

Research Article

Building Collaborative Capacity in Early Intervention Preservice Providers Through Interprofessional Education

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ABSTRACT

Purpose: Interprofessional practice within early intervention is underscored by policy, research, and recommended practices. The purpose of this study was to explore the impact of a brief interprofessional training on preservice speech-language pathology, early intervention/early childhood special education, physical therapy, and occupational therapy students' knowledge, beliefs, and attitudes about teaming and collaboration. Students' satisfaction with and perspectives of the training were also examined.

Method: A one-group, pretest–posttest design was used to examine differences in 36 students' knowledge, attitudes, and beliefs around interprofessional practice after the training. Descriptive approaches were used to analyze student satisfaction data and focus group data in order to evaluate student perceptions of the interprofessional training.

Results: A paired–samples *t* test showed preservice students demonstrated increased scores in self-perceived ability, value, and comfort in working with others after the training institute. Descriptive analyses illustrated students gained a richer knowledge and appreciation for other disciplines and perceived the practice of interprofessional collaboration as a valuable learning experience.

Conclusion: The interprofessional training procedures, evaluation of impacts, and future directions are discussed.

Professional best practices in speech-language pathology (SLP) and early intervention/early childhood special education (EI/ECSE) require practitioners to collaborate in developing and executing comprehensive clinical and educational plans that focus on the various needs of children and families. Professionals in these areas therefore require knowledge, skills, and abilities in their discipline-specific areas as well as core competencies of collaborative interprofessional practice (IPP). Position statements, practice policies, certification and licensure requirements, and accreditation requirements of the American Speech-Language-Hearing Association (ASHA), its associated Council on

Academic Accreditation, and the Council for Exceptional Children Division for Early Childhood (CEC-DEC) all emphasize the need for, and the importance of, multiple professions working interdependently to optimize outcomes for each individual being served (e.g., ASHA, 2008, 2015; CEC-DEC, 2020; Division for Early Childhood [DEC], 2014). In addition to producing effective collaborative professionals, training programs with intentional systematic interprofessional education (IPE) efforts can help reduce stereotypes associated with specific professions and enhance teamwork and clarification of roles within the collaborative relationship (Pecukonis et al., 2008).

A key guiding principle and recommended practice in early intervention (EI) is effective teaming and collaboration with families and multidisciplinary providers (e.g., SLP, EI/ECSE, physical therapy [PT], and occupational therapy [OT]; DEC, 2014). Effective teaming is particularly

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important for young children with complex needs, as a single provider does not have all the expertise required to support a child with needs in multiple areas (Lieberman-Betz et al., 2019). Collaboration to support young children with complex needs and their families is promoted through federal special education legislation (Individuals with Disabilities Education Act, 2004) and driven by professional organizations' recommended practices, standards, and codes of ethics (e.g., ASHA, DEC, the American Physical Therapy Association, and the American Occupational Therapy Association). Personnel preparation standards ensure exposure to interprofessional collaboration for students; however, standards do not include specific expectations related to practice settings. Given the broad and generalist nature of SLP programs, students may have limited exposure to EI interprofessional teaming and collaboration (Barton et al., 2012). In order to prepare all practitioners to effectively collaborate with families and other providers in EI contexts, it is crucial to explore ways to integrate IPE opportunities within the curriculum.

The Centre for the Advancement of Interprofessional Education (CAIPE, 2002) defines IPE as “occasions when students from two or more professions learn about, from, and with each other to improve collaboration and the quality of care.” The goal of IPE is to provide students with opportunities to practice as part of an interprofessional team to prepare them with the knowledge, skills, and attitudes to provide services in a collaborative manner in their future practice (Buring et al., 2009; CAIPE, 2017). Research suggests that preservice IPE promotes skills in interdisciplinary collaboration and teamwork (Cusack & O'Donoghue, 2012; Guraya & Barr, 2018), promotes professional competencies, and reduces preconceptions and stereotypes among the various participating disciplines (Reeves et al., 2007). A key component of collaborative practice involves socialization across disciplines so professionals have an understanding of the values and beliefs of providers representing other fields of practice (King et al., 2016). Indeed, “to partner effectively, students and practitioners must be socialized to adopt a dual professional and interprofessional identity, in which they value the roles of others and function as collaborative team members” (King et al., 2016, p. 171).

IPE at the Preservice Level

Accreditation standards and support of IPE from Institute of Medicine et al. (2003) have led to an increase in IPE in preservice training for various health care professions (McNair, 2005; Pollard & Miers, 2008). A systematic review by Reeves et al. (2016) examined 46 IPE studies conducted with health care and allied health practitioners and precertification students. A majority of studies (78%) used experimental or quasi-experimental designs to

examine the effects of IPE, with fewer studies using qualitative methods to evaluate programs (11%). Additionally, a majority of studies collected data using a single method (58%). Many of the included studies were designed and/or evaluated in alignment with the Kirkpatrick model of educational evaluation, which comprises four levels: reaction, learning, behavior, and results. Outcomes addressed included reactions to IPE experiences, as well as perceptions, attitudes, and knowledge of interprofessional collaboration skills, which align with Levels 1 and 2 of the Kirkpatrick model; however, less is known about changes in participants' behavior and impacts on recipients of care (Musaji et al., 2019; Reeves et al., 2016). Findings of the systematic review suggest mostly positive effects of IPE on these outcomes and indicate a need for increased use of multiple methods to evaluate IPE programs. Although several disciplines were included in the Reeves et al. (2016) systematic review, educators were not included in the samples of studies.

