clinical and/or educational settings after graduation. Services offered by CSD professionals have a high impact on a patient's quality of life. Thus, the clinical preparation of these professionals is complex, requiring a graduate degree for independent professional practice. Consistent with what is known about high quality learning, CSD graduate programs focus their pedagogical efforts on clinical preparation to support student development in integrating theory and practice to be effective professionals following graduation from CSD programs (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010).

Like many clinical disciplines, CSD prepares students to treat individual clients with isolated disorders. CSD graduate training programs typically organize their course offerings into disorder categories, with separate courses established to focus on individual communication disorders such as stuttering, aphasia, language disorders, and speech sound disorders. Historically, this practice has been successful in providing students opportunities for deep learning in specific areas of professional practice. The drawback of this type of clinical training program, however, is that it is often difficult to offer students learning experiences that are comprehensive and encourage significant, coordinated learning across course offerings (Fink, 2003). This situation calls for curricular integration that provides realistic, applied learning experiences for students.

Local context

Although the areas of communication disorders are presented separately in most graduate programs, they seldom present as isolated disorders in any one individual client. An adult who survives a stroke might have cognitive and language challenges as well as swallowing issues. A preschool child with a language disorder may often have a speech sound disorder. An individual with Down syndrome will have challenges with speech sounds, language, cognition, fluency and feeding. This multi-component nature of communication disorders is consistent across the lifespan.

Academic training programs in CSD have assumed that the integration of knowledge required to adequately diagnose and treat individuals will occur *spontaneously* in a student during the course of their graduate program through experience with courses and clinical work. At our university, we have anecdotally observed that as a result of our compartmentalized curriculum, students in the graduate program often need assistance to incorporate and synthesize information across their graduate courses. Their struggle with integrating information may be an unintended outcome of the present curricular design.

Traditionally, students take a class about language disorders, which covers learning about how some children struggle to understand what they hear or to create meaningful messages for others. They take another about speech sound disorders, which covers learning about how some children struggle to acquire sounds for intelligible speech, at some point in their graduate CSD curriculum. Faculty who teach these classes inform students that children with one type of communication disorder are at risk for other areas of speech or language impairment. Students seem to understand this information and are able to rationally acknowledge that children could have both a language and a speech disorder concomitantly; however, they lack practice in problem-solving about those types of cases in a way that challenges them to integrate course-specific learning to develop a more comprehensive understanding of the interrelatedness of these separate yet integral components of communication. Thus, in our view, students lack the opportunity for distributed practice in synthesizing their knowledge and skills to develop strong critical, clinical thinking processes across their field of study (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013).

Pondering this "silo effect" (Miller, Jones, Graves, & Sievert, 2010) led to faculty discussions about the potential impact of cross-curricular integration where course instructors wondered whether designing integrative opportunities for students to assimilate material within the same experience/project across their classes might lead to improved learning. These discussions were the genesis for this current project. This paper describes the design, implementation, and outcome of an integrated course project intended to provide a realistic, applied learning experience for students.

Solution

The following section describes the process of developing and assessing student perceptions of a learning experience designed to help students integrate content across courses to solve a series of clinical problems presented using a case study and role-play approach. Project development, assessment of student confidence to engage in clinical work, and interpretations of these assessment findings are discussed, as well.

Evidence-base for pedagogical design

Because CSD majors learn to treat communication disorders in patients, case-based learning (CBL) techniques are used by many faculty to enhance learning, develop clinical thinking skills, and to make classroom situations more like "real life" for students. Wrenn and Wrenn (2009) advocate for active learning to avoid a dependence on passive listening, encourage an evolution from transmission of knowledge to student skill development, facilitate student engagement, and emphasize student exploration as part of the learning process. For CSD students who are seeking to practice clinically, active learning is a particularly intuitive pedagogical strategy to utilize in designing high-quality graduate level courses (Ginsberg, Friberg, & Visconti, 2012). CBL is one form of active learning that has been applied with reported success by faculty in a number of clinical fields (Thistlewait et al., 2012).

