

Conceptual Framework

We have identified key interrelated components central to the Interprofessional Learning Continuum model to include the IPEC® core competencies (IPEC, 2016), Kirkpatrick outcomes model and modern validity theory (Messick, 1989). The Interprofessional Education Collaborative (IPEC®) core competencies provide a competency framework (IPEC, 2016). The Kirkpatrick model outlines a structure for categorizing outcomes (Kirkpatrick & Kirkpatrick, 2016). Lastly, the 5 claims of validity used in modern validity theory are a key component to support the use of evaluation data. Together, these frameworks support not only educational design but also defensible interpretation of evaluation data.

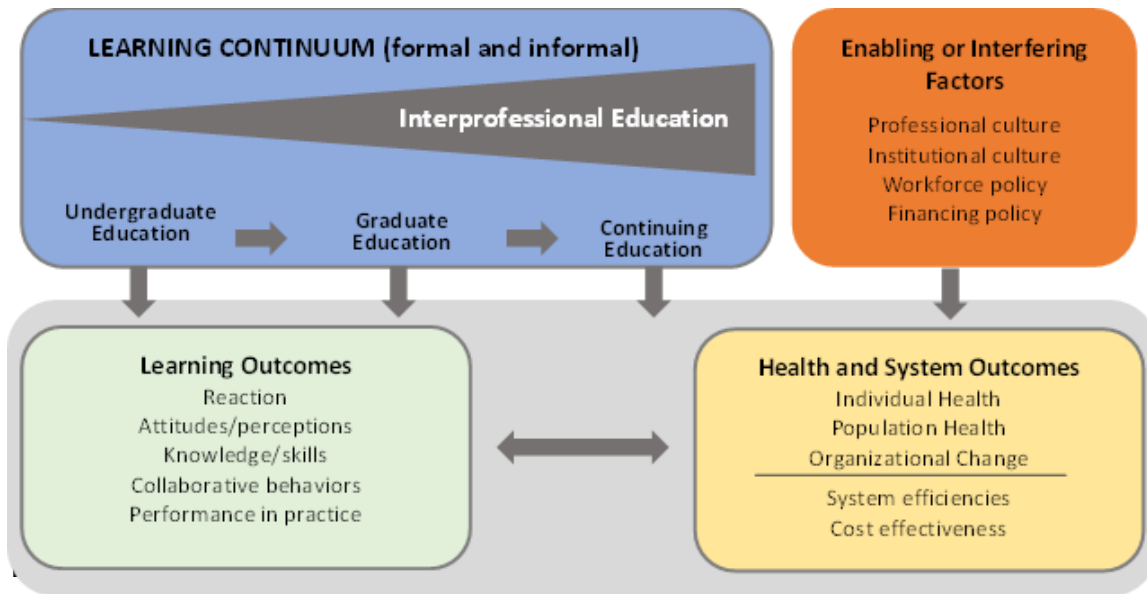
Interprofessional Continuum of Learning (IPCL)

The IOM (2015) report, *Measuring the Impact of Interprofessional Education on Collaborative Practice and Patient Outcomes* disclosed that “in reviewing the IPE literature... the committee identified numerous gaps in the evidence linking IPE to patient, population, and/or system outcomes” (p. 2) and made a call to action around the widespread adoption of a conceptual framework to support interprofessional education across the lifelong learning continuum from pre-licensure (undergraduate and graduate) to post-licensure (continuing education). In this context, the IOM introduced the interprofessional practice learning continuum (IPLC) to create a framework that links interprofessional education with health and system outcomes and ensures that interprofessional learning occurring in the pre-license educational setting is connected and reinforced in the post-licensure setting (i.e., practice).

The IPLC model describes short-term learning outcomes for individuals and teams and includes distant changes in health and system outcomes. In this way, the IPLC model views performance in practice as an outcome beyond collaborative behavior towards a possible link to health and system outcomes (Ashenbrenner, Ast and Kirch, 2015; IOM, 2015). For this reason, the IPLC model considers key factors in culture and policy that may hinder the evaluation of IPCE interventions, directly or indirectly, and subsequently obstruct the alignment between the education and healthcare delivery systems (Cox et al., 2016; IOM, 2015; Reeves et al., 2017).

