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Designing a Conceptual Framework to Align Learning Objectives to the Interprofessional Education Collaborative Core Competencies: A Narrative Review

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Abstract

Introduction. Early placement of interprofessional education (IPE) in academic curricula may foster foundational learning to shape student attitudes, knowledge, and skills and better prepare practice-ready clinicians for future team-based collaboration. The purpose of this narrative review was to investigate and analyze the current use of IPE in OT and PT higher education.

Methods. Three databases, Academic Search Complete, Cochrane Database of Systematic Reviews, and ERIC, were searched from 2017 to 2022. Inclusion criteria were articles with full text availability, published within the 5-year search time range from the time of the narrative review process, peer reviewed studies, original research, meta-analysis studies, case studies, and review articles. Duplicates were removed, and studies were excluded if related to only clinical or practice-based healthcare delivery, community health service-learning, virtual or telehealth platforms, not applicable to the disciplines of OT and PT, or not available in English.

Results. After filtering and screening articles yielded from the literature review, a total of studies ($n = 76$) provided considerable evidence for contributing to best-practice guidelines in aligning IPE learning with student outcomes and the Interprofessional Education Collaborative Core Competencies. Substantial evidence was found, which resulted in the creation of a conceptual framework to advance IPE health science education and to meet discipline-specific IPE accreditation standards for OT and PT education. The resultant proposed IPE Conceptual Framework provides alignment of course learning objectives, accreditation standards, institutional and programmatic learning outcomes, and IPEC Core Competencies to create authentic IPE learning activities.

Discussion. This study provides a current review for IPE in OT and PT education in the United States and can have application abroad. The findings guided development of a conceptual framework for alignment of IPEC Core Competencies, curricular outcomes, and accreditation standards. Follow-up studies are recommended to validate the utilization of the proposed framework, and then subsequent research inquiry to further assess IPE effectiveness.

Keywords: curriculum development, healthcare academia, interprofessional education, occupational therapy, physical therapy

Introduction

Many healthcare-based professions have recognized the value of interprofessional (IP) collaboration in increasing delivery of more effective patient care services. Examples include nursing (Hasnain et al., 2017; Steinheider et al., 2021); medicine (MacKenzie et al., 2019; Watanabe et al., 2019); occupational and physical therapy, (Steinheider et al., 2021; Watanabe et al., 2019); and pharmacy (Kirwin et al., 2017). Interprofessional education (IPE) was established as a needed healthcare initiative after the World Health Organization (WHO) report found medical error leading to as many as 250,000 annually (WHO, 2010). Subsequent actions from organizations, such as the Interprofessional Education Collaborative (IPEC), identified IPE competencies to improve the patient care experience, improve the health of populations, and lower healthcare costs, described as the triple aim (Boyers & Gold, 2018; IPEC, 2011; Johnson, 2017; Stockert & Ohtake, 2017). IPE occurs when two or more professions learn with, from, and about one another for effective collaboration and improvement of patient health outcomes (Steinheider et al., 2021; WHO, 2010). IP collaboration occurs when multiple health workers from different professional backgrounds work together with patients, families, and communities to deliver the highest quality of care (IPEC, 2016; WHO, 2010).

As clinical knowledge and technical skills improve, learning how to collaborate within a healthcare team is essential for professional success and patient safety within the healthcare field. However, effective IP collaboration such as delivering multidisciplinary care in the critical care of patients, or recommending care outside one's own scope of practice requires understanding of one's own role as well as the roles of other members of the healthcare team. In the academic setting, students are being trained to become healthcare providers; therefore, students' attitudes need to be shaped during the academic training with an emphasis towards working as a healthcare team member and knowing the roles of others. Introducing IPE in academia is ideal as it affords students the opportunity to understand their roles and that of others and begin practicing team-based collaboration for healthcare delivery (Lairamore et al., 2018). How IPE can be most effectively taught in the classroom for healthcare preclinical students remains a debate with unresolved conclusions. Educators have accepted the challenge to craft authentic experiences to promote collaborative problem-solving and decision-making within real life-like patient encounters (Berger et al., 2019). A myriad of teaching and learning methods are being used to facilitate andragogy, or adult learning, and IPE, such as role-playing (Kirwin et al., 2017); case studies (Goreczny, 2016; Scrooby et al., 2019; Yancey et al., 2018), lectures (Goreczny, 2016; Oxelmark et al., 2017), simulations (Applebaum et al., 2020; Carson & Harder, 2016; Gellis et al., 2019; Morrell et al., 2019; Poirier et al., 2019); online simulation trainings (Kim et al., 2019; Truong, 2016); and high-fidelity

simulations (Coppola, 2019). All IPE methods have been associated with promising results for adult learners.

Before learners truly know something, according to Kolb (1984), they must genuinely experience it first and progress through the learning cycle of concrete experience, reflective observations, abstract conceptualization, and active experimentation. When developing either learning activities in a course, or entire curricula, the backwards design framework begins with the end in mind (Wiggins & McTighe, 2011). Pardue (2015) followed the tenets of backwards design in developing an IPE theoretical framework that included: (a) desired outcomes, (b) selected student groups, (c) instructional strategies, (d) evaluation, and (e) pedagogical reflection. Pardue (2015) linked this theoretical framework to the IPEC Core Competency Domains which focuses on interprofessional collaborative practice as key to safer and higher quality patient centered care. The four Core Competency Domains are: Roles and Responsibilities for Collaborative Practice; IP Communication; IP Teamwork and Team-based practice; and Values/Ethics for Collaborative Practice (IPEC, 2016).

Due to temporal, spatial, and financial barriers, most IPE experiences are single activity events that are not scaffolded, linked to, or threaded throughout the student's continuum of learning (Lairamore et al., 2018). Participating in single IPE events may prevent adult learners from transitioning through the whole experimental learning cycle (Kolb, 2014). Faculty may not have the opportunity to ensure learners achieve the desired learning outcomes (Pardue, 2015).

