Assessing and Enhancing the Skills of Interprofessional Practice Facilitators: Clinical and Educational Applications

Dissertation Submitted by:

Cindy Bravo

Dissertation Committee:

James Scott Parrott, PhD (Chair)

Kim Fenesy, DMD

Albert Heuer, PhD, MBA, RRT

Carma Bylund, PhD

Alan Cooper, PhD, MBA

Abstract

Institutions of higher learning and healthcare organizations are charged with providing and supporting interprofessional education and collaborative practices for the central purpose of improving patient care quality. These efforts are complex and require that leaders provide the necessary resources to ensure successful outcomes. The most critical of these resources are the facilitators who provide guidance at every step of the process, supporting teamwork dynamics, and ensuring the alignment of strategic goals and objectives. Considering the implications of poor facilitation, it is important they receive comprehensive, targeted assessment-based training that includes performance feedback. The literature concerning the facilitation of interprofessional teams provides limited guidance to stakeholders. This dissertation research contributes to this area of study by exploring the literature for the facilitation skills and competencies that contribute to best practices, as well as by describing the development and testing of two comprehensive, contextually designed facilitator performance assessment instruments. This research is intended to be used as a resource for stakeholders in the development of facilitator training programs.

Dedication

For my daughters, Sofia and Victoria, who supported me through the toughest of times and helped me celebrate the successes each step of the way. My hope is that this has served as an example of perseverance and resilience regardless of the challenges that life presents. For my loving mother, who is my earliest influencer, showing me that hard work pays off and to not let anyone stop me from being successful. For Professor Johnson, who has always believed in my potential, and provided me with mentorship throughout my career, inspiring me to teach, and to continue with my education. He has also has provided me with the love and support of a father, and for this I am eternally grateful. And finally, for my chair, Dr. Parrott, without whom this research would not be possible. His dedication to my development as a researcher and his continuous support throughout each phase of this journey has not only been exemplary, however, it has provided me with a critical set of skills that will continue to have a major impact on my life as a researcher, and educator.

Acknowledgements

I would like to thank Dr. Denmark for providing the strategic pathway for each stage of this journey and for contributing his expertise to this research. I thank Dr. Heuer for his support and contribution to this research, and for always inspiring me to do my best every step of the way. I thank Dr. Gropack for always being so supportive of my career and for contributing to her expertise to this research. She is a great role model. I thank Vincent Dorazio, for providing me with the opportunity to perform my first pilot study, and for providing his expertise to this research. A special thanks to the dissertation committee for dedicating their time and expertise in providing me with the important feedback needed to be successful. I hope to have the opportunity to do the same for others in the future.

This dissertation research would not be possible without the opportunity provided by Dr. Fenesy and Dr. Sabato, and I am eternally grateful, thank you both. And finally, I would like to thank all of the study participants for their participation and vital feedback that made a major contribution to this study, and the SPICE program.

Table of Contents

List of Tables

List of Figures

Chapter I: Introduction and Background

Twenty years ago, the Institute of Medicine (IOM) triggered a national quality initiative through a series of critical assessment reports focused on the delivery of healthcare in the United States (Brandt, B., 2015). The first two reports, *To err is human: Building a Safer Health System,* and *Crossing the quality chasm: a new health system for the 21st century,* provided an assessment of quality conditions, a new vision for optimizing the delivery of healthcare, and a focus on preparing the interdisciplinary teams to work collaboratively in order to deliver safe, high quality care (Institute of Medicine, 2001; Institute of Medicine, Committee on Quality of Health Care in America, 2000).

Expanding upon the need to prepare the healthcare workforce, the IOM published a third report, *Health Professions Education: A Bridge to Quality,* emphasizing that in order to ensure an impactful and enduring change, there must be a transformation both in the healthcare system and in health professions education (Institute of Medicine, Committee on the Health Professions Education Summit, 2004). Among this report's recommendations is a strong emphasis on the need to include interprofessional education and collaborative practice (IPECP), as a core competency in the healthcare professions education process through to clinical practice.