ASHA has identified IPE/IPP as an important focus of its strategic plan and included IPE/IPP in 2020 certification standards (ASHA, 2022). Specifically, ASHA states that students' clinical experiences “include interprofessional education and interprofessional collaborative practice, and should include experiences with related professionals that enhance the student's knowledge and skills in an interdisciplinary, team-based, comprehensive service delivery model.” However, discipline-specific training is the prevailing model for most professional programs, with preservice practitioners receiving instruction largely within disciplinary silos (King et al., 2016). There are often few opportunities to engage in coursework or applied experiences across disciplines, perpetuating the presence of these silos into practice settings (Dobb-Oates & Wachter Morris, 2016).

Despite the important role of speech-language pathologists in the delivery of EI services, research on the outcomes of IPE in SLP is limited (Prelock & Deppe, 2015). For example, Barton et al. (2012) described a personnel preparation program for SLPs that engaged them in EI/ECSE content through coursework and practical experiences but did not include another discipline in the personnel preparation program. Pawlowska et al. (2020) examined an applied interprofessional play-based assessment with infants and toddlers in a clinic setting but did not include EI students in the experience. Additionally, Teeters Myers and Peganoff O'Brien (2015) included an EI-based assignment in one of the two courses of their IPE sequence, but EI students were not included in their sample. Indeed, while a limited number of studies have included EI content (Barton et al., 2012; Pawlowska et al., 2020; Teeters Myers & Peganoff O'Brien, 2015) or trained SLPs and educators together (e.g., Miolo & DeVore, 2016; Paul et al., 2020; Suleman et al., 2014; Weiss et al., 2020), we are not aware of a study that has included EI and SLP students in an IPE experience focused on EI practice settings.

Although the core competencies of IPE, including communication, teamwork, delineation of roles, and valuation of ethics (Interprofessional Education Collaborative, 2016), extend across practice settings and life span groups, there are idiosyncrasies unique to EI that deserve consideration. For example, students may lack confidence in interacting with young children who have disabilities and their caregivers during their professional education (Greenfield et al., 2015). Additionally, disciplinary lines are often muddled in working with young children due to the fundamental variability of development and the interconnectedness of developmental domains (Bagatell & Broggi, 2014; Campbell et al., 2009), as well as the use of the primary service provider (PSP) model in EI. Such unique characteristics of service provision to young children with disabilities and families warrant an examination of how preservice programs are incorporating IPE specific to young children, as well as the effectiveness of that training.

Previously studied IPE models involving educators, SLPs, or other related service providers have included brief trainings (e.g., several hours) with an accompanying applied activity (Anderson, 2013; Bagatell & Broggi, 2014; Gould et al., 2017; Paul et al., 2020), longer (e.g., 2 weeks) joint practicum experiences (Cassidy et al., 2020; Vereen et al., 2018; Weiss et al., 2020), and more fully developed semester-long practicum experiences embedded within programs (Miolo & DeVore, 2016; Renschler et al., 2016). Several studies have included problem- and case-based learning as part of the IPE model (e.g., Gould et al., 2017; Paul et al., 2020; Wallace & Benson, 2018), which is considered an important instructional approach for adult learners (Bryan et al., 2009; Steinberg & Vinjamuri, 2014). Findings suggest improvements in students' attitudes and a deepened understanding of IPP (Bagatell & Broggi, 2014); increased knowledge and comfort with applying transdisciplinary approaches (Weiss et al., 2020); and barriers such as (a) initial confusion around roles and responsibilities of the other profession, (b) communication issues created by the use of discipline-specific terminology, and (c) limited opportunities for interprofessional collaboration in their training programs (Anderson, 2013). More research on brief collaborative trainings using case-based learning is needed to increase feasibility of use of the model across preparation programs with little room for electives or cross-program experiences.

Purpose of This Study

Few graduate SLP programs provide a specialty area in EI (Prelock & Deppe, 2015). Specific activities that situate IPE competencies in EI practice settings are needed for preservice SLP students, as well as those from other disciplines (i.e., EI/ECSE, PT, OT) to ensure that students engage in IPE and socialization opportunities and are

prepared to work in interdisciplinary contexts upon graduation. Limited research in pursuit of this endeavor supports an expansion of IPE activities or trainings incorporating the various team members who serve children in early childhood and school-age settings to better prepare students for IPP with children and families postgraduation (Anderson, 2013; Dobbs-Oates & Wachter Morris, 2016; Margison & Shore, 2009; Pfeiffer et al., 2018). Additionally, use of multiple measures to examine impacts of IPE is warranted. To address these gaps, an IPP training was developed and implemented as part of a larger, federally funded interdisciplinary personnel preparation program focused on training SLP and EI/ECSE students to work with young children with complex needs and their families. This preservice interprofessional training (hereafter called the IPP Summer Institute) was an intensive, 2-day training open to graduate students across the disciplines of SLP, EI/ECSE, PT, OT, and special education. The training (described in more detail below) involved content delivered by interdisciplinary faculty and a progressing case-based activity and was evaluated through multiple methods, specifically the use of an established IPE questionnaire, an exit survey, and group interviews.

The purpose of the current article is to describe the IPP Summer Institute and its impact on graduate students' values, beliefs, and perspectives on IPP and interpersonal collaboration. The following primary research question was examined: Are there differences in preservice students' knowledge, beliefs, and attitudes of IPP as measured by the Interprofessional Socialization and Valuing Scale (ISVS; King et al., 2010) before and after participation in the IPP Summer Institute? Because satisfaction and engagement levels in training relate to learning (Kirkpatrick & Kirkpatrick, 2016), participants' satisfaction with and perceptions of the IPP Summer Institute were also explored.

Method

Participants

A total of 36 preservice students in EI service professions participated in this study. Participants were graduate students in the professions of SLP ($n = 7$), EI/ECSE/special education ($n = 6$), PT ($n = 7$), and OT ($n = 16$). Twelve of the participants (five EI/ECSE and seven SLP students) had completed their first year of a 2-year federally funded interdisciplinary personnel preparation program at the same university and were required to attend the IPP Summer Institute as part of their grant-funded program. The remaining participants (one special education student, seven PT students, and 16 OT students) had been invited to attend the institute by faculty based on their interest in working with young children. The PT and OT students

attended universities different from those attended by the SLP, EI/ECSE, and special education students.