Figure 2

Interprofessional Continuum of Learning (IPCL) Conceptual Framework



In 2010, the Interprofessional Education Collaborative (IPEC) convened an expert panel of interprofessional educators to develop core competencies across four domains: values and ethics, roles and responsibilities, interprofessional communication, and teams and teamwork (IPEC, 2011). These competencies marked a significant step in recognizing the importance of interprofessional collaborative practice (IPCP) and in guiding educational efforts to prepare health professionals to work together toward a patient-centered, community- and population-focused U.S. health care system. The competencies were updated in 2016 to emphasize population health and the continuum of learning from pre-licensure to post-licensure practice, and they are now widely accepted as the foundational framework for interprofessional continuing education (IPCE) (IPEC, 2016).

Within this framework, competence reflects knowledge applied in practice, while performance represents competence enacted in real-world settings; outcomes, such as patient and system outcomes, are therefore consequences of performance. Accreditation organizations, including ACCME, ACPE, ANCC, and Joint Accreditation, are grounded in this competency-based approach (ACCME, n.d.). Joint Accreditation Criteria™ require IPCE activities to be developed around interprofessional competencies (JAC 8) and to assess changes in skills, strategies, and performance at the individual, team, or patient level (JAC 11) (Joint Accreditation, 2021).

The Interprofessional Learning Continuum (IPLC) model further situates individual and team learning outcomes as proximal effects of education, with more distal effects on health and system outcomes. In this context, while interprofessional competencies are developed through individual learning, their expression through collaborative performance is essential for linking IPCE to higher-level outcomes (Ashenbrenner, Ast, & Kirch, 2015; IOM, 2015).

Table 1

IPEC Competencies

Values and ethics for interprofessional practice (VE)	Work with individuals of other professions to maintain a climate of mutual respect and shared values. Sub competencies: - VE1 – Place the interests of patients and populations at the center of care delivery - VE7 – Demonstrate high standards of ethical conduct and quality of care
Roles and responsibilities (RR)	Use the knowledge of one’s own role and those of other professions to appropriately assess and address the health care needs of patients and populations. Sub competencies: - RR1 – Communicate one’s roles and responsibilities clearly - RR2 – Recognize one’s limitations in skills, knowledge, and abilities - RR3 – Engage diverse professionals/resources as appropriate - RR4 – Explain roles and responsibilities of team members - RR5 – Use the full scope of one’s profession to provide safe, effective, and equitable care - RR6 – Communicate with team members to clarify responsibilities - RR7 – Forge interdependent relationships within and outside the health system - RR8 – Engage in continuous professional and interprofessional development
Interprofessional communication (IC)	Communicate with patients, families, communities, and professionals in a responsive and responsible manner.
Teams and teamwork (TT)	Apply relationship-building values and principles of team dynamics to deliver safe, efficient, and equitable care. Sub competencies: - TT3 – Engage self and others to manage ethical dilemmas and system challenges - TT4 – Integrate knowledge and experience of multiple professions - TT5 – Apply leadership practices that support team effectiveness - TT6 – Engage team members in shared problem-solving - TT8 – Reflect on individual and team performance for improvement

Kirkpatrick Model

The use of an evaluation model helps to capture a broad range of evaluation data in IPCE that leads to more comprehensive outcomes (Joint Accreditation Leadership Summit, 2017; Reeves et al., 2016). To this point, the Kirkpatrick Model (Table 2) of categorizing outcomes defines learning outcomes at four levels of change: reactions (level 1), knowledge/skills (level 2), behavior (level 3), and performance (level 4), where each level builds on the previous level. In the context of interprofessional education, Barr et al. presented a modified model of Kirkpatrick’s levels whereas level 2 is expanded to separate attitudes/perceptions (2a) and knowledge/ skills (2b). Level 4 is expanded to include specific types of outcomes including changes in healthcare systems (4a) or improved health outcomes of patients (4b). As shown in Table 2, in the modified Kirkpatrick Model, attitudes, knowledge and skills translate to levels 1, 2a and 2b whereas behavior, practice and changes in patient or system outcomes are levels 3, 4a and 4b (Barr et al., 2005).

Table 2
Expanded Kirkpatrick Model

Level 1: Learner reactions	Learners' perceptions of the quality, relevance, and overall effectiveness of the activity.
Level 2a: Modifications of attitudes/perceptions	Changes in attitudes or perceptions toward other professions and the value of team-based care.
Level 2b: Acquisition of knowledge/skills	Gains in knowledge and skills related to interprofessional practice and application to professional roles.
Level 3: Behavioral change	Transfer of learning to the practice setting, reflected in changes in professional practice.
Level 4a: Change in organizational practice	Broader changes in organizational processes or the delivery of care.
Level 4b: Benefits to patients, families, and communities	Improvements in patient, family, or community health and well-being.