The IOM recognizes that when contributions from health professionals are well coordinated, patients experience improved healthcare outcomes as well as efficiency in the delivery of services (IOM, 2013). The World Health Organization (WHO) emphasizes the need for healthcare organizations (HCOs) to support IPECP efforts in order to best prepare for world-wide “urgent health challenges” (WHO, 2010).

IPECP is considered an important factor in the movement to improve efficiency and quality of patient care outcomes, therefore, it is critical to train health profession students, as well as healthcare professionals in the skills required for collaborative practice (IOM, 2013; Michalec, Giordano, Pugh, Arenson, & Speakman, 2017; WHO, 2010). This type of education and training will vary in approach considering the differences in setting and context, which present a different set of factors and facilitation challenges for organizations.

The IPECP learning experience can vary considering the contextual differences between the classroom and clinical settings, which may involve a different set of obstacles and limitations that need to be mitigated by the facilitator. Considering the differences in context between the classroom and clinical settings, it is most critical that facilitators be prepared to manage the context - related obstacles and challenges in order to successfully reach specific organizational goals and objectives.

Facilitators are charged with providing support and guidance in both settings. In order to prepare facilitators for the challenges involved and ensure outcomes, it is important that the assessment of performance be comprehensive in approach and contain context - specific aspects that can in turn inform the training and development process. The assessment of performance is critical considering that poor facilitation can have negative effects on IPECP outcomes, therefore it is important that facilitators receive training and development that includes a comprehensive, context - specific assessment of facilitation performance (Nicol & Forman, 2014; Reeves et al., 2016). Considering the above factors, it is important to tailor facilitator performance assessment tools for the environment in which facilitation takes place.

IPECP in Healthcare Organizations

Many healthcare organizations (HCOs) have responded to the changing regulatory structure of the healthcare system, and the need to improve quality outcomes through more efficient approaches by strengthening their IPECP efforts in the form of process improvement teams. Recently, HCOs have started to implement process improvement methodology such as Lean, which involves the use of process improvement steps and tools that assess and analyze processes, identifying areas of inefficiency/waste (Schweikhart & Dembe, 2009).

The inclusion of this process/quality improvement area of practice stems from the need to view IPECP as a process and less as an intervention, in order to possibly bring more structured solutions to the complexities involved in the healthcare delivery process (Aij, Simons, Widdershoven, & Visse, 2013; Andersen, Rovik, & Ingebrigtsen, 2014; Lawal et al., 2014; Olson & Bialocerkowski, 2014; Schweikhart & Dembe, 2009).

IPECP in the healthcare setting involves teams who are faced with patient care challenges, as well as healthcare administration challenges that may impede patient care efforts. Whatever the challenge, facilitators assist teams in the application of process improvement methods, such as Lean, to improve issues related to the delivery and management of patient care. The IPECP Lean facilitator has the responsibility of guiding interprofessional teams towards developing and reaching improvement goals. Facilitation of healthcare teams focused on improving the efficiency and quality of care delivered, has been acknowledged as being critical to the success of HCO goals and objectives, yet the research concerning facilitator characteristics and performance assessment, which supports such work, has been minimal (Fierro, 2016; Reeves et al., 2016).

This IPECP facilitation process can be both complex and challenging in the clinical settings. It is important to consider the multitude of factors involved in the clinical context in order to develop effective facilitator training and performance assessment approaches.

Clinical context. Facilitators in the clinical setting need to be able to motivate teams, manage team dynamics, and guide them through collaborative process improvement practices, while keeping in mind some facilitation challenges for learning such as the need for resources, logistical planning that considers the unpredictable nature of the healthcare environment, dedicated non-clinical protected - time, team member buy - in, organizational culture change and consideration of the the real-life implications regarding the outcomes of IPECP (Brandt, F., B., Kitto, & Cervero, 2018).