The recommended timing of IPE inclusion in curricula is disputed in the literature. Price et al. (2021) argued for early placement of IPE in the curricula for the disciplines of dentistry, medicine, nursing, pharmacy, and PT. The study of Price et al. (2017) highlighted IPE in PT curriculum and was helpful for the purposes of this narrative review. Kirwin et al. (2017) agreed, stating that earlier placement of IPE in the curriculum improves students' comfort levels in their professional roles as they simultaneously tackle learning how to collaborate on a team. Kolb et al. (2017) also found earlier inclusion of IPE in the curricula of nursing and medicine programs were better, as it supported addressing potential professional stereotypes and barriers during interactions between students of these professions. Reeves et al. (2012) noted agreement in their narrative review that early IPE delivery could diminish professional stereotypes. However, the authors also discovered contrasting literature supporting that later delivery of IPE was better because students had a stronger understanding of their own roles and identities as future health care professionals (Reeves et al., 2012).

Matulewicz et al. (2020), used a multi-model approach to IPE, with intentional IPE activities in the classroom and during academic clinical fieldwork, was shown to have a successful impact on learner outcomes among students (n = 243) from

dentistry, health administration, pharmacy, occupational therapy (OT), and physical therapy (PT). Nwaesei et al. (2019) found similar positive results using IPE with pharmacy and medical students (n = 39) through early implementation in the classroom, and with the same students during fieldwork or clinical rotations.

Best practice guidelines for incorporating IPE into healthcare education continue to be defined, redefined, and justified (Lairamore et al., 2018). In the academic education of OT and PT students, opportunities exist to utilize learning methods in the curricula for the training of a collaborative, practice-ready workforce (Johnson, 2017; Sabus & Macauley, 2016; WHO, 2010). However, there is no current standardization for IPE in health science education to include required content, scaffolding of content, delivery, or duration of IPE activities. A gap exists in rehabilitative health-science education regarding best practice teaching delivery of IPE-based experiences.

The purpose of this narrative review was to investigate and analyze the current use of IPE in OT and PT higher education. Kolb's (1984) experiential learning theory (ELT) guided this review. Kolb described ELT as an ongoing process beginning with engagement with new experiences and ending with the application of newly formed information from experience. Pardue (2015) described a theoretical framework in nursing curriculum for linking IPE to the IPEC Core Competency Domains of Roles and Responsibilities for Collaborative Practice, IP Communication Practices, Values/ Ethics for IP practice, IP Teamwork and Team-based Practice. Pardue described how the design and development of IPE should use backwards design (Wiggins & McTighe, 2011), beginning with the end in mind first and starting with desired learning outcomes. The literature review of this study revealed a research gap with no studies utilizing Pardue's (2015) IPE Framework in OT or PT curricula. A narrative review was the most appropriate methodological approach for this study due to the novelty of IPE in higher education healthcare academia and the diverse range of studies to answer the research question: What are best-practice guidelines in aligning IPE learning with student outcomes and the IPEC Core Competencies?

Methods

Three databases, Academic Search Complete, Cochrane Database of Systematic Reviews, and ERIC, were used in this narrative review with a combination of the following terms: "adult learning," "interprofessional education," "interprofessional education collaborative," "occupational therapy," and "physical therapy." Inclusion criteria were articles including OT and PT with IPE in academia within the search time range from 2017 to 2022, peer reviewed literature, and full text availability. Additionally, the study design, level of evidence, and primary outcomes were considered including studies or articles of original research, meta-analysis, case studies, review articles, and the associated results and findings from these studies. Duplicates

were removed and studies were excluded if they were related to only clinical or practice-based healthcare delivery, community health service-learning, virtual or telehealth platforms, not applicable to the disciplines of OT and PT, or not available in English (Table 1). The literature search and narrative review process concluded in March 2022.

Filters were used with each search to focus on relevant studies published from 2017-2022. This timeframe captured the past 5 years from the time when the narrative review process was conducted from 2019 through 2022. These searches were conducted three separate times, following the same literature review process, in January-February 2019, October-November 2020, and July-August 2021, and final compiling and review of studies in March 2022. This narrative review was conducted following the Scale for the Assessment of Narrative Review Articles (SANRA) checklist (Baethge et al., 2019). The SANRA checklist was used to provide a structure for identifying articles not used, considered, and used in the narrative review by using a scoring system (0-2) respectively. The selected articles received a score of 2 indicating that the articles: a) satisfied evidence gaps for IPE in health science academia, and b) had quality and standards that informed the development of this study's IPE Conceptual Framework.

Results

Relevant Evidence-Informed Inquiry

This narrative review utilized research from adult learning theory, IPE, and the IPEC report (IPEC, 2016), which informed the development of a conceptual framework for OT and PT education. The literature search range of 5 years produced 556 articles relevant to this inquiry. After screening abstracts and removing duplicates (n = 480), a total of 76 articles met inclusion criteria and were used for this review. The most recent evidence that connected adult learning with OT and PT was Kolb's experiential learning theory yielded 7 studies. A total of 32 studies identified matched IPE to OT and PT education. Studies on IPE with surgery, anesthesia, military, and aviation were excluded, as this information was outside the scope of practice of OT and PT. A search of various forms of IPE activities with IPEC produced 31 articles. Finally, of the potential studies on IPE Models with OT and PT, only 6 studies met inclusion criteria (Table 1).

Each category from the keyword search (Table 1) provided evidence to inform the development of the IPE Conceptual Framework from this narrative review. Evidence from adult learning provided guidance in areas such as sequential learning activities, varied experiences to meet a range of learning styles, and experiences that can be associated with real world application. These themes of adult learning provided context for the learning activities of the IPE Conceptual Framework discussed in this study. Evidence from IPE provided guidance in aligning outcomes throughout the curriculum and how these threads of alignment can carry through the institutional IPE learning outcome, programmatic learning outcome, and discipline-specific accreditation standards. Evidence from the IPEC category

provided insights on intentional development and alignment to the IPEC Core Competency Domains and sub-competencies. Evidence from the IPE model category informed of various educational models and structures for alignment throughout the curriculum to guide formation of the IPE Conceptual Framework.