Preservice program experiences prior to the IPP Summer Institute varied across participants. SLP students had completed 1 year of their 2-year program, which at that point included coursework and practicum experiences spanning the scope of practice in SLP (e.g., communication and swallowing needs across the life span). They completed one course specifically focused on infant, toddler, and preschool language assessment and intervention as well as other courses addressing communication assessment and intervention for developmental and acquired disorders in childhood. SLP students had completed clinic-based practica with children but had not yet had an EI/ECSE practicum experience. EI/ECSE students had completed coursework in infant and toddler intervention, assessment in EI/ECSE, and communication and language development and intervention in young children prior to the IPP Summer Institute. The special education student was in a teacher certification program focused on preschool through 12th grade but had limited exposure to early childhood-specific content at the time of the IPP Summer Institute.

Of the seven PT students, five had completed their fifth of eight semesters of preparation, and two PT students had graduated the previous month. All had completed four credit hours of coursework related to the PT management of children and youth with disabilities, including typical child development, examination and intervention planning, family-centered care, and teaming, as well as a one-credit-hour pediatric service-learning course. The OT students had completed eight credit hours of coursework related to OT in the pediatric setting, including content about relevant diagnoses, theories, and evaluation and intervention planning, in addition to a 10-week Level 1 fieldwork experience. Prior to beginning the professional portion of their preparation, OT students had completed the prerequisite coursework in human development and related topics.

Setting and General Procedure

This study was approved by a university institutional review board, and all attendees of the IPP Summer Institute gave their informed consent to participate in this study. The IPP Summer Institute took place at a conference facility over the course of a weekend, beginning on a Friday evening and finishing midday Sunday, and consisted of formal presentations of content, applied case studies, and evaluation activities. Specified objectives for the institute were for students to (a) demonstrate skills in developing interprofessional intervention plans collaboratively with team members to address outcomes for children with complex needs across developmental domains; (b) demonstrate

knowledge of team-based problem-solving approaches to expand knowledge and skills in working with children with complex needs; (c) demonstrate skills in making evidence-based decisions to promote positive outcomes for children with complex needs and their families; and (d) demonstrate skills in self-reflection throughout experiences in problem solving, teaming, and service delivery.

On the first evening, the IPP Summer Institute facilitators made introductions and reviewed the agenda and format for the weekend. Facilitators included interdisciplinary faculty (SLP, EI/ECSE, PT, and OT), family members, a featured speaker, and graduate research assistants. Students and facilitators participated in team-building exercises, which were included to allow students to become familiar with one another before engaging in the more intensive team-based work that occurred on subsequent days. On the second day of the IPP Summer Institute, students first completed a measure of attitudes and beliefs toward IPP (King et al., 2010). Then, interdisciplinary speakers presented during four content blocks focused on infants and toddlers with complex needs, collaboration and teaming, and supporting families. Speakers included SLP, PT, and OT grant-affiliated faculty; a parent and sibling of an individual with complex needs; and a featured speaker. Each speaker presented for 30–45 min (see Table 1). After each content block, students progressed through a case-based application in interdisciplinary teams (as described below), requiring them to apply new content and engage in problem solving to support the child and family in their case. Time allocated for each of the case study application segments ranged from 30 to 60 min.

The final day of the institute involved team presentations of cases and evaluation activities. Students prepared their cases for presentation using PowerPoint and were given 20 min to present and discuss their case with the other students and facilitators (10–15 min to present, 5–10 min for questions/discussion). After presentations, students completed a posttest measure of attitudes and beliefs

Table 1. Content blocks and time per speaker.

Content block (total time)	Presentation topic	Length of presentation
Content Block I (75 min)	NICU/transition home and family stressors	45 min
	Feeding	30 min
Content Block II (75 min)	Family perspectives	30 min
	Teaming and collaboration	45 min
Content Block III (60 min)	Assistive technology	30 min
	Positioning and mobility	30 min
Content Block IV (30 min)	AAC	30 min

Note. NICU = neonatal intensive care unit; AAC = augmentative and alternative communication.

around IPP, completed an exit evaluation, and engaged in group interviews on students' perspectives of IPE and the IPP Summer Institute.

Implementation of the Progressing Case-Based Application

The second day of the IPP Summer Institute was structured such that after each content block, interdisciplinary student teams met to engage in a progressing case study activity. Teams of six students were preassigned by IPP Summer Institute facilitators, with at least one student from each profession represented on each team. Students were informed their teams would use the PSP model to support the child and family. To increase collaboration and problem solving during each segment of the case study, teams were provided access to an online portfolio containing a problem-solving process guide, which required them to identify (a) family priorities; (b) additional information needed to support decision making and how to obtain that information; (c) immediate actions required by the team; (d) outside resources to support the child and family; (e) and possible child/family objectives, intervention steps, and the evidence base to support those decisions. The portfolio also contained a completed mock individualized family service plan (IFSP) for each individual case to provide additional contextual information to support team discussion and problem solving. When teams required family input for decision making, a facilitator who was assigned the role of family member went to the team, discussed the issues presented to them by the team, and collaborated in a decision-making process to determine the next steps for the child and family.

Case studies were developed by doctoral graduate assistants in special education with expertise in EI and deaf-blindness. All case studies were reviewed by at least two interdisciplinary faculty facilitators prior to the IPP Summer Institute. IFSPs were developed by the same graduate assistants to accompany each case study. All six case studies began the same way. Each team was given

the beginning section of the case "Little Things That Count" (Johnson & Reilly, 1993), the story of "Megan," an infant born prematurely and admitted to the neonatal intensive care unit shortly after she was born. Subsequently, each team's case describing Megan and her family progressed along a different trajectory, though all cases related to the content blocks presented throughout the IPP Summer Institute. Topics described across the six case studies included specific disabilities and medical needs, changes in family structure, introduction of other stressors, and other relevant issues faced by providers and families of children with complex needs. Although all cases covered the same topics, specifics varied for each team (see Table 2). Teams were provided one segment of their case study after each content block; case study segments were aligned to the information delivered during the content block.