Within this context, the facilitator is charged with supporting the improvement process from project planning and guidance, to managing interprofessional team dynamics, and completion of goals and objectives. Facilitator skills and competencies performed in this context involves a focus on guiding teams in the use of process improvement tools and methodologies such as Lean. Adding to the complexity of this context, facilitation of teams consisting of healthcare professionals who have a direct role in and may be ultimately accountable for IPECP implementation outcomes brings an element of risk that is not found in the classroom environment (Teodorczuk, Khoo, Morrissey, & Rogers, 2016).

Therefore, facilitators working within the context of a “high stakes” environment may have more pressure regarding the need to balance team dynamics and communication, while guiding them through process improvement procedures (Bidassie, Williams, Woodward-Hagg, Matthias, & Damush, 2015). Facilitators working in the clinical environment are challenged to work in teams of healthcare professionals who are accountable for teamwork outcomes, and may also have competing intradepartmental responsibilities that may add additional complexities to the IPECP process.

Considering the complexities involved in the facilitation of interprofessional teams in the clinical setting, the assessment of facilitator performance should include the use of a performance assessment instrument designed in consideration of the above context - specific factors. The Interprofessional Lean Facilitator Assessment Scale (ILFAS) is such an instrument and it contains core competencies and theories that provide a comprehensive approach to the assessment of performance (Bravo-Sanchez, Parrott, Dorazio, Denmark, & Heuer, 2017). The facilitator assessment tool is setting and context - specific, making it a comprehensive instrument that can help inform the training and development process.

This dissertation will provide a detailed mapping and description of the development and pilot application of this instrument in the clinical setting, as well as demonstrate how many of the core components of the ILFAS are transferable to the higher education setting. The facilitation of IPECP in the classroom setting has many commonalities to the facilitation of IPECP in the clinical setting when compared. However, it is important to consider the differences in the factors and context involved in the delivery of IPECP in the higher education setting when designing an assessment approach.

IPECP in Higher Education

Healthcare profession schools of higher learning have answered the call for developing integrative and dynamic IPECP programs for students by developing a variety of learning activities ranging from patient case discussions to teamwork high - fidelity simulations (Nexus, 2018). The implementation of IPECP in the educational process involves a transition from traditional discipline teaching silos towards having students learn with, from and about each other, with the support of faculty facilitators.

Among the many difficulties surrounding the implementation of IPECP is the challenge of training faculty facilitators. Traditionally, faculty teach students by leading conversations and transferring knowledge in a teacher-to-learner model. The facilitation of IPECP activities involves a shift to a non-traditional teaching model involving a student-to-student learning approach, therefore, comprehensive faculty facilitator training focused on this model in addition to IPECP competencies is needed and critical to the success of these types of programs (Nicol & Forman, 2014; Reeves et al., 2016; Schmitz & Brandt, 2015). Although faculty training is currently being provided in various forms, facilitator training has often fallen short of expectations, creating additional challenges to delivering quality IPECP student experiences and learning (Brandt, 2015; Reeves et al., 2016). In order to develop training and assessment of facilitators practicing in the higher education setting, it is important to consider the context.

Classroom context. Classroom settings distant from the direct patient care environment may limit the IPECP experience to learning activities that do not have the benefit of direct implementation or observation of the impact of collaborative practice plans or care interventions. As a result, the outcomes of activities conducted in the classroom setting can be considered as low risk since they do not involve direct patient contact, providing an opportunity for both facilitators and students to practice and correct errors in the process (Freytag, Stroben, Hautz, Eisenmann, & Kämmer, 2017). This poses a challenge for faculty facilitators and students to work through hypothetical clinical team scenarios and outcome discussions.