Table 1. Keyword Search Results by Category

Category	Results	Keywords
Adult learning (7/124)	5/80	Experiential learning theory
	0	Pardue theoretical framework
	1/24	Physical therapy
	1/20	Occupational therapy
Interprofessional Education (32/259)	1/6	Kolb
	0	Pardue
	17/112	Physical therapy
	6/104	Occupational therapy
Interprofessional Education Collaborative (31/132)	8/37	Physical & occupational therapy
	12/102	Interprofessional Education
	5/11	Collaborative
	2/2	Simulation
	1	Simulation & debriefing
	0	Scavenger hunt
	0	Escape room
	0	Animated lecture
Interprofessional Education Model (6/41)	0	Chart review (medical / patient)
	7/9	Physical therapy
	4/8	Occupational therapy
Interprofessional Education Model (6/41)	3/35	Interprofessional Education
	1/2	Model
	2/4	Physical therapy
Total (556/5843)	76/556	Occupational therapy

Adult Learning

Experiential Learning Theory

The matching of adult learning with Kolb's ELT produced five studies. Amongst adult learners, learning styles vary dynamically, and there can be substantial change in predominant styles based upon intellectual needs or stressors present in the group (Compton & Compton, 2017). Sequencing of learning activities and events is a key factor in ELT and was found to enhance learning and to promote the transfer of knowledge from one situation to another (Bahgat et al., 2018).

Simulation is an experiential learning activity during which participants are immersed within a real life-like situation to prepare for potential future patient encounters (Beard, 2018). When using ELT, Lee et al. (2020) proposed including a pre-briefing, a simulation with trained organizers, and a debriefing reflection with trained facilitators. A post-simulation survey to assess student outcomes was also recommended for future

renditions (Lee et al., 2020). After incorporating the pre-briefing, simulation, and debriefing model, Mascarenhas et al. (2021) conducted original research in a qualitative designed study, and noted significantly improved communication skills among dental students (n = 43). No studies were identified within 5 years from when the narrative review was initiated to include a publication period from 2017-2022, that matched adult learning with Pardue's theoretical framework.

Adult Learning and Physical Therapy and Adult Learning and Occupational Therapy

Adult learning matched with OT and PT produced a total of two articles, one for each discipline. Using a case study, Ban et al. (2021) found that when students (n = 59) from nursing, OT, and PT showed their hospital name badge during patient introductions, the participants had an increased sense of belonging to the hospital and recognized improved delivery of compassionate care. In an exploratory case study, Brewer and Flavell (2018) conducted interviews and reported that when OT students (n = 10) shared workspace and time with other team members during their fieldwork rotations, the OT students had improved IP communication, better sense of equal status, and experienced more learning about and from one another.

Interprofessional Education

Interprofessional Education and Kolb

Matching IPE with Kolb, OT, and PT produced 32 studies overall. The sole study with IPE and Kolb (Kolb et al., 2017) found that, among first-year medicine (n = 44), nursing students (n = 73), chief physicians (n = 25), nursing directors (n = 8), and administrative directors (n = 21), there was a high degree of positive attitudes and approval for IPE. The study utilized a 35-item validated tool called the University of West England IP Questionnaire. The tool was categorized into four areas: communication and teamwork, IP learning, IP interaction, and IP relationships. There were no studies found that mentioned both IPE and Pardue.

Interprofessional Education and Physical Therapy

Literature on IPE and PT students participating with a range of disciplines in IPE is emerging, with 17 articles published in the past 5 years. Most reports indicated positive results of increased value for IPE (Sytsma et al., 2021); respect and knowledge for other disciplines (Cunningham et al., 2018); ability to communicate with others (Harrison-Bernard et al., 2017); and ability to articulate one's own role on the team (Harrison-Bernard et al., 2019). These outcomes improved over the timeframe of 2016-2018 from when the studies of Harrison-Bernard et al. (2017) and Harrison-Bernard et al. (2019) occurred.

Stephens and Ormandy (2018) found the best IPE learning activities focused upon professional identity, team dynamics, and

simulation with reflection. Within an anatomy course, Barton et al. (2018) used a unique case study example utilizing cadaver-based instruction of IPE. In this quantitative quasi-experimental design study, students ($n = 81$) from various disciplines in healthcare learned from and with one another by collaborating in cadaver learning modules. PT students were given additional opportunities to dissect and reinforce their anatomy knowledge through peer-to-peer teaching. IP student groups also were able to demonstrate the value of interdisciplinary collaboration in learning circles, resulting in increased communication and collaboration among participants. The primary outcomes provided quantitative data showing that 93% of the students reported that their experiences in the cadaver laboratory served to enhance their learning, and 97% reported that the use of human cadavers should be continued in future courses. To add, the facilitating faculty saw benefits from IPE learning activities including improved colleague relationships, a better sense of community, decreased segregated learning, and enhanced teaching delivery (Barton et al., 2018). Hadley et al. (2018) included the use of feedback from standardized patients and standardized patient family members ($n = 29$) in the debriefing sessions. This feedback enhanced the students' learning regarding communication, especially with word choices and voice volume.

Integrating shared decision-making for patient care was a theme that emerged from 42 mixed professional health care students' reflections (Hendricks-Ferguson et al., 2018). In this original qualitative research study, Hendricks-Ferguson et al. (2018) analyzed student perspectives of healthcare providers ($n = 42$) providing shared decision making. In another quantitative experimental design study using complex neurological cases, students ($n = 46$) representing nine different healthcare disciplines were prompted to dig deeper in their IPE groups, which increased positive attitudes towards each other, improved physical skills, and had the participants feeling more ready for clinical practice (Fenn et al., 2020). Similarly, Berger et al. (2019) reported the use of complex cases triggered the participants ($n = 67$) to come outside of their comfort learning zone and to rise to the occasion for authentic, simulated patient encounters. Original research was conducted by Mcquown et al. (2020) in large scale IPE activities. Students from nursing, nurse practitioner, medicine, pharmacy, PT, and social work ($n = 524$) from a hospital, university, and medical university generated successful outcomes (Mcquown et al., 2020). In this study, student participated in a rapid-cycle model that included online modules, in-person poster skills section, an IP team simulation, and a simulation with a standardized patient. One of the primary findings of this study showed that 92.7% of the students rated that they felt "a great extent" to "a very great extent" that their educational session helped them to appreciate the benefits of IP teamwork. However, Lairmore et al. (2019) warned that too large of a group may decrease participant satisfaction with their own professional identity, while in contrast, smaller groups improved teamwork, collaboration, and socialization among the members.