Reliability and Validity

A lack of well validated measurement tools is a barrier to linking IPCE to higher-level health and system outcomes (IOM, 2015). To paraphrase Schmitz & Cullen (2015), a lack of existing tools in the field of IPCE is not a problem, however, understanding whether tools are measuring the right things; whether the results are reliable; or whether the results are sufficient to inform decision making. Reliability requires measurement testing to examine the data generated by the tool and document validity evidence. To this point, the results cannot be considered valid if the scores are not reliable. Still, it is possible for an evaluation tool to generate very reliable scores that do not lead to more accurate decision-making or better outcomes. For this reason, the process of determining reliability and validity (i.e., validation) is a result of the full assessment process including how the data generated by the tool are used (Schmitz & Cullen, 2015). Essentially, it is not appropriate to refer to the validity of a tool, instead validity should refer to an interpretation of the scores (AERA, APA, & NCME, 2014; Messick, 1989; Schmitz & Cullen, 2015; Schmitz et al., 2017).

The validation process begins with a set of claims (hypotheses) about what the scores mean that are tested through a process of collecting and analyzing data to document validity evidence. To this point, it is important to note that validity can never be proven; but evidence can strengthen or rebut validity claims. Modern validity theory incorporates five validity claims: Claim 1 (content), Claim 2 (response process), Claim 3 (internal structure and reliability), Claim 4 (relations to other variables), and Claim 5 (consequences) (Messick, 1989, AERA, APA, & NCME, 2014; Schmitz & Cullen, 2015; Schmitz et al., 2017). Table 3 describes the five validity claims and expected evidence.

Claim 1 (content) and Claim 2 (response process) focus on the development of the tool (Archibald, 2014). Evidence to support content validity refers to the steps taken to assure that question items represent the construct they are intended to measure. Without content validity, the tool may not align with the intent of the evaluation (Schmitz et al., 2017). Response process ensures the learner's response reflects an expected response that aligns with the intention of the evaluation. Evidence should demonstrate that the learners understand the question items (Schmitz et al., 2017). It is notable that evidence of response process is not whether participants answer correctly or incorrectly (Schmitz & Cullen, 2015). Internal structure evidence evaluates the relationships of individual assessment items with each other and with the overarching construct(s) (Cook & Hatala, 2016; Schmitz & Cullen, 2015; Schmitz et al., 2017). Much of the focus on internal structure is on reliability (Schmitz et al., 2017). In general, every measurement tool should provide validity evidence for Claims 1-3 (content, response process, and internal structure) (Schmitz and Cullen, 2015).

Moving towards Claim 4 (relationship to external variables) and Claim 5 (consequences of assessment) is dependent on the intention of the measurement tool. These claims give meaning to the scores. Relationship to external variables seeks to understand how the scores relate to the world outside the measurement tool. Evidence should evaluate this relationship (e.g., positive or negative, strong or weak) (Cook & Hatala, 2016; Schmitz & Cullen, 2015; Schmitz et al., 2017). And consequences of the assessment evaluate the extent to which the data leads to better outcomes (e.g., health and system outcomes). Evidence of consequences of the assessment looks at the impact (e.g., is it beneficial or harmful?) of the tool itself and the subsequent decisions and actions. The extent of evidence required will vary depending on the measurement tool and the claim of how it will be used (Cook & Hatala, 2016; Schmitz & Cullen, 2015). Schmitz & Cullen (2015) provide practical insight:

“Speaking practically, tools being used for high-stakes assessments, evaluations or for research require more validity evidence than instruments being used for low-stakes purposes in local settings. Many learner assessments and most course evaluation tools, for example, fall into this category. Even here, however, validity evidence may be important if the assessment or evaluation tool is to be used across IPE offerings; if it is testing a theory of IPCP development (for example) over time; or if it seeks to build on existing research or contribute to new (generalizable) knowledge” (p.12).