There also may be resource and logistical challenges considering the traditional silo structure of the higher education learning environment (El-Awaisi, Joseph, El Hajj, & Diack, 2018; Reeves et al., 2016; Ruiz, Ezer, & Purden, 2013). As a result, faculty facilitators, in collaboration with institutional leadership, may need to devise creative solutions in resource allocation, curriculum planning, course scheduling, activity supplies and location/space accommodations (Reeves, 2016). Additionally, faculty facilitators may include full-time non-practicing academic faculty, adjunct full-time clinicians, and researchers that may not have the same teaching experience, skills, and qualifications that can have an effect on the IPECP student experience (LeGros, Amerongen, Cooley, & Schloss, 2015).

The above factors are important for faculty facilitators to consider when planning for and delivering IPECP in the higher education setting. The performance assessment of facilitators practicing in the classroom setting should be designed in consideration of the above context - specific factors. The Interprofessional Facilitator Performance Assessment Scale (IFPAS) is an instrument that was developed with many of the core components contained in the ILFAS, however it is designed specifically for the classroom setting (Bravo-Sanchez et al., 2017). This dissertation will describe the core framework development and pilot application of the ILFAS and IFPAS instruments.

Dissertation structure

The structure of the following dissertation begins with a schematic overview of the methodology used in the development of the ILFAS and the concept transformational process used to develop the IFPAS instrument (Chapter 2), followed by an overall broad examination of the research on facilitation in order to identify theoretically grounded components of facilitation (Chapter 3), followed by an empirical examination of existing tools to determine how well they map to the components identified in the research (Chapter 4), continuing with a description of the development and pilot testing of an assessment tool for use in the clinical context that is theory - based and comprehensive in comparison to existing tools (Chapter 5), and finally, an examination of how a tool, based on the principles identified in Chapter 3 but tailored for use in a classroom context performs as part of a facilitator feedback intervention in a higher education setting (Chapter 6).

References

Aij, K. H., Simons, F. E., Widdershoven, G., & Visse, M. (2013). Experiences of leaders in the implementation of lean in a teaching hospital-barriers and facilitators in clinical practices: A qualitative study. *BMJ Open, 3*(10) Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edswsc&AN=000326882800029&site=eds-live

Andersen, H., Rovik, K. A., & Ingebrigtsen, T. (2014). Lean thinking in hospitals: Is there a cure for the absence of evidence? A systematic review of reviews. *BMJ Open, 4*(1) Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edswsc&AN=000337363700002&site=eds-live

Bidassie, B., Williams, L. S., Woodward-Hagg, H., Matthias, M. S., & Damush, T. M. (2015). Key components of external facilitation in an acute stroke quality improvement collaborative in the veterans health administration. *Implementation Science, 10*(1) doi:10.1186/s13012-015-0252-y

Brandt, B. (2015). *Interprofessional education and collaborative practice: Welcome to the "New" forty-year old field*

Brandt, F., B., Kitto, M., S., & Cervero, M., R. (2018). Untying the interprofessional gordian knot: The national collaborative for improving the clinical learning environment. *Academic Medicine, 93*(10), 1437-1440. doi:10.1097/ACM.0000000000002313

Bravo-Sanchez, C., Parrott, J. S., Dorazio, V., Denmark, R., & Heuer, A. J. (2017). Development of an interprofessional collaborative practice lean facilitator assessment scale (ILFAS). *Journal of Interprofessional Care,* (December)

El-Awaisi, A., Joseph, S., El Hajj, M. S., & Diack, L. (2018). A comprehensive systematic review of pharmacy perspectives on interprofessional education and collaborative practice. *Research in Social & Administrative Pharmacy : RSAP, 14*(10), 863. doi:10.1016/j.sapharm.2017.11.001

Fierro, R. S. (2016). Enhancing facilitation skills: Dancing with dynamic tensions. *New Directions for Evaluation, 2016*(149), 31-42. doi:10.1002/ev.20177

Freytag, J., Stroben, F., Hautz, W. E., Eisenmann, D., & Kämmer, J.,E. (2017). Improving patient safety through better teamwork: How effective are different methods of simulation debriefing? protocol for a pragmatic, prospective and randomised study. *BMJ Open, 7*(6) doi:10.1136/bmjopen-2017-015977

Institute of Medicine. (2001). *"Crossing the quality chasm: A new health system for the 21st century"*. Washington, D.C.: National Academy Press. doi:10.17226/10027 Retrieved from http://www.nap.edu/read/10027/chapter/1

Institute of Medicine, Committee on Quality of Health Care in America. (2000). To err is human: Building a safer health system
.