The literature has found a number of positive findings regarding simulation; however, learners reported feeling nervous performing in front of students from other disciplines (Costello et al., 2018). In addition, social positioning was found in dysfunctional IPE student teams (Price et al., 2021), with one discipline (nursing students) giving over their power during an IPE event to another discipline (medical students). One explanation could be the perception that medical students had more knowledge, and their intimidation influenced nursing students' behavior (Furr et al., 2019). In a different original research study of PT ($n = 48$) and medical students ($n = 142$), Mette and Hanze (2021) noted that, when the level of challenge in the IPE activity increased, communication became more negative. This finding was interesting to the study authors and it was discussed that typically medical students were in the majority in IP groups. Thus, PT students may have felt inclined to communicate more intensively, causing medical students to perceive negative communication. Further, this quantitative experimental design study highlighted potential imbalances of student IP groups, and the dynamics that PT students took on more of a tutor role due to familiarity with the IP learning style of this study. PT students may have not benefitted from being a learner or tutee role during the IPE group sessions. The predictor variable was significant when calculating the intensity of one's own discipline ($\beta = -0.24$, $t(104) = 2.10$, $p < 0.05$). The authors discussed that the students may have relied upon internal coping mechanisms, such as self-reliance and professional identity ego, to increase self-confidence. Interestingly, results from another original research study of 150 PT students indicated that, although IPE produced good self-efficacy in the classroom, once in the clinic, participants had lower self-efficacy, did not feel comfortable speaking up, and avoided attempts to resolve conflict (Jones et al., 2021).

Most assessments of IPE in the literature review were in English and used participants within one discipline. For example, Kirwin et al. (2017) only used pharmacy students and role-played other disciplines. This study was included to demonstrate how role playing can be used as a building block towards IP collaboration utilizing rubrics. Pharmacy students ($n = 130$) were assessed by faculty using three rubrics to assess for communication skills and attitudes when explaining medication-related questions with positive results. However, each discipline was role-played by pharmacy faculty members and not by actual healthcare team members, which may have biased the outcome. Regarding IPE and PT, Williams et al. (2018) successfully translated, validated, and implemented the Swedish version of the Interdisciplinary Education Perception Scale with students ($n = 154$) from medicine, nursing, OT, and PT.

Interprofessional Education and Occupational Therapy

The literature for IPE and OT yielded a total of 6 studies. Studies described OT students participating in a variety of IPE experiences with similar outcomes to PT students and other healthcare disciplines. With dietitian and speech and language

pathology (SLP) students, the IPE experience produced increased student satisfaction and knowledge about other disciplines while decreasing anxiety about future clinical practice (Mills et al., 2020). Hudson et al. (2017) found similar results following IPE experiences: increased satisfaction levels, understanding of others' roles, and more positive attitudes towards collaborative care. Improved professional roles, communication, collaboration, and teamwork were noteworthy in MacKenzie et al. (2017), which involved students ($n = 320$) across four disciplines. Although Steinheider et al. (2021) documented overall positive attitudes, the authors discovered the participants ($n = 367$) preferred staying within the same IPE teams during the experiences and the use of standardized patients over paper case studies to enhance their learning. An increase in mean score from pretest to posttest regarding quality and safety of patient care was found in 155 students; however, Watanabe et al. (2019), in an original quantitative research study using an experimental design found that additional preliminary IPE work was needed before implementation of the IPE experience in order to achieve attitudinal improvements in IPE communication, teamwork, and team-based learning. The study involved students ($n = 151$) from medicine, nursing, laboratory science, OT, and PT. There were significant increases in four of the five categories on the Attitudes Toward Health Care Teams; however, the authors recommended preceding learning activities of communication and leadership to provide students more concrete knowledge for patient safety (Watanabe et al., 2019). A Turkish study by Özata and Kilikcier (2021) used a descriptive and comparative design to examine health science students' readiness for IPE and determined student readiness among nutrition students, speech language pathology, dentistry, OT, PT, nursing, audiology, and medicine ($n = 561$) for IPE encounters. Using various statistical analyses including mean, median, t -test, Mann-Whitney U, and Kruskal-Wallis tests, the study found statistically significant influences on factors including the student's discipline ($p < 0.01$), mother's education level ($p < 0.01$), hospitalization experience ($p = 0.04$), and willingness to take a course with another discipline ($p < 0.01$).

Interprofessional Education and Physical Therapy and Occupational Therapy

A total of eight articles were used from the literature review for IPE and PT and OT. The use of IPE experiences with combined OT and PT students have been found to increase perceived confidence and preparation for future clinical practice (Kim et al., 2019; Manspeaker et al., 2017; Thomas et al., 2017). Wang and Ho (2020), in an original research qualitative study, interviewed students ($n = 56$) from nursing, dentistry, OT, PT, pharmacy, and medical technology. The authors argued each discipline faced different dilemmas, but that all student participants in their study felt more prepared to handle the predicted stereotyped dilemmas they would face after collaborating with future co-workers. King et al. (2017) highlighted that success of IPE in first year health science students required support from leadership and administrators. Allen et al. (2019) recommended a structured framework that allows flexibility for critical thinking and active

problem-solving for IPE. Yet, before implementation of any IPE event, Kerry et al. (2021) highlighted the importance of training-the-trainer for improving educator competence. One example was a knowledge exchange project held across Canada in which 23 OT and PT educators shared their teaching delivery and collaborated with each other to build an IPE educators community across the country (Hudon et al., 2018).

Interprofessional Education Collaborative

The literature review presented 12 studies for the IPEC. Critical development and alignment of IPE with the IPEC Core Competencies ought to be purposeful and meaningful rather than just a checklist of student outcomes (Joynes, 2018). Zorek et al. (2021) asserted that the IPEC Core Competencies have become the gold standard for planning, implementing, and assessing IPE activities. In addition, the authors described the need to develop a standardized assessment tool that measures IPE in the educational curricula and is accepted across institutions (Zorek et al., 2021). Malik and Malik (2021) emphasized the importance of clearly defining learning outcomes; involving multiple disciplines, such as nursing, pharmacy, OT, PT, SLP, and dentistry; and strategically positioning IPE in the curriculum. Malik and Malik (2021) also provided general guidance on implementation, challenges to integration, and assessments for measuring intellectual and attitudinal changes after IPE activities.