CBL occurs when clinical cases are presented to students to discuss, determine outcomes, then present impressions to other groups and the group facilitator (Jalgaonkar, Sarkate, & Tripathi, 2012). CBL that integrates role-play learning has been found to better develop professional communication skills in students from clinically-based, allied-health fields (Jalgaonkar, Sarkate, & Tripathi, 2012).

Student characteristics

Participants in this case study were 34 first-year CSD graduate students attending a large university in the midwestern United States. All participants were co-enrolled in two pediatric-focused speech-language pathology courses: Preschool Language Disorders (PLD) and Speech Sound Disorders (SSD). The first and second authors of this paper served as the instructors for these courses respectively, and collaborated to conceptualize this project, facilitate students' understanding of the processes and content of the project, and assess students' work.

Project design

Course instructors for the two courses collaborated to create a CBL assessment and interpretation project for students which was simultaneously completed as a component of each class. This project was a terminal project for both courses, spanning the final four weeks of the semester. Students were randomly assigned to groups of four to five students, and then were randomly assigned a specific case study on which to focus. Each group completed three phases of this project: 1) develop an assessment plan, 2) interpret findings, and 3) present findings and treatment priorities to families via role-play. Customized feedback, specific to their assigned case, was provided from the course instructors after each phase. Each of these project phases is summarized in Table 1.

Phase	Timeline	Focus	Primary objectives	Student product	Feedback from
Ι	Weeks 1 and 2	Assessment planning	 Draft assessment plan appropriate for specific case study in which students: Select appropriate assessment strategies Provide rationale for each selection Identify additional information needed 	Assessment plan detailing all required elements for Phase 1	Extensive written feedback provided from both instructors that was case-specific and focused on successful integration of course content to solve clinical problem
П	Weeks 2 and 3	Findings and interpretations, Professional reporting	 Given assessment plan and results using a different case, students were asked to: summarize findings in report format interpret findings determine diagnosis make recommendatio ns for treatment and disorder management 	Written professional report outlining clinical findings and interpretations of these findings across disorders	Extensive written feedback provided from both instructors that was case-specific and focused on successful integration of course content to solve clinical problem
III	Week 4	Presentation of findings to parents	Students prepared a brief presentation to assess their ability to present technical information in an understandable manner	Enacted role- play of presentation of interpretations to caregivers (with instructors serving as mock parents for each case)	Feedback was provided to students verbally during the role-play exchanges and via a rubric following the conclusion of the presentations

Table 1. Project Phases, Objectives, and Timeline

Analysis of the Effectiveness of this Solution

Data Collection

Prior to Phase I and following Phase III, students were asked to complete a survey of their perceptions related to their readiness to engage in clinical work as a speech-language pathologist. These pre- and post-project measures were identical with the exception of three open-ended questions that were

posed as part of the post-project survey. A copy of the survey used to collect data in this study can be found in Appendix A.

In completing the pre- and post-project surveys, students responded to 18 statements, providing responses using a Likert-type scale indicating a range of responses from "strongly disagree" to "strongly agree." Responses to these questions were coded and analyzed using descriptive statistics as well as chi-square tests to examine categorical data (Fraenkel & Wallen, 2003).

A thematic analysis was conducted on the responses from the three open-ended questions. Transcripts of all responses for each question were independently reviewed by two graduate students who were not participants in the study. Each student was instructed to read all responses and make notes of initial ideas. Once each student was familiar with the data set, she was instructed to code responses and categorize them into similar themes. Once the students believed that all themes were identified, they met to establish initial agreement. Themes that were not identified by both raters were discussed and agreement was obtained.

Results

When comparing student ratings for each of the 18 statements measured at pre- and post-project intervals, mean scores indicated that students believed they were more prepared for professional practice in every area measured in the survey. Statistical analysis of these data yielded information specific to student perceptions of course-based learning and how integrating PLD and SSD content impacted their learning.

Five survey statements dealt specifically with perceptions of student learning tied to content for PLD or for SSD. Of the areas measured related to SSD, three yielded significant relationships from preproject to post-project intervals: preparation to plan a speech sound assessment, x^2 (2, N = 34) = 12.960, p < .01, preparation to score a speech sound assessment, x^2 (12, N = 34) = 23.132, p < .05, and preparation to interpret a speech sound assessment, x^2 (9, N = 34) = 20.580, p < .05. Of the areas measured related to PLD, statistically significant gains were observed in two from pre-project to post-project intervals: preparation to plan a language assessment, x^2 (2, N = 34) = 10.667, p < .01, and preparation to interpret a language assessment, x^2 (9, N = 34) = 21.121, p < .05. Tables 3 and 4 report these data.