Institute of Medicine, Committee on the Health Professions Education Summit. (2004). *Health professions education: A bridge to quality* National Academy of Sciences. doi:10.1111/j.1945-1474.2004.tb00473.x

IOM. (2013). *Interprofessional education for collaboration: Learning how to improve health from interprofessional models across the continuum of education to practice: Workshop summary.* ().National Academies Press.

Lawal, A. K., Rotter, T., Kinsman, L., Sari, N., Harrison, L., Jeffery, C., Kutz, M., Khan, M. F., Flynn, R. (2014). Lean management in health care: Definition, concepts, methodology and effects reported (systematic review protocol). *Systematic Reviews, 3*(1) doi:10.1186/2046-4053-3-103

LeGros, T. A., Amerongen, H. M., Cooley, J. H., & Schloss, E. P. (2015). Using learning theory, interprofessional facilitation competencies, and behavioral indicators to evaluate facilitator training. *Journal of Interprofessional Care,* , 7p. doi:10.3109/13561820.2015.1040874

Michalec, B., Giordano, C., Pugh, B., Arenson, C., & Speakman, E. (2017). Health professions students' perceptions of their IPE program: Potential barriers to student engagement with IPE goals. *Journal of Allied Health, 46*(1), 10. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/28255592

Nexus, I. (2018). National center for interprofessional practice and education
. Retrieved from https://nexusipe.org/

Nicol, P. W., & Forman, D. (2014). Attributes of effective interprofessional placement facilitation. *Journal of Research in Interprofessional Practice & Education, 4*(2), 1-11. Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com.proxy.libraries.rutgers.edu/login.aspx?direct=true&db=aph&AN=110370183&site=eds-live

Olson, R., & Bialocerkowski, A. (2014). Interprofessional education in allied health: A systematic review. *Medical Education, 48*(3), 236-246. doi:10.1111/medu.12290

Reeves, S., Fletcher, S., Barr, H., Birch, I., Boet, S., Davies, N., McFayden, A., Rivera, J., Kitto, S. (2016). A BEME systematic review of the effects of interprofessional education: BEME guide no. 39. *Medical Teacher, 38*(7), 656-668.

doi:10.3109/0142159X.2016.1173663

Ruiz, M. G., Ezer, H., & Purden, M. (2013). Exploring the nature of facilitating interprofessional learning: Findings from an exploratory study. *Journal of Interprofessional Care, 27*(6), 489-495. Retrieved from http://informahealthcare.com/jic

Schmitz, C. C., & Brandt, B. F. (2015). The readiness for interprofessional learning scale: To RIPLS or not to RIPLS? that is only part of the question. *Journal of Interprofessional Care, 29*(6), 525-526. doi:10.3109/13561820.2015.1108719

Schweikhart, S. A., & Dembe, A. E. (2009). *The applicability of lean and six sigma techniques to clinical and translational research*

Teodorczuk, A., Khoo, T. K., Morrissey, S., & Rogers, G. (2016). Developing interprofessional education: Putting theory into practice. *Clinical Teacher, 13*(1), 7-12. doi:10.1111/tct.12508

WHO. (2010). Framework for action on interprofessional education & collaborative practice WHO. Retrieved from http://apps.who.int/iris/bitstream/10665/70185/1/WHO_HRH_HPN_10.3_eng.pdf

Chapter II: Schematic Description of Dissertation

Structure and Methodological Approaches

The need for facilitation of IPECP in both clinical and classroom settings is well supported by the evidence (Aij, Simons, Widdershoven, & Visse, 2013; Baril, Gascon, Miller, & Côté, 2016; Fierro, 2016; Reeves et al., 2016). Although the need for facilitation has been emphasized, there is limited evidence regarding performance characteristics (Evans, Ward, & Reeves, 2018; Olson & Bialocerkowski, 2014; Reeves et al., 2016).