Fleming and Willgerodt (2017) described further application of IPE and IP collaboration amongst students and healthcare providers in clinical training settings. In this study, the authors described ways that nursing education programs could bridge the gap to transition students into healthcare practice using the four IPEC Core Competencies in various settings, such as IP teams, hospital settings, and in the academic setting (Fleming & Willgerodt, 2017). The four IPEC Core Competency Domains may be further sequenced in a course or curriculum for scaffolded learning by differentiating the sub-competencies into basic, intermediate, and advanced IP categories (Patel Gualdo et al., 2017). IPE studies described opportunities for faculty training and curricular workshops instructing how to effectively incorporate the IPEC Core Competencies are successfully supporting IPE initiatives (Berger et al., 2017; Joynes, 2018).

Outcomes linked to IPE attainment have also been used in recent studies. El-Awaisi et al. (2018) noticed pharmacy students ($n = 129$) had more positive and enthusiastic attitudes towards IPE and were requesting these experiences to be more formally incorporated into their curriculum. Various outcome measures can assess specific areas of student attainment. For example, King and Violato (2021) employed the Interprofessional Attitude Scale outcome measure in longitudinal studies to assess attitudes toward IPE and IP collaboration in many areas, including patient-centeredness, IP biases, diversity and ethics, and community centeredness. The extensive 3-year longitudinal study included 13 health professional programs from six health science facilities

among students ($n = 994$) from agricultural life sciences, medicine, dentistry, nursing, OT, PT, and many other disciplines.

Assessment measures may be linked directly to the IPEC Core Competencies. For example, González-Pascual et al. (2018) used selected items from a 42-item IPEC self-assessment after students ($n = 43$) psychology, pharmacy, and medicine participated in an IPE simulation and found significant improvements when the specific sub-competencies were targeted. Like Stone (1994), González-Pascual et al. (2018) recognized that students overestimated their personal competencies by scoring themselves higher on pretests compared to posttests; these students realized that they had less awareness of their abilities than they previously thought. Lockeman et al. (2021) extended the assessment tool used by González-Pascual et al. (2018) by validating the IPEC Self-Assessment Tool and categorizing responses into the “Interactions” Domain, which is composed of the IPEC Core Competency Domains of Teamwork, Roles and Responsibilities, and Communication; and the “Values” Domain, which is composed of the IPEC Values and Ethics Core Competency Domains (Lockeman et al., 2021). Cahn et al. (2018) described how a health professions institute of nursing, OT, PT, SLP, and physician assistant (PA) students ($n = 1,500$) used two simulations linked to the IPEC Core Competency Domains of Roles and Responsibilities and IP Communication.

Pretest-posttest measures and single post-event measures have been administered in a combination of ways to assess student attainment of specific IPE areas, such as during a single IPE event or a series of IPE learning activities. Richard et al. (2019) in a realist review article identified the use of simulation as a single learning activity to successfully implement IPE. In an original quantitative experimental design study by Simko et al. (2017), a series of multiple learning activities, such as case studies, multiple simulations, lecture presentations, assignments, care planning, and small or large group discussions, have also been found effective in higher education. Students from various disciplines ($n = 60$), had reported increased post-test scores after participating in a series of IPE activities with a significant change on the Interdisciplinary Education Perception Scale ($p = 0.019$) for nursing students and ($p = 0.007$) for pharmacy students. For the Collaboration and Satisfaction about Care Decisions, there was a similar statistically significant increase for nursing students ($p < 0.001$) and among pharmacy students ($p < 0.001$).

Interprofessional Education Collaborative and Simulation

The literature in the narrative review included a total of 5 studies. IPE and simulations have been employed in many IPE studies with a variety of methodologies (Appelbaum et al., 2020; Morrell et al., 2019; Poirier et al., 2017). Video recordings of simulations for a quantitative research design allowed researchers to rewind and replay scenarios that occurred in the IPE simulation and to evaluate student performance using the IPEC Core Competencies (Poirier et al., 2017). Appelbaum et al. (2020) used a high-fidelity mannequin programmed to have a significant decline in clinical

status during the simulation. The performance of participating final-year nursing and medical students ($n = 243$) suggested that psychological safety and power distance have an underlying effect on attaining knowledge and skills for IP collaboration.

Simulation is frequently used within a series of IPE learning activities (Humbles et al., 2017; Simko et al., 2017). Humbles et al. (2017) shared anecdotal results from a pretest-posttest design of an educational series involving a case study with diabetes management that included a lecture, four clinical setting simulations, and a debriefing. The researchers noted that, as a result of participating in the IPE, nursing students were able to apply concepts brought by other health professions, openly discussed various scenarios about the immediate community, were reminded of epidemiology, and had a much better understanding how to collaboratively target healthcare issues.

To examine the effect of power distance, such as the perception of role hierarchy, team cohesion, and psychological safety (the belief that one can speak up without fear of negative consequences), Applebaum et al. (2020) used a mediator variable in their quantitative IPE study. The results suggested that power distance between professional roles may affect team dynamics and impair psychological safety (Applebaum et al., 2020).

Interprofessional Education Collaborative and Simulation and Debriefing

Harrison-Bernard et al. (2017) utilized simulation with debriefing techniques incorporating the IPEC Core Competency Domains of “IP Communication” and “Roles and Responsibilities” and recorded a statistically significant improvement in the learners’ IPEC Core Competency scores. In a follow-up longitudinal study among PA and PT graduate students, Harrison-Bernard et al. (2019) used pretest and posttest measures after students ($n = 74$) participated in IPE clinical case studies, small group activities, and class discussions. The authors reported a statistically significant improvement regarding “Roles and Responsibilities” in each of the PA and PT students’ scores in regard to renal physiology (Harrison-Bernard et al., 2019). No studies were found that combined IPEC Core Competency Domains with escape rooms, animated lectures, or chart reviews.