Measurement and Data Collection Procedure

Several measures and procedures were used to collect quantitative and qualitative data. A pre-post measure of participant attitudes, beliefs, and perceptions of working with professionals from other disciplines was administered, as well as an exit evaluation to collect students' satisfaction ratings of the institute. Group interviews conducted on the final day, along with open-ended questions on the exit evaluation, provided additional information about students' perspectives of the IPP Summer Institute.

The ISVS

An adapted version of the ISVS (King et al., 2010) was administered to students prior to the start of the first content block and after the group presentations on the final day of the IPP Summer Institute to assess attitudes and beliefs around collaborating with professionals from other disciplines. The ISVS is a 24-item scale with three identified factors (Factor 1 – *Self-perceived ability to work with others* [nine items]; Factor 2 – *Value in working with others* [nine items]; Factor 3 – *Comfort in working with*

Table 2. Case study characteristics.

Case study	Child diagnosis/characteristics	Other factors for consideration
1	Deaf-blindness, motor delays	Parent-child bonding, cochlear implants
2	Cerebral palsy	G-tube placement, lack of extended family support, new baby
3	Autism spectrum disorder	NG tube to supplement bottle feeding, supporting infant/toddler in child care
4	Cleft palate, developmental delays	Parent divorce, mother return to work, change in PSP
5	Hydrocephalus, motor delay, intellectual disability	Supplemental oxygen, shunt, G-tube, cultural and linguistic diversity, financial struggles
6	Congenital limb defects, hydrocephalus, developmental delays	Leg surgery (partial amputation), parent job loss, financial struggles

Note. G-tube = gastrostomy tube; NG = nasogastric; PSP = primary service provider.

others [six items]). Example items across the entire scale included, “I feel confident in taking on different roles in a team (i.e., leader, participant),” “I value open and honest communication with team members,” “I have an understanding of my own approach to care within an interprofessional team,” and “I am able to share and exchange ideas in a team discussion.” Multiple items were slightly reworded to align with terminology used by those in education-based fields (e.g., use of “student” instead of “client”), and a rating scale of 1–6 was used (Gregory et al., 2020; Iachini et al., 2016). The primary dependent variable (mean item score) was computed by adding the ratings of all items of the scale and dividing by 24, and dependent variables for the three factors were computed by adding the ratings for the items associated with each factor and dividing by the total number of items for each factor. Based on our sample, the ISVS showed good internal consistency for scores pre- and posttraining (Cronbach’s $\alpha = .91$ and $.88$, respectively) as well as across the three factors pre- and posttraining (Cronbach’s $\alpha = .75$ – $.86$). The lowest internal consistency was found for the third factor. These levels of internal consistency align with previous studies using the mean item ISVS total and factor scores (Acquavita et al., 2020; Gregory et al., 2020; King et al., 2010).

IPP Summer Institute Exit Evaluation

A researcher-developed questionnaire was completed by students at the end of the IPP Summer Institute. To evaluate satisfaction with the IPP Summer Institute, students rated 13 statements about content, structure, presenters, learning, and satisfaction on a 5-point Likert scale. To understand perceptions of the IPP Summer Institute, two open-ended questions asked students to indicate what they most liked about the IPP Summer Institute and what they felt could be improved.

Group Interviews

For the final evaluative activity examining students’ perceptions of the IPP Summer Institute, case study teams were combined to create three interdisciplinary groups of 12 students each. A primary facilitator was assigned to each group, with additional IPP Summer Institute facilitators present to support conversations. Two of the primary facilitators were doctoral students in EI/ECSE, and the other primary facilitator was a faculty member in PT who also presented during the IPP Summer Institute. The three primary facilitators were selected based on the following criteria: (a) They had not served as a course instructor for any of the students, and (b) they had experience with qualitative research methods. Three primary questions were posed during the group interviews to elicit conversation: (a) How has the IPP Summer Institute changed how you relate to and understand other related services/

education professionals? (b) What aspects of the teaming/problem-solving process did you find most beneficial? (c) What aspects of the teaming/problem-solving process did you find most challenging? Additional probes were asked by facilitators to extend the conversation based on the group discussion. Group interviews were recorded using audio recorders and transcribed verbatim for analysis.

Research Design and Data Analysis Procedure

To address the primary research question, a one-group, pretest–posttest design was used to examine whether there were significant differences in the mean item score for the full measure and the mean item score for each of the factors of the ISVS before and after the IPP Summer Institute. To explore student satisfaction with and perceptions of the IPP Summer Institute, researchers conducted descriptive analyses of exit evaluation Likert scale items and open-ended questions. Transcripts from the group interviews were analyzed using qualitative analysis. To descriptively analyze the open-ended responses from the exit evaluation, the primary coder, an EI/ECSE doctoral student with previous coursework and experience in quantitative and qualitative methods, read through the exit evaluation open-ended responses and categorized responses into general themes. After reviewing a key generated by the primary coder and practicing categorizing statements together, the second coder, also an EI/ECSE doctoral student with previous coursework in quantitative and qualitative methods, performed reliability coding on 20% of responses for both open-ended exit evaluation questions. Interobserver agreement (IOA) for the first question was 100%. IOA for the second question was 87.5%. Once the second coder was finished, the two coders met to discuss the statements where they were misaligned and came to a consensus on the appropriate category. The transcribed group interview data were qualitatively analyzed using reflexive thematic analysis (Braun & Clarke, 2019). Using a phenomenological approach, researchers were interested in understanding the experiences of students who participated in the IPP Summer Institute, as well as their perceptions of not only the institute but also teaming and collaboration as they relate to serving young children in the context of EI/ECSE. The group interview data presented here reflect data from two group interviews that included 24 of the 36 participants (i.e., 12 per group). Due to technical difficulties with the audio recording, one of the three group interview recordings was lost.