Table 3

Modern validity theory: 5 Claims of Validity

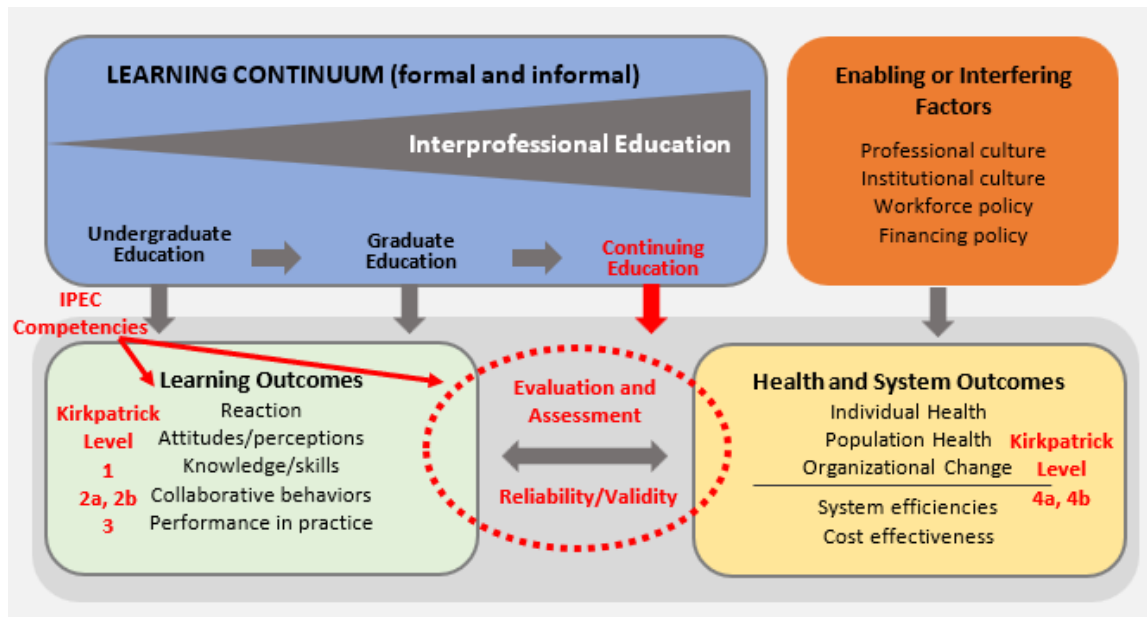
Claim	Description	Examples of expected evidence in CE
Claim 1: Content	Represents an intended set of constructs.	<ul style="list-style-type: none"> • Written by experts • Based on theory • Mapped to competencies
Claim 2: Response process	Learners understand the questions.	<ul style="list-style-type: none"> • Cognitive interviews or other method to ensure the learners understood the question items.
Claim 3: Internal structure	Questions correlate highly. Focus is on reliability.	<ul style="list-style-type: none"> • Internal consistency reliability (Cronbach’s alpha) • Factor analysis (exploratory and confirmatory)
Claim 4: Relationship to external variables (data)	Understand how questions relate to the world outside the measurement tool. Are the scores confirmed with other evidence?	<ul style="list-style-type: none"> • Convergent validity: Scores from measurement tools measuring self-reported attitudes correlate with observations in work-based assessments. • Discriminant validity: Groups of people who would be expected to score differently, do so. • Predictive/criterion-based validity: Do the opinions from a self-report measurement tool predict future attitudes, choices, or performance?
Claim 5: Consequences of Assessment	The ultimate benefit of the assessment	The use of scores leads to more accurate decision making, improved planning, or better outcomes.

A well-developed measurement tool is not the result of a “one and done” validation process. The data generated by the tool should be examined and re-examined over time. As described in Practical Guide Volume 3: Steps for Developing an Assessment Plan, the validation process should be outlined in an assessment plan that includes such things as: the purpose; target audience; what is being assessed (i.e., which competencies; knowledge, skills, attitudes, and behaviors); how the assessment data will be collected; and how the results will be analyzed, disseminated, and used (Schmitz et al., 2017).

Rationale (linking it all together)

We contend that Joint Providers must build upon the IPLC model by incorporating key components of IPCE including the IPEC® core competencies, evaluation and assessment strategies, the Kirkpatrick outcomes model and the 5 claims of reliability and validity. As depicted in Figure 3, these components build a conceptual framework to generate reliable data that offers learners the opportunity to assess individual interprofessional competencies, identifies enabling and/or interfering factors impacting health and system outcomes and provides key information to inform a feedback loop between the education and healthcare delivery systems.

Figure 3
 Revised Conceptual Framework



Together, the revised conceptual framework informed a logic model to organize and explain the key components and interrelationships between learning and changes in skills/strategy (competence) and/or performance and/or patient outcomes to guide an evaluation component (e.g., survey) at the activity level to gather and analyze data and conduct an overall program analysis.