Students feel prepared to:	Mean	Mean	Pearson	df	Sig.
	Pre-Test	Post-Test	Chi-		
	(SD)	(SD)	Square		
Plan a language assessment	2.09	3.24	10.667	2	.005*
	(.712)	(.431)			
Select a language assessment	2.29	3.15	6.592	6	.360
	(.836)	(.610)			
Score a language assessment	2.15	2.59	17.638	12	.127
	(.892)	(.857)			
Interpret a language assessment	2.09	3.24	9.722	6	.011*
	(.712)	(.654)			
Diagnose a language disorder	2.18	3.00	3.556	6	.737
	(.917)	(.426)			

Table 3. Pre- and Post-Project Data for PLD Course

Note: n=34

**p* < .05

Students feel prepared to:	Mean	Mean	Pearson	df	Sig.
	Pre-Test	Post-Test	Chi-		
	(SD)	(SD)	Square		
Plan a speech sound assessment	2.32	3.26	12.960	2	.002*
	(.638)	(.448)			
Select a speech sound assessment	2.26	3.18	9.166	6	.164
	(.751)	(.626)			
Score a speech sound assessment	2.50	2.59	23.132	12	.027*
	(.749)	(.857)			
Interpret a speech sound assessment	2.47	3.15	20.580	9	.015*
	(.662)	(.657)			
Diagnose a speech sound disorder	2.36	3.24	2.262	4	.688
	(.742)	(.496)			

Table 4. Pre- and Post-Project Data for SSD Course

Note: n=34

**p* < .05

Seven survey statements focused on the impact of integrating course content from PLD and SSD. Table 5 reports complete data for each statement.

Students feel prepared to:	Mean Pre-	Mean	Pearson	df	Sig.
	Test	Post-Test	Chi-		
	(SD)	(SD)	Square		
Diagnose a disorder in both speech and	1.82	3.12	5.748	4	.219
language	(.769)	(.409)			
Use assessment information to plan	2.21	3.12	6.551	4	.162
intervention	(.740)	(.537)			
Use assessment information to plan prevention	1.69	3.12	2.315	4	.678
	(.585)	(.537)			
Communicate assessment findings to families	2.55	3.50	3.511	3	.319
when one area of disorder is identified	(.832)	(.508)			
Communicate assessment findings to families	2.27	3.53	6.376	3	.095
when two areas of disorders are identified	(.761)	(.507)			
Discuss relation between speech, language,	2.45	3.20	19.174	6	.004*
communication, and literacy	(.754)	(.641)			
Explain prevention and/or intervention to	2.61	3.29	11.579	4	.021*
family members	(.556)	(.629)			

Table 5. Pre- and	Post-Project Data	a for Integrated	Project Content
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Note: n=34

**p* < .05

Of these, two statements yielded statistically significant change from pre-project to post-project intervals: preparation to explain information to family members, $x^2(4, N = 34) = 11.579$, p < .05, and preparation to discuss the relation between language, speech, communication, and literacy $x^2(6, N = 34) = 19.174$, p < .01.

Thematic analysis identified a range of themes from the student responses to the open-ended questions asking opinions on the positive and negative aspects of the project as well as suggestions for use in the future. In response to the question "What do you consider to be the most positive aspects of this project?" 20 comments (35% of the responses) were related to interpreting results and explaining them to parents. Obtaining real-world experience and working with a group were two themes that were represented by 16% (9 comments each) of the responses. The next two most prevalent themes, integrating speech and language information and receiving feedback from instructors, were mentioned by 5 students each (9%). Analysis of the 30 comments identifying the negative aspects of the project indicated two

prevalent themes: unclear directions (12 comments) and time (7 comments). Of the 11 responses to the question that asked whether this project should be repeated in the future, 10 respondents said yes (91%). When asked to suggest changes for this project, 29 comments were offered. Thirteen responses (45%) mentioned providing more time and seven responses (24%) suggested providing more guidance/directions. Six responses suggested changes to how the project was formatted and an additional 4 responses requested that a larger number of case studies be used.