There are also a limited number and poorly developed competency assessment tools and approaches available, and their practical value remains to be determined (Blue, Chesluk, Conforti, & Holmboe, 2015; Sargeant, Hill, & Breau, 2010a; Straus, 2005). Although facilitator training is taking place in several organizations today, most performance evaluation instruments are not validated, comprehensive, nor theoretically grounded . This results in great uncertainty with regard to IPECP facilitator best-practices and is suggestive of related knowledge and skill assessment gaps.

As a result, tools that currently exist may not be fully capturing existing deficiencies, and training programs may not be able to target the specific areas in need of improvement. Research studies concerning the development of facilitator assessment instruments should be grounded in theory and rigorous methodology in order to identify key performance characteristics and make substantial contributions to this area of study. It is important to utilize a comprehensive facilitator assessment instrument that is theory - based and can identify target areas of improvement for the progressive development of skills and competencies. Tools such as these should be able to provide guidance to evaluators/trainers regarding the specific areas for skill and competency improvement, informing and streamlining progressive training efforts (Nicol & Forman, 2014). This is critical since the success of team performance depends on the success of facilitator performance (Nicol & Forman, 2014).

In an effort to develop such comprehensive instruments, this dissertation research explores the literature that identifies the core components for facilitation, and includes these components in the framework and application of an instrument designed specifically for the clinical setting and subsequent development of a similarly comprehensive instrument specific to the classroom setting, comparing both to existing instruments that include the use of some of the identified core components. Below is a schematic overview of the methodology used in this dissertation (Figure 2.1) and a figure summarizing the implemented methodology is located at the end of this chapter.

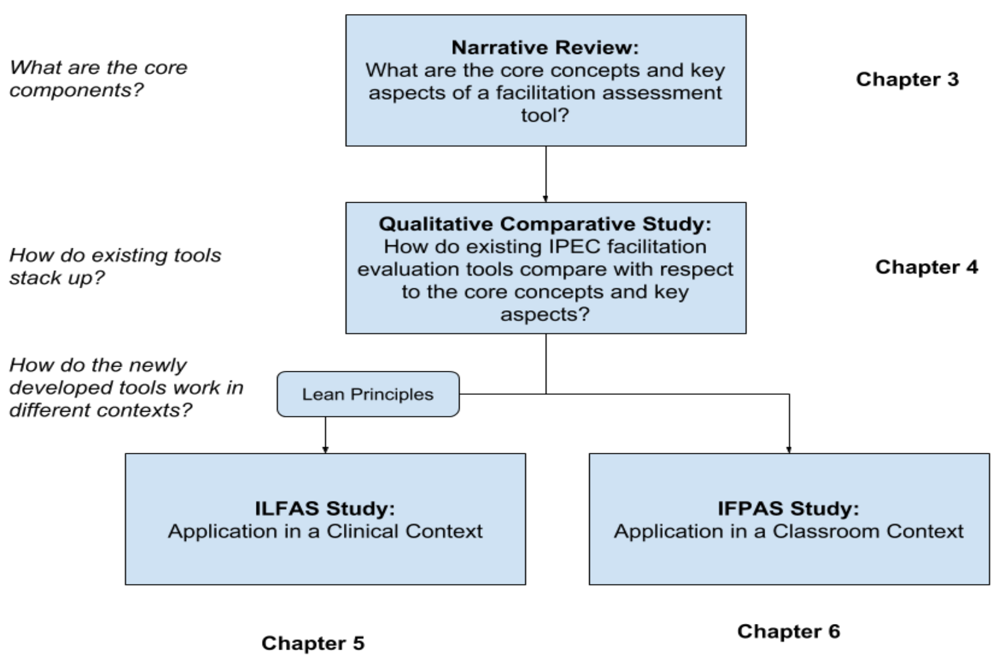

Figure 2.1 Schematic overview of the dissertation methodology

Chapter Three: Narrative Review Identifying Additional Components of an IPECP Facilitator Assessment Tool