Group interviews were transcribed by hand by the same primary coder and reviewed for accuracy. Once transcribed, the primary coder and a third graduate assistant with previous coursework in qualitative methods read through the documents separately, familiarizing themselves

with the transcripts. They also assigned codes independently. Once independent coding was complete, graduate students met to discuss agreements and discrepancies between their codes. The primary coder and graduate assistant independently used the codes to develop themes related to the research questions. Once this step was complete, the two met to discuss the themes. Together, they revised and defined the themes to make meaning of the responses from the group interviews.

Results

Preliminary Analyses

SPSS Version 25 was used to run all statistical analyses, and missing data were handled using listwise deletion. Paired *t* tests were conducted to address the research question. Preliminary analyses examining the distribution of the ISVS mean item difference scores for the full measure from Time 1 to Time 2 showed low levels of skewness and kurtosis and resulted in a nonsignificant Shapiro–Wilk test of normality ($p = .084$). However, three outliers were identified. After examining normality of the distribution with the outliers removed (low levels of skewness and kurtosis, but significant Shapiro–Wilk statistic [$p = .040$]) and running a paired-samples *t* test with outliers removed, $t(28) = 12.58, p < .001$, it was decided to maintain outliers in all analyses as scores likely reflected natural variation in the data.

Students' Knowledge, Beliefs, and Attitudes About IPP

A paired-samples *t* test was used to examine changes in preservice students' knowledge, beliefs, and attitudes about IPP after engaging in the IPP Summer Institute. Results showed students demonstrated a statistically significant increase on the mean item ISVS score from Time 1 to Time 2, $t(31) = -10.156, p < .001$, with a large effect size ($d = 1.31$; Cohen, 1988), suggesting more positive attitudes, beliefs, and perceptions of IPP after the IPP Summer Institute. Additionally, students demonstrated a statistically significant increase on mean item scores from Time

1 to Time 2 across all three factors of the ISVS including their self-perceived ability to work with others, $t(33) = -7.527, p < .001, d = 1.28$; their perception of the value in working with others, $t(31) = -9.041, p < .001, d = 1.05$; and their comfort in working with others, $t(33) = -5.938, p < .001, d = 1.01$ (see Table 3). Effect sizes across all three factors were large in magnitude (Cohen, 1988).

Students' Satisfaction With the IPP Summer Institute

Descriptive analysis of Likert ratings on the IPP Summer Institute exit evaluation provided information about students' satisfaction with training activities. Thirty-five of the 36 students completed the exit evaluation following the IPP Summer Institute. Out of 35 responses, 100% of students said they strongly agreed or agreed that (a) information was presented in a way they could easily understand; (b) organizers communicated information clearly; (c) facilitators were well prepared and organized; (d) the content, materials, and activities presented during the IPP Summer Institute were of high quality; (e) they were likely to use information and strategies presented at the institute; (f) the institute addressed topics that were important to them; (g) they gained new knowledge; and (h) they were overall satisfied with their experience at the IPP Summer Institute. Additionally, 97% indicated they strongly agreed or agreed that (a) the IPP Summer Institute provided information and activities that reflected current research, best practice, and theory; (b) the facilitators were knowledgeable on the subject; and (c) they learned new skills. Finally, 94% of students indicated on the exit evaluation they strongly agreed or agreed that the structure of the IPP Summer Institute aided in their ability to learn material presented and that they learned about new resources.

Students' Perceptions of the IPP Summer Institute

Open-ended responses on the exit evaluation and transcripts of group interviews were analyzed to examine students' perceptions of the IPP Summer Institute.

Table 3. Results of the paired-samples *t* test.

ISVS score	Time 1 <i>M</i> (<i>SD</i>)	Time 2 <i>M</i> (<i>SD</i>)	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
Total score	4.83 (0.473)	5.45 (0.371)	-10.156	< .001	1.31
Perceived ability to work with others	5.07 (0.472)	5.68 (0.377)	-7.527	< .001	1.28
Perception of the value of working with others	4.97 (0.591)	5.59 (0.381)	-9.041	< .001	1.05
Comfort in working with others	4.24 (0.613)	4.85 (0.708)	-5.938	< .001	1.01

Note. ISVS = Interprofessional Socialization and Valuing Scale.

Exit Evaluation Open-Ended Responses

The first question asked participants, “What did you like most about the Summer Institute?” The following themes emerged: (a) content/organization, (b) learning from other disciplines, (c) accommodations/extras, (d) collaboration, and (e) fellowship. Not all themes occurred across all open-ended exit survey responses.

Content and organization. Twenty-three students (66%) commented on the way the institute was organized, the way content was presented, and the group work on their case studies. One attendee wrote, “I liked how the presentations were mixed in with the case study so we could apply what we just learned.” Another student wrote, “I liked the different topics that were presented throughout the institute. They were all very informative, and it was evident that each presenter was very knowledgeable about their topics.” Another noted, “I liked practicing talking with a family member and answering questions.”

Learning from other professions. Thirteen students (37%) wrote about the opportunity to learn from other professions as well as share information about their own profession. One student mentioned how the IPP Summer Institute was able to “bring the multiple disciplines together within the small groups. This allowed for a greater understanding of what each profession may contribute and how we can support each other and our clients.” Another wrote that the institute “. . .gave me an opportunity to see the focus of other professionals on the team. It also gave me an opportunity to assist in their goals with my knowledge of my own discipline.”