Reflections on the Implications of these Findings

An overwhelming majority of students felt that this integrative learning project was a valuable contribution to their course experience and should be repeated, as they perceived gains in their ability to interpret and explain assessment and treatment information and process "real-world" clinical situations. Thus, for the students, the CBL-focused project we designed seemed to provide an experience that facilitated their learning.

That said, there were many components to this project that might have impacted student perceptions of their learning. For that reason, it is difficult to identify the exact project variable or combination of variables that were most effective. While the focus of the project was CBL, perhaps extrinsic, intervening variables (e.g., group assignment, student dispositional factors) were important in the successful implementation of this project. While this is possible, we believe that data provided by students is compelling. In all areas measured by pre- and post-testing, students reported more favorable perceptions of their clinical skills and abilities as a result of participating in this project. Following the completion of this project, both the PDL and the SSD students commonly reported at a statistically significant level that they were able to plan and interpret assessment more effectively. Neither group reported, at a statistically significant level, that they felt more confident to select an assessment or diagnose a disorder, which may be due to the fact that assessments to be used were somewhat evident (only one particular assessment might work for a given case), and students likely assumed all cases to describe disordered communication, thus impacting their opportunity to gain experience with making differential diagnoses. Additionally, students reported at a significant level that they could discuss the relation of speech and language disorders and could successfully explain priorities for interventions, indicating that the collaborative nature of this project was perceived as helpful in understanding the interrelation between the PLD and SSD courses. This significant increase is not reflected in the other areas, particularly in the area of "communicating assessment findings when two areas of disorders are identified." Subjective feedback from students would support this notion, as students felt that the most difficult aspect of this project was in Phase III, where they were asked to communicate findings and interpretations to "parents" during a role-play scenario. Students struggled translating professional terms and jargon to language that was friendly to non-professionals and indicated that they needed additional practice in this area to feel competent for future professional practice.

In terms of responses to open-ended questions, over 60% of comments provided by students identified positive attitudes toward aspects of the project connected directly to CBL: practice in

interpretation of case-based clinical data, role play in explaining results to "parents" in their audience when presenting information, and experience with "real life" situations. Students clearly specified the CBL approach as being important to their learning. We agree that it was an important component in this case.

Additionally, one of the unique features of this project was the "interrupted" nature of this CBL project. Students were provided with a case and asked to carry out different phases of work with their case over the course of four weeks, getting feedback from instructors at the end of each phase. While formal feedback was provided as written comments and via rubrics as part of the process of assessing our students' work, we noticed that many students sought out in-person consultations and conversations with us to strategize approaches to address their assigned clients. It is possible that this multi-modal communication across the entirety of this project allowed for an immediacy and clarity of feedback and support that may be absent from many learning experiences for students. Ten percent of positive open-ended comments spoke to this phenomenon, indicating that responses and feedback from instructors were important for their learning. Ginsberg (2007a, 2007b) indicates that this style of immediacy and relevancy in communication from faculty is associated with greater motivation for learning and increased active learning by students. Thus, it is possible that the structure of teacher-student interactions across the project was also an important part of student learning.

Students did identify aspects of the integrated project that were they perceived as being problematic. Most commonly, students said they desired more directions about completing the activity than they were provided as part of each phase of the project. They also wished they had more than four weeks to complete the phases of this project. We recognize that these are common criticisms of collaborative learning projects and would simply note that logistics did not allow for more time, nor are extensive directions provided in a true CBL context. Comments centering on the need for more directions are likely indicative of the cognitive dissonance inherent to problem-solving activities, though we acknowledge that providing a series of questions for students to consider (similar to modeling or think-alouds) may help students tolerate this type of learning experience more successfully in the future.

Curriculum revision

Results from this study, in conjunction with others assessing the impact of integrative pedagogies within our department, led our faculty to consider making comprehensive changes to the graduate CSD curriculum. As a departmental effort, faculty spent time reflecting on the desired outcomes of our graduate curriculum with nearly unanimous agreement across the faculty that an integrated approach to teaching and learning was desirable. These outcomes were the basis for some of the decisions that were made as part of the curriculum revision process, including a four-course cognition and language series to teach perspectives on communication and literacy across the lifespan and the design of an integrative diagnostics course.