Literature concerning the facilitation of IPECP in the classroom and clinical setting was explored in order to identify the core components considered to be effective. The literature is presented in three categories of study: **Organizational Leadership, Hierarchical Learning Theory,** and **Pedagogical Training.**

The *Organizational Leadership* category consists of literature concentrated in the areas of IPECP, Lean, and Shingo, which provide skills and competencies that give guidance regarding best practices in the facilitation of heterogeneous groups (Bravo-Sanchez et al., 2017). The *Hierarchical Learning Theory* category is comprised of literature regarding Bloom's Taxonomy of Learning Objectives, metacognition**,** constructivism learning/teaching theory, which provide structure to the assessment framework and informs the development of facilitator skills and competencies (Bravo-Sanchez et al., 2017). *The Pedagogical Training* category includes literature focused on iterative **-** deliberate skills training and assessment-based training. When considering the best approaches to developing facilitator skills and competencies, it is important to include the repeat practice of skills coupled with the assessment of each performance in the skills development process.

Chapter Four: Qualitative Comparison of Facilitator Assessment Tools

This chapter provides a comparison between existing facilitator assessment instruments used within the context of IPECP, and the proposed instruments (ILFAS and IFPAS), through an empirical examination that demonstrates the extent to which each instrument contains items which target high-level complex knowledge and cognitive processes (using the revised Bloom's Taxonomy - The Taxonomy Table), as well as the assessment framework levels of intended outcomes using the modified Kirkpatrick's educational outcomes model (Anderson et al 2001; Barr 2005).

Chapter Five: Development and Validity Testing of the of the Interprofessional Lean Facilitator Assessment Scale (ILFAS)

The impetus for developing a facilitator performance assessment instrument for the clinical setting began with the need to formally assess facilitators practicing Lean performance improvement in a New York municipal hospital. An extensive literature search helped to identify the Interprofessional Facilitation Scale (IPFS) as one of the few validated facilitator performance assessment instruments available (Nexus, 2018; Sargeant, Hill, & Breau, 2010b). Below, we describe how the findings from the narrative review results (described in chapter 3) were applied in the context of developing a facilitator assessment tool for use in a healthcare organizational context.

The IPFS was developed using the **IPECP competencies** identified by Banfield and Lackie (2009). These competencies focus on three specific areas: (1) Interprofessional facilitation; (2) Patient - centered collaborative practices; and (3) Cultural sensitivity and safety in interprofessionalism, which can be used in training, assessment, curriculum development, and guidance for faculty, suggesting applicability to both clinical and classroom settings (Banfield & Lackie, 2009). These IPECP competencies emphasize the use of various skills that support team collaboration, ensure patient - centered care objectives and goals, and the facilitator approach to creating a culturally respectful and safe learning environment.

Aside from assisting teams in practicing interprofessionalism, facilitators in the clinical environment may also be charged with **ensuring teamwork outcomes that improve quality and efficiency of the care delivered**. When considering this additional functionality of facilitators within the clinical setting, and the **need for facilitators to acquire and transfer knowledge and complex skills to teams**, it is evident that additional skills and competencies should be considered in the assessment of facilitator performance.