Interprofessional Education Collaborative and Scavenger Hunt

There was only one study that included the use of a scavenger hunt as an IPE learning activity. In a short report study, Singh et al. (2019) used a scavenger hunt to identify patient safety items in a hospital setting, surgical room, and pediatric office. IP students ($n = 575$) from healthcare disciplines participated in a four-month academic course and collaborated to identify all patient safety issues in these various settings. Quantitative data from the study revealed higher mean scores from 2015 to 2016, indicating improved student understanding of roles, respect, and scope of practice of other disciplines, increased effective communication,

and understanding of teamwork for patient safety (Singh et al., 2019).

Interprofessional Education Collaborative and Physical Therapy

The literature yielded 7 studies for IPEC and physical therapy demonstrating effectiveness for IPE learning activities including case studies, training experiences, pro bono clinics, and service-learning opportunities. Case studies, when used with simulations, group discussions, or community engagements, had significant increases in the utilized IPEC Core Competency Domains. (Harrison-Bernard et al., 2017, 2019). Isolating one or two of the IPEC Core Competency Domains when evaluating IPE simulation activities has resulted in positive and statistically significant changes in competency scores, especially when the simulations have incorporated case studies with physical therapy students (Harrison-Bernard et al., 2017, 2019).

Gellis et al. (2019) utilized a battery of tests including the Attitude Toward Health Care Teams Scale, Team Communication Self-Efficacy, and IP Collaboration Scale to demonstrate the efficacy of IPE education. A total of 111 participants indicated a 97.3% satisfaction rate using pre-post training surveys with better attitudes and greater self-efficacy during team communication.

Other possibilities for IPE are pro bono clinics and service-learning opportunities. A pro bono clinic, as defined by Charrette et al. (2020), is a clinical practice setting used in healthcare education and clinic-based programs providing services at no charge to participants. The pro bono clinic in this study focused on providing services primarily to older adults to reduce fall risk through group therapy sessions scheduled twice a week for 75 minutes. Reflections and feedback among PT and pharmacy students could be coded within the four IPEC Core Competency Domains. Results indicated that a pro bono clinic served dual purposes: providing free therapy services to local community members, and modeling IPE among key faculty members the students could observe (Charrette et al., 2020). International service-learning opportunities promote IPE and needs-based community collaboration abroad. Fell et al. (2019) examined an international service IPE activity in Trinidad that involved students from medicine, PA, nursing, OT, PT, and audiology (n = 31). The researchers linked IPE outcomes to the IPEC Core Competency Domains of “Value/Ethics” and “Roles and Responsibilities.” Fell et al. (2019) found little improvement in these domains, which affirmed similar findings of Stone (1994) and González-Pascual et al. (2018) who speculated the lack of improvement could have been due to students scoring themselves high on pre-test self-efficacy measures.

Interprofessional Education Collaborative and Occupational Therapy

The literature review yielded a total of four studies for IPEC and OT. One of the studies from the current literature for IPEC and

OT used various outcome measures, such as the IPEC Competency Self Efficacy Tool (IPECC-SET), which consists of 38 items; revised and shorter outcome tools for the IPECC-SET 27, consisting of 27 items; and the IPECC-SET 9, consisting of 9 items (Kottorp et al., 2019). In this rigorous study, participants from 11 different health professional programs (n = 1,354), including dentistry, medicine, nursing, OT, PT, social work, and pharmacy, refined and validated the IPECC-SET 27 and IPECC-SET 9. The results indicated that both the IPECC-SET 27 and IPECC-SET 9 were valid and reliable for student assessment of the four IPEC Core Competencies. The authors suggested that different lengths and versions of the tool should be selected to mitigate participants dropping out of the data collection due to extensive questions (Kottorp et al., 2019).

In a similar study, Frost et al. (2019) justified the IP Professional Assessment as a valid tool used to rate observed IP skills, such as professionalism and collaboration, when working with other healthcare providers to provide people-centered care. Over an extensive period of several years, participants (n = 205) from 12 entry level professions, including medicine, nursing, pharmacy, OT, PT, and SLP, developed and validated the 26-item tool to measure across six IPEC Core Competency themes: “Altruism and Caring,” “Excellence,” “Ethics,” “Respect,” “Communication,” and “Accountability” (Frost et al., 2019).

Extensive collaboration across disciplines and professions helped to mitigate IPE issues. This recommendation for multiple simulations was further supported by Morrell et al. (2018). Their IPE simulations had positive qualitative and results on student outcomes among athletic training, nursing, and OT students (n = 79) when simulation performance was tied to themes related to the IPEC Core Competencies such as: “Collaboration,” “Respect,” “Knowledge of Other Professions,” and “Communication.”

Interprofessional Educational Model

Limited information was available on the use of IPE models within OT or PT education. Scrooby et al. (2019) followed a constructivist approach for first-year students in an anatomy class and developed IPE competencies for leadership, communication, professional identity, collaboration, conflict management, and teamwork. To guide simulation development for IPE, Lucas et al. (2020) proposed using a simulation planning template, debriefing guidelines, and involving additional stakeholders, such as confederate nurses, standardized patients, and standardized family members, to authenticate the IPE activity. The use of confederates and standardized individuals made their simulations more authentic and realistic. Lucas et al. (2020) described a Reflective IPE Network Model and provided both templates to guide navigate the development of simulations and a guide to use during the IPE process. Additionally, the University of Virginia created the ASPIRE Model for IPE and IP Collaborative Practice utilized education experiences mapping the IPEC Core Competencies with three curricular content areas: practical tools,

leadership, and relational factors with positive results on initial implementation (Brashers et al., 2019). Cahn et al. (2018) also described the use of the IMPACT Practice Model to highlight the troubles of teaching IPE when a course had too many unnecessary and uni-professional competencies. The IMPACT Practice Model used multiple simulations to introduce IPEC Core Competencies and to create a greater reinforcement effect. The IMPACT Practice Model also suggested other implementation strategies to frame IP competence in a purposeful and meaningful way so IPE was not simply added on to existing curricula (Cahn et al., 2018). Additionally, Cahn et al. (2018) advised educators to be aware of unbalanced skill competencies of one discipline that are over-emphasized, as the lack of balance could interfere with IP collaboration and team-based care. This situation distracts from the purpose and nature of the IPE and provokes problems between IP coordinators. To mitigate potential challenges, Yancey et al. (2018) recommended forming communities of practice by working within smaller groups of students in both classroom and clinical settings.