Possible Generalizations to Other Settings

Ultimately, this project functioned as a pilot study of cross-curricular collaboration between course instructors and students and, in light of reported results, may well serve as a model for future integrated pedagogical efforts in CSD and other clinically-based disciplines. Examples include other professions that involve client-counseling/advising, i.e., law and medicine. If educational efforts in clinical disciplines are focused on supporting the development of competent clinicians, preparation programs must teach students to view patients as "whole" persons in order to identify needs and prioritize treatments. Thus, integrating learning experiences across the curriculum could be an effective approach for teaching and learning in disciplines such as medicine, nursing, physical/occupational therapies, psychology, and education.

The benefits of integrated experiences support efforts to develop interprofessional education (IPE) and interprofessional practice (IPP) models for students seeking clinical careers in disciplines such as education, nursing, nutrition, audiology, speech-language pathology, education, and medicine. IPE and IPP models of academic and clinical teaching demand that students consider the "whole person" in their work, easily incorporating information across boundaries that exist with less integrative pedagogies. In doing so, the benefits of helping students make purposeful connections between seemingly unrelated information may unlock deeper learning and understanding for students. Faculty who actively participate in developing such projects can contribute to gains in learning and engagement of their students, an outcome that appeared to result from this case.

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Appendix A: Pre-/Post-Project Assessment

After completing this project, I feel more prepared in planning a sound assessment. Strongly disagree Disagree Neutral Strongly agree Agree After completing this project, I feel more prepared in planning a language assessment. Strongly disagree Strongly agree Disagree Neutral Agree After completing this project, I feel more prepared in administering a sound assessment. Strongly disagree Disagree Neutral Strongly agree Agree After completing this project, I feel more prepared in selecting the appropriate assessment tool to measure the status of an individual's sound system. Strongly disagree Disagree Neutral Agree Strongly agree After completing this project, I feel more prepared in selecting the appropriate assessment tool to measure receptive and expressive language skills in preschool children. Strongly disagree Disagree Strongly agree Neutral Agree After completing this project, I feel more prepared in <u>scoring</u> an assessment tool to collect data on sounds. Strongly disagree Disagree Neutral Agree Strongly agree After completing this project, I feel more prepared in scoring receptive and expressive language tools. Strongly disagree Disagree Neutral Agree Strongly agree After completing this project, I feel more prepared in interpreting the scores yielded from a sound assessment tool. Strongly disagree Disagree Neutral Agree Strongly agree After completing this project, I feel more prepared in interpreting the scores yielded from receptive/expressive language tests. Strongly disagree Disagree Neutral Agree Strongly agree After completing this project, I feel more prepared in determining whether a speech sound disorder exists. Strongly disagree Disagree Neutral Agree Strongly agree After completing this project, I feel more prepared in determining whether a language delay/disorder exists. Strongly disagree Disagree Neutral Strongly agree Agree After completing this project, I feel more prepared in determining whether a disorder exists in more than one area (speech and language). Strongly disagree Disagree Neutral Agree Strongly agree

After completing this project, I feel more prepared in using assessment information to determine a direction for intervention.

Strongry disagree Disagree Neutral Agree Str	trongly agree
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After completing this project, I feel more prepared in using assessment information to determine a direction for prevention.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree			
After completing this project, I feel more prepared in communicating assessment findings to family members when there is one area of need.								
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree			
After commember	After completing this project, I feel more prepared in communicating assessment findings to family members when there are both speech and language difficulties.							
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree			
After completing this project, I feel more prepared in explaining to parents how speech and language interact for both communication and literacy.								
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree			
After commember	ompleting this project, I feel rs.	more prepared in	explaining prever	tion/intervention	methods to family			
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree			

What do you consider to be the most positive aspects of this project?*

What do you consider to be the negative aspects of this project?*

What would you suggest as changes, should this project be repeated in the future?*

*indicates question asked only at the time of administration for the post-project assessment survey