Accommodations/event extras. Ten students (29%) commented on the accommodations and event extras such as the food, location, and “fidget” toys available for them during the sessions. One student wrote they enjoyed the “. . .thoughtful inclusion—thought of everything we could possibly need during the day (pens, pencils, snacks, fidgets).”

Collaboration. Eight students (23%) wrote about the value of working in collaboration with other professions and its benefits for children and families. One student shared, “I thoroughly enjoyed working in a collaborative team with difference [*sic*] disciplines (OT, PT, special educators). I feel like this was great practice working with an interprofessional team.” Another wrote, “I also learned the value of collaboration and its benefits to the other disciplines and parents and children.”

Fellowship. Two students wrote about the opportunities for fellowship, including fellowship with students from their own university and students from other programs.

The second exit survey question asked, “How could the overall event be improved?” The following themes emerged: (a) content/organization, (b) inclusion of disciplines, (c) presenter/facilitator knowledge and interactions, (d) resources, and (e) hands-on experiences.

Content/organization. Twenty students (57%) commented on the content/organization of the weekend, including the timing, the content in the cases and presentations, and having to present as a group at the end of the weekend. Many specifically mentioned the timing, wanting more time to form their ideas and complete the case study problem-solving process. One student noted, “I would rather have worked on the entire case study for longer periods of time. I did not feel like my group was able to fully develop ideas during the short blocks.” Another student wrote she wished the IPP Summer Institute would “allow students to reflect more and have this reflection time and case study between speakers so there is more movement and process time.”

Inclusion of professions. Eleven students (31%) wrote about the inclusion of professions. Students specifically noted they would like the role of the special educator to be highlighted and included more specifically throughout the weekend. Two students also mentioned physical therapists could have been better included. One student wrote, “As a SPED (special education) person, I am not sure how much I learned specific to my future. The lectures seemed to revolve more around PT, OT, SLP and didn’t involve much as a special educator. For the case study, I was unsure on what my role was.”

Presenter/facilitator knowledge and interactions. Seven students (20%) commented on their interactions with the presenters/facilitators during the IPP Summer Institute. Some noted the facilitators did not have knowledge of other professions or spoke using stereotypes. Others noted they received different advice from the various facilitators. One student wrote, “I felt like the facilitators all had different feelings toward subjects and stuff said was different/opposite to what I learned in class. More communication between the facilitators beforehand would have been good.”

Resources. Three students (9%) commented on how they would have liked more resources they could use with families and during the weekend to support their work on the case studies.

Hands-on experiences. Two students (6%) wrote they would have liked more hands-on experiences throughout the weekend related to positioning, augmentative and alternative communication, and assistive technology.

Group Interviews

Students were asked three questions in their group interviews.

1. How has this institute changed how you relate to and understand other health care or education professionals?
2. What aspects of the teaming/problem-solving process did you find the most beneficial?
3. What aspects of the teaming/problem-solving process did you find the most challenging?

Four major themes emerged from the transcripts of the two group interviews: (a) exposure to other professions, (b) teaming to benefit the child/family, (c) confusion/concerns about the PSP model, and (d) real-world barriers (see Table 4). As previously noted, the recording for the third group interview was lost due to technical issues with the recording device.

Exposure to other professions. Through the facilitator presentations and their work on interprofessional case studies, students reported they were exposed to other professions they will likely collaborate with in the future. Experiences at the IPP Summer Institute helped students learn about other professions and who to reach out to for support outside of their field. Some noted they had little exposure to other professions prior to the IPP Summer Institute and lacked understanding of other disciplines. One student discussed her experience learning more about other professions:

Yeah, I thought that PTs just focused on lower extremities, very exercise oriented. And actually talking and hearing what they had to say, they were talking about daily routines and I was like, I thought that was only OTs! It was very eye-opening. And I've never actually spoken with speech language pathologists either, so getting to hear the new vocabulary I feel like I'm a more equipped OT and I can better see how I can implement language in my practice.

Students spoke about how the IPP Summer Institute case studies provided opportunities to practice collaborating with other professions. One student shared her experience:

I just think it was great to have all of us collaborate together because out of all the professions at least PTs are going to work with I think it is going to be in the pediatric setting SLPs, OTs, and the early interventionists so it was...great to get that interaction.

Another student shared about the new exposure to the special education profession:

...special education was here, which I thought was really cool because I have never really had a chance to

talk to someone in that profession and I had no idea all the things they could do, so I would never have known to be able to call someone in that realm...

Beyond the different skills each profession brought to their team, students were able to find commonalities between their professions:

...I'm realizing we all share some of the very similar principles from birth to kindergarten and just having that basic understanding I think helped us to kind of let our guards down when we talk. We feel already like we're on common ground and then just build upon that.

Teaming to benefit the child/family. Many students shared how the IPP Summer Institute provided them with opportunities to collaborate in order to benefit the child and family in their case. Instead of one profession possessing more knowledge, one student shared how the IPP Summer Institute helped her see how "...we can all work together to find the best outcome for the child and family." Students spoke about opportunities to bring their own perspectives to the table, often looking at the same problem from a different lens. Combining their knowledge assisted them in providing intervention that encompassed all of the child and family needs. One student shared:

I thought it was kind of beneficial to get the different perspectives 'cause we would kind of come up with an idea and then it would be adjusted by different disciplines. Like, "Oh, how about we do it this way?" and then somebody else would add another way to make it more cohesive rather than just like if it were a bunch of different disciplines treating this patient—it is not as efficient because they each would have implemented their own strategy where you can combine them.

Students also noted how this event was different than previous collaborative events they had attended. Students recounted events in the past where they felt other professions were protective of their profession and were

Table 4. Summary of themes derived from group interviews.