Interprofessional Education Model and Physical Therapy

The current literature yielded similar findings regarding IPE models and PT. Among the suggestions for IPE program sustainability, Lucas et al. (2020) suggested that former students could serve as volunteer mentors for current students. This peer-to-peer collaboration would help build community and mentorship within a discipline and reinforce learning as students progressed in their curriculum. Reflection over time could also help students gain deeper perspectives towards IPE (Lucas et al., 2020).

Interprofessional Education Model and Occupational Therapy

The literature resulted in similar findings for IPE models and OT. In particular, Yancey et al. (2018) described the need for students to develop a sense of “dual identity” to become stronger IP collaborative practice-ready clinicians. A dual identity was defined as encompassing both a distinct discipline-related identity and an identity with being a team member in a particular setting (Yancey et al., 2018). Improvement of attitudes, knowledge, and skills is the overall goal when incorporating IPE into courses and curricula. Sy (2017) discovered that, among 189 OT (n = 100), PT (n = 56), and SLP (n = 33) participants, students who had engaged in IPE activities during their education had more positive attitudes towards IP collaboration in clinical practice.

Discussion

The main purposes of this narrative review were to analyze and synthesize current knowledge on IPE in higher education health science academia and to answer the research question: What are best-practice guidelines in aligning IPE learning with student outcomes and the IPEC Core Competency standards? This study revealed themes and guidance to facilitate alignment of IPE

learning activities, course learning objectives, institutional and programmatic outcomes, accreditations standards, and IPEC Core Competencies. Though the narrative review was limited to a five-year period (2017-2022), there is a continued stream of studies currently being published that could contribute to the development and successful implementation of IPE in the training of healthcare providers. The synthesis of the findings from this narrative review identified emerging themes and guidance that were used to inform development of a conceptual framework that can promote sustainable IPE learning and alignment of outcomes across the student academic progression. This framework is the first to describe educational strategies to align student objectives, institutional and programmatic outcomes, accreditation standards, and IPEC Core Competencies in OT and PT curricula. The proposed framework may also be utilized by other healthcare institutions and other disciplines to support educational and curricular alignment.

Development of the IPE Conceptual Framework

The literature review findings were used to design a conceptual framework for IPE that was informed by evidence and aligned institutional and programmatic learning objectives, accreditation standards, and IPEC Core Competencies (IPEC, 2016) using the Backwards Design method (Wiggins & McTighe, 2011). Prior to implementing IPE in healthcare academic programs, stakeholders must consider which students, which courses, where in the curriculum to start, and how to scaffold and thread for programmatic and institutional best practice delivery. This multi-step process was used to create authentic IPE learning activities and measurable outcomes.

The first step was determining institutional, programmatic, and course learning objectives for the students. Organizational accrediting bodies, such as the Accreditation Council for Occupational Therapy Education (ACOTE) and Commission and Accreditation in Physical Therapy Education (CAPTE) require the integration of IPE within the respective curricula of OT and PT programs in the United States (Harrison-Bernard et al., 2017). Many accreditors in healthcare education are adding criteria that requires the integration of IPE in the curriculum in the United States and abroad. For example, ACOTE has adopted IPE standards for OT education for students to demonstrate knowledge of principles of IP team dynamics to perform effectively in different team roles (ACOTE, 2018). Similarly, CAPTE requires PT education programs to include learning activities directed toward developing IP Core Competencies in Values and Ethics, Communication, Roles and Responsibilities, and Teamwork (CAPTE, 2019). Malik and Malik (2021) emphasized the importance of clearly defined learning outcomes, strategic alignment in the curriculum, and involvement of faculty from all included disciplines that begins during the early IPE planning stages.

The second step was outlining the IPEC Core Competencies and selecting sub-competencies with deliberate IPE activities. The IPEC Core Competencies include four Domains of Teamwork, Roles and Responsibilities, Values and Ethics, and Communication. Each of the Core Competency Domains has associated sub-competencies. When educators are designing IPE activities, intentional selection of the desired outcomes should include alignment with specific sub-competencies within the desired Domain. For example, if an educator wanted to emphasize the IPEC Domain of Communication, one sub-competency that might be selected is for students to use respectful language appropriate for a given difficult situation or conflict (IPEC, 2016). Studies suggest that there is wide adoption of IPEC Core Competencies as the gold standard for designing, planning, and implementing IPE (Zorek et al., 2021). The sub-competencies of the IPEC Core Competencies Domains can be further categorized into basic, intermediate, and advanced levels of student attainment (Patel Gunaldo et al., 2017). In addition, linking the learning activities to the desired learning objectives is essential for curricular alignment and to meet accreditation criteria. To add to the example provided earlier for the IPEC Domain of Communication, the educator may design a simulation with a standardized patient and family member to discuss a difficult situation regarding a transition into hospice care. Healthcare educators and program directors may confront significant challenges when considering how, when, and where to implement IPE in courses and across curricula. Time constraints, scheduling challenges, limited faculty availability, training sessions, commitment of time and resources, and faculty workload considerations will also need to be addressed.

The third step was selecting the most appropriate outcome measure tools to determine effectiveness. Malik and Malik (2021) described various outcome measures directly assessing the effects of IPE and how changes in students' knowledge, skills, or attitudes could assess success of the IPE activity implementation. Several tools can be considered in the utilization of the model proposed in this study. Among the many IPE outcomes or tools to be considered include the IPEC Self-Assessment Tool (Lockeman et al., 2021); IP Attitude Scale (King & Violato, 2021); IP Professionalism Assessment (Frost et al., 2019); Attitude Toward Health Care Teams Scale, Team Communication Self-Efficacy Scale, IP Collaboration Scale, and the Training Satisfaction Survey (Gellis et al., 2019); 42-item IPEC Self-Assessment (González-Pascual et al., 2018); and IPECC 9 (Kottorp et al., 2019). Each one was assessed for their pros and cons prior to implementation and the IPEC Self-Assessment was utilized for the OT and PT IPE. One of the recommended outcome measures for use for IPE assessment was from Lockeman et al. (2021), the IPEC Self-Assessment Tool. The tool has been validated and utilized in several IPE studies (Dow et al., 2014; Lockeman et al., 2016; Roberts et al., 2019) with positive results. Additionally, the tool allows students to self-assess their IPE behaviors across multiple Core Competency Domains including "Values" and

patient "Interactions" including behaviors such as communication and roles and responsibilities.

The final step was assessing the effectiveness of each learning activity and adjusting them accordingly to ensure the institutional IPE learning outcomes were being met. The following learning activities based on empirical evidence from the cited studies may promote IPE learning with potential positive results. The literature provided many examples effective in promoting IPE to include simulation, IP case study collaborations, case conferences, role-playing, and lectures. Simulation is widely used in many studies for IPE learning (Beard, 2018; Gellis et al., 2019; Humbles et al., 2017; Poirier et al., 2017; Morrell et al., 2018). Additional learning opportunities include lectures (Humbles et al., 2017), scavenger hunts (Singh et al., 2019), and case studies (Scrooby et al., 2019). Simko et al. (2017) offered multiple learning activities in a sequenced manner using case studies, presentations, assignments, and care planning. In another multiple modality model, Harrison-Bernard et al. (2019) introduced clinical cases, small group discussion, large Post-it notes, and class discussions.

Challenging students in meaningful ways and having IP students learning from, about, and with one another fosters the development of collaboration skills and attitudes necessary for shared healthcare decision making. Successful educational planning would allow students to engage in IP learning activities that shape their attitudes, knowledge, and skills so they are prepared to enter the workforce as practice-ready clinicians and collaborators. See Figure 1 for the depiction of the resulting IPE Conceptual Framework.

Implications and Limitations

This narrative review synthesized current evidence on IPE, IPEC Core Competencies, and OT and PT academia. The resulting conceptual framework, informed by evidence and supported by adult learning theories, may be a useful tool to guide IPE curriculum designers. This study was limited to OT and PT academia with IPE and the use of IPEC Core Competencies. Further studies can explore the development and assessment of multiple learning activities in an IPE educational model to determine the level of transfer from classroom IPE instruction into collaborative clinical practice.

Conclusion

This narrative review synthesized current evidence on IPE, IPEC Core Competencies, and OT and PT academia. The resulting conceptual framework, informed by evidence and supported by adult learning theories, may be a useful tool to guide IPE curriculum designers. Further studies can explore the development and assessment of multiple learning activities in an IPE educational model to determine the level of transfer from classroom IPE instruction into collaborative clinical practice.

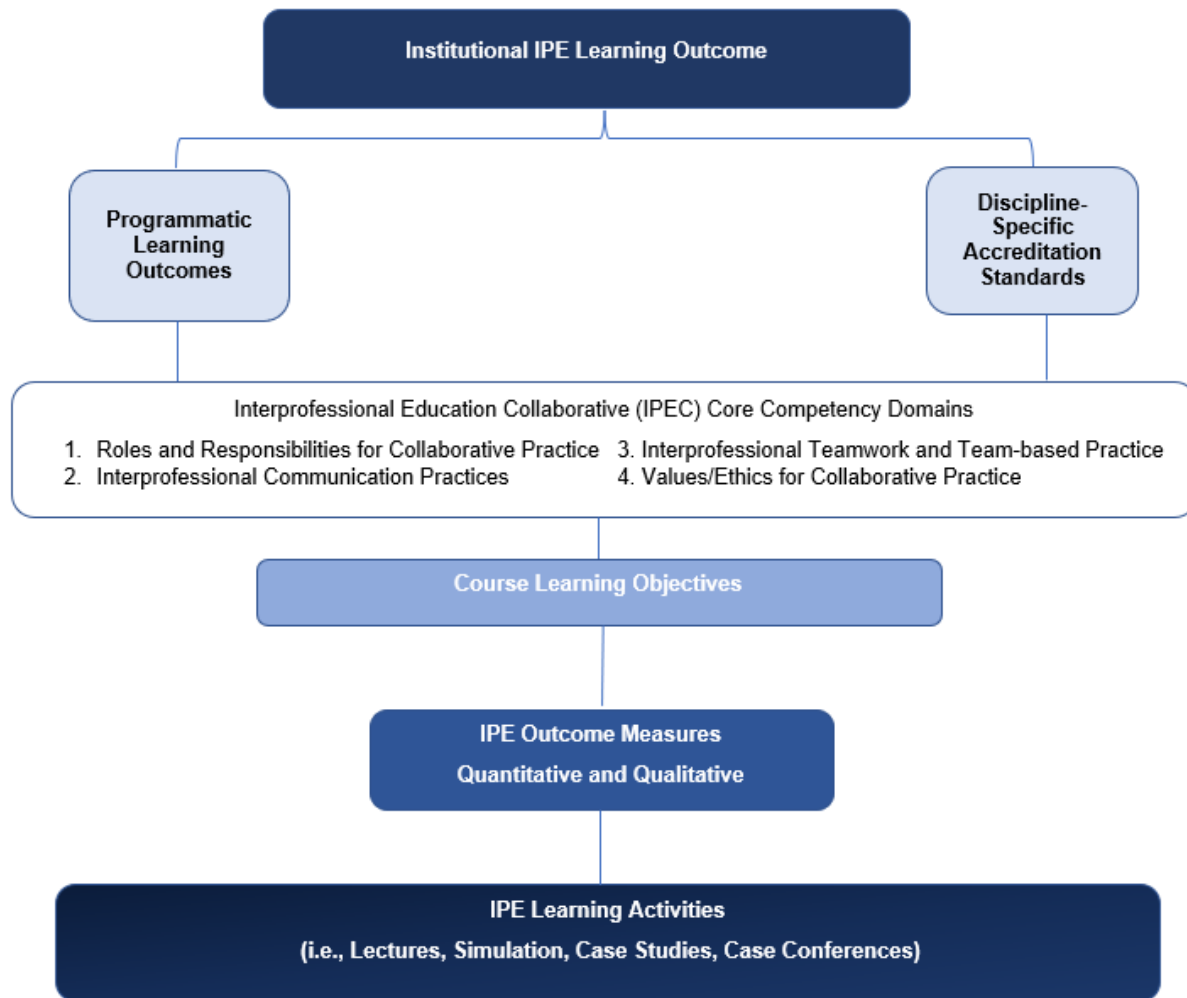


Figure 1. IPE Conceptual Framework for alignment in curricular design

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