Theme	Description
Exposure to other professions	Discussion related to exposure to other professionals with whom students would likely collaborate in the future.
Teaming to benefit the child/family	Discussion around collaborative opportunities provided by the IPP Summer Institute through the progressing case study.
Confusion/concerns about the primary service provider model	Discussion related to confusion about the primary service provider model and what it looks like in practice.
Real-world barriers	Discussions around barriers to collaboration in early intervention practice settings.

less inclined to collaborate. One student compared her two experiences:

I remember when I did an interprofessional event with PTs and nurse practitioners and it was very much like, “No, no, no, I’m going to take care of that,” and here [at the IPP Summer Institute] we were like, “Oh I could also do that,” or “We could combine this.” Like, it was such a good experience and I feel like after that [first] experience I was like, “Uh, I’m kind of scared about being part of a team,” but this experience [with the IPP Summer Institute] made me feel like, “Oh, it’s possible.”

Students discussed creating and implementing goals as a team to assist with embedding intervention throughout routines and the importance of having knowledge of one another’s goals. One student shared, “I like the idea of like working together to create a goal. . .that way you’re working toward these goals wherever a child is.” In response, someone else said, “. . .even if you technically have separate goals, I think it is important to focus on minimizing how many different things parents need to do every day beyond their everyday activities that address as many goals as possible.”

Confusion/concerns about the PSP model. A recurring theme was the confusion of the PSP model and what it looked like in practice. Students noted they needed more clarification and background about Part C EI and the PSP model. As they reflected on the IPP Summer Institute, many brought up questions about scope of practice and confusion about role release. Students wondered about when to do their own research/implementation versus when to consult with another profession. One student reflected on the presentations and what it meant in practice:

. . .during her lecture [she was] saying that we as professionals have the right to do our own research on other disciplines, but again I found that a little bit daunting and the fact of I would not feel comfortable in doing, like toe walking for instance after reading about it. I don’t know if I would feel comfortable demonstrating that and carrying out those interventions with my patient because I have not practiced that.

Attendees appeared to be confused about the difference between having to play the role of all professions independently instead of using consultation to gather the necessary knowledge to share with families. They wondered if some of what was mentioned by presenters violated their respective professions’ code of ethics. One student shared, “Yeah, I didn’t know that was ethical to do that—to just carry out my own independent research outside of my scope of practice and integrate it without consulting a professional in that role.”

Real-world barriers. When asked about the challenges of collaboration, many students brought up real-world barriers such as billing, scheduling, and collaborating with professions in the medical field (e.g., nurse practitioners, nurses, doctors) who may not be as knowledgeable about EI or as open to teaming. One student discussed visibility in the medical realm:

We still run into that problem where the pediatrician doesn’t necessarily know to prescribe OT, PT or they still don’t know how we can benefit the child or the patient and what their outlook is on physical therapy or occupational therapy or SLP, you know.

Additionally, students brought up concerns about billing. Students noted they might not have time or be able to bill for meetings with other professions or families as often as they would like.

One student described the challenges of billing:

I don’t think it was so much the team building, but it’s like, putting it into real-world experience when you actually have to think about the billing and what are we allowed to do and what do we really want to do. We can’t give up 15 minutes of free time to talk to every family because then we would never get paid. So, I think that was the hardest because it’s almost like there’s nothing we can do about it.

Additionally, students expressed confusion about joint visits and how that would look for billing:

One challenge I’m still confused about, and this wasn’t necessarily with this experience, but if we were to collaborate in real life and have sessions together I’m still not sure how that works for billing. I saw an OT and a speech pathologist doing a session together and they were like kinda taking turns, but they were both on it the whole time, but I’m not sure how that works for billing.

Overall, student perspectives offered rich insight into how IPE experiences may impact student comfort with and attitudes toward working with other disciplines. Students also offered valuable feedback on aspects of the IPP Summer Institute as well as suggestions on how to enhance the activities for future offerings.

Discussion

IPE at the preservice level is an integral part of preparing practitioners to provide effective services to young children with disabilities and their families. Previous

research suggests that preservice IPE activities are effective at increasing knowledge of IPP; however, few studies have investigated the effects of an interprofessional training relevant to EI practice settings. This study suggests that such a training involving interprofessional faculty and family presenters, paired with case-based methods of instruction, may be effective at increasing the knowledge, attitudes, and beliefs around IPP in students representing the disciplines of SLP, EI/ECSE/special education, PT, and OT. Additionally, descriptive and qualitative results suggest students were satisfied with IPP Summer Institute activities and valued the experience with their peers. Student perceptions of the institute lend support to quantitative findings that learning took place and also help inform future trainings (Kirkpatrick & Kirkpatrick, 2016). More information related to the PSP model and role release, as well as increased facilitator preparation, could improve the IPP Summer Institute for students.

Results of the quantitative analysis examining changes in interprofessional attitudes and beliefs after the IPP Summer Institute were statistically significant; however, discussion of practical significance (Mohajeri et al., 2020) is warranted. Although it is not possible to translate statistical significance directly into practical significance for any given field, contextual information supports interpretation of magnitude of the effects of the IPP training (Mohajeri et al., 2020). First, the difference between pre-test and posttest means on the total ISVS score was .62 points. This difference is larger than the difference reported on the ISVS after involvement in year-long interprofessional training by others in medical (.25 in Gregory et al., 2020) and social work (.49 in Acquavita et al., 2020) fields. This comparison to studies using the ISVS as a pre-post measure supports interpretation that the difference observed in the current data aligns with (and exceeds) prior studies using the measure in a similar way. Next, the magnitude of the effect size also provides information about the practical significance of the current results (Mohajeri et al., 2020). For the sample of SLP, EI/ECSE, PT, and OT students engaged in the IPP Summer Institute, the effect sizes for the total and three factor scores were large based on established conventions. Additionally, the effect size for the total ISVS score was larger than those reported in other studies using the ISVS in a pre-post design (.52 in Gregory et al., 2020, and .67 in Acquavita et al., 2020, for total scores). This, along with alignment in the qualitative data, supports the practical significance of the findings reported in this study.

Implications for Practice and Research

The results of this study have implications for personnel preparation in SLP, EI/ECSE, and other related service fields (e.g., PT and OT). EI practice uses a teaming

model that recognizes the integrated nature of child development, the primary role of the family in promoting child development and supporting the functioning of the family, and the necessity of effective collaboration across all team members. Extending preservice IPP instruction beyond content knowledge to providing intentional IPE learning application opportunities for students who may not receive adequate EI content in their coursework or practica has the potential to establish collaborative practice as a foundational skill for professionals entering the field. The IPP Summer Institute described in this study may provide a feasible model for implementing IPE across two or more disciplines in other preservice preparation programs. Results of this study suggest a brief yet intensive case-based model for IPE may support positive changes in knowledge and beliefs of IPP and provide a satisfying experience for students representing multiple disciplines. The brevity of the training increases the feasibility of implementing similar experiences across programs preparing providers in EI and related fields, which often have programs of study and requirements for internship experiences for their students with little flexibility or room for shared coursework. Therefore, programs that already provide IPE opportunities across two disciplines may consider using this approach as a way to extend IPE without requiring a complete restructuring of programs of study. These findings are especially relevant for institutions that do not have programs that represent multiple EI disciplines as illustrated in this study, which included participants across three different universities.

Interestingly, students noted discrepancies between what they had learned in their respective preservice programs or what they perceived as profession-specific norms and what was presented by interprofessional faculty at the IPP Summer Institute, as well as the presentation of stereotyped views of some professions during the training. Such feedback provides valuable information about how to engage in discussion and planning activities with presenters to ensure professional stereotypes are limited in presentations and that similar messaging is provided. The source of the discrepancies may relate to real-world interprofessional barriers that persist, despite the research base supporting IPE and IPP. As identified in this study, there are issues related to professional licensing, reimbursement, and workplace culture that may interfere with IPP. Faculty presenters should be mindful that professional role differences and stereotypes are real (Mandy et al., 2004) and help students practice navigating such challenges while also providing information on overcoming perceived or historical barriers (Brown, 2016; Farrugia, 2022). Giving students a secure place to freely discuss differing viewpoints and stereotypes will afford faculty the chance to clarify misconceptions around disciplinary knowledge and roles. Providing multiple perspectives and problem-based

learning are key strategies to use with adult learners (Bryan et al., 2009; Steinberg & Vinjamuri, 2014). Incorporating details into case scenarios in which the participants must address systemic barriers to IPP may be an additional way to better prepare future interprofessional practitioners. Students will benefit from opportunities to practice non-profession-specific collaborative skills such as communication, reflection, and conflict resolution (Lestari et al., 2018) in combination with their disciplinary knowledge.

Future research is needed to replicate findings of this preliminary study with a larger sample, as well as examine multiple outcomes of students participating in IPE opportunities. Although results of quantitative analyses were statistically significant and there is evidence to suggest the results are practically meaningful, we do not know the extent to which changes in attitudes and beliefs around IPP or satisfaction with the training impacts retention of information or use of IPP in the field. Understanding the proximal and distal impacts of IPE on students' knowledge and practice is important for designing effective and efficient personnel preparation activities that shape curricular programming and aligns with the findings from Reeves et al. (2016) that evaluation of IPE at Levels 3 and 4 of the Kirkpatrick model is needed. This study examined a brief training within the context of a fully developed interdisciplinary grant-funded program for SLP and EI/ECSE graduate students. Follow-up measures were not administered to determine whether changes on post-training measures were maintained beyond the actual training. Longitudinal studies following participants from students to early-stage professionals would provide valuable insight into the extent that IPE is translated to IPP (Musaji et al., 2019). Additionally, understanding the components of preservice preparation programs that support effective IPP for early-stage professionals will help support the development or refinement of preparation programs and increase the readiness of EI service providers to collaborate with other professionals and families early in their practice. Future research is needed to understand the components of IPE that may be successfully incorporated into a variety of programs of study, how trainings such as the IPP Summer Institute may enhance those efforts, and how best to measure both proximal and distal outcomes of IPE.

Limitations

It is important to consider limitations when interpreting findings of this study. First, the measure of knowledge, attitudes, and beliefs of IPP was a self-report measure delivered with a very brief amount of time between each administration. The pretest may have primed the participants for the intended focus of the IPE training. Although this may have decreased the internal validity of

the findings from a methodological standpoint, it may further support the use of a pretest in training packages to support learning in efficient ways. No direct measures of students' perspectives of IPP were administered; therefore, results may be biased due to the subjective nature and limitations of self-report measures. Reliability of closely spaced administrations of the ISVS is unknown. Findings involving the ISVS should, therefore, be interpreted with caution. Additionally, the one-group, pretest-posttest design does not allow for inferences of causal effects; therefore, confidence that the IPP Summer Institute caused changes in ISVS scores is limited. Relatedly, the study design did not allow for a "teasing apart" of content delivery from the case-based application, so it is not known if the positive outcomes were more influenced by aspects of the cases or simply from the combination of factors involved in case-based learning. Finally, as discussed previously, the recording for the one-group interview was lost due to technical errors with the audio recording. This restricted the amount of data available for the qualitative analysis addressing students' perspectives of the IPP Summer Institute.

Conclusions

Results of this study suggest that a brief IPE training implemented via case-based learning may positively impact the knowledge, attitudes, and beliefs of preservice providers toward IPP. Qualitative findings also suggest students highly value opportunities to engage with students and faculty representing multiple disciplines. Faculty may consider formal IPE training opportunities as a regular part of their curriculum to support teaming and collaboration among service providers who support young children with complex needs and their families.

Data Availability Statement

The data sets generated and/or analyzed during this study are available from the author on reasonable request and as meets the guidelines of the institutional review board overseeing this project.

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