Although the IFPS was designed using IPECP competency areas and pilot-tested and validated in the clinical setting, it was not designed to capture the assessment of specific facilitator technical skills and competencies that are also required for successful facilitation of process/quality improvement interprofessional teams. IPECP competencies are essential to the success of interprofessional teams in the healthcare setting. However, if facilitators lack specific *process improvement technical skills* and *competencies that support interprofessional teams*, then efforts in reaching organizational goals and objectives may fail.

The IFPS instrument provides a starting point in which to assess the ability of facilitators to support the work of interprofessional teams in the healthcare setting. In an attempt to create a comprehensive facilitator performance assessment instrument, the

ILFAS instrument was developed using IPECP skills and competencies, as derived from the IFPS, and contains additional items designed to assess technical, as well as core learning and practice skills that have been identified in the literature as being important to the facilitation process. The additional skills and competencies that were included in the development of the ILFAS are discussed below.

Added Component: Process Improvement Skills and Competencies. Healthcare organizations have been implementing process improvement methodologies, such as **Lean**, to improve quality and efficiency within their organizations since the 1990s (Mason, Nicolay, & Darzi, 2015). Facilitators assist interprofessional teams in the implementation and utilization of process improvement methodology and tools, therefore the assessment of the knowledge and technical skills regarding organizational improvement approaches used in healthcare organizations (such as Lean) is important. In short, a facilitation assessment tool has to be tailored to the concrete situation and when an organization uses a formal approach to process improvement, the facilitation assessment needs to reflect this.

The training and development of IPECP and Lean specific skills and competencies also requires the ability of facilitator trainees to learn and apply new knowledge. The process of learning and applying the knowledge within the practice of facilitation involves ***additional*** skills focused learning processes. The assessment of the core ability to learn and apply knowledge informs the facilitator skills developmental process.

Added Component: Learning domains. The assessment of learning domains (cognitive, affective, psychomotor) within the scope of facilitation provides targeted information regarding skill-learning abilities, therefore informing the skills developmental process and best prepares facilitators to transfer and assess team knowledge and practices (Nicol & Forman, 2014). Bloom et al. (1956), provides a framework for these learning domains and recommends their use in the development of curriculum and performance assessment approaches (Anderson et al., 2001; Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956; Kasilingam, Ramalingam, & Chinnavan, 2014; Krathwohl, Bloom, & Masia, 1965; Krathwohl, 2002; Rovai, Wighting, Baker, & Grooms, 2009; Simpson, 1974).

As demonstrated in the literature concerning the development of performance assessment instruments, the development of the ILFAS involved the use of keywords related to the Bloom's Taxonomy of Learning Domains (cognitive, affective, psychomotor), in order to provide a conceptual examination of facilitator skills (performance behaviors) (Feinstein & Cannon, 2002; Kasilingam et al., 2014; Rovai et al., 2009). These key terms would direct the assessor's attention toward specific behaviors that evinced skills in the cognitive, affective, and psychomotor domains. See appendix B for examples of keywords for each domain (Kasilingam et al., 2014).

The assessment of facilitator **cognitive skills** regarding the ability to learn, process and apply new knowledge is important considering that facilitators must also transfer that knowledge to the members of interprofessional teams. The ILFAS is designed with items that target the cognitive ability of facilitators to remember, understand, apply, analyze, and evaluate learned knowledge by including cognitive skill-related target words such as explain, translate, and implement (Bravo-Sanchez et al., 2017; Kasilingam et al., 2014).

The knowledge transfer process can be complex and involves direct interaction between facilitators and teams, therefore it is important for facilitators to have a positive affect when facilitating teamwork. The assessment of **affective skills** regarding the facilitator attitudes regarding the work involved in reaching organization/project goals and objectives is critical, considering the potential effect on overall team dynamics and motivation to be successful (Gast, Schildkamp, & van, 2017). Some of the affective skill-related keywords used in the ILFAS items include: “willingness”, “participate”, “stimulate”, “advocate”, “encourage”, and “attitude” (Bravo-Sanchez et al., 2017; Kasilingam et al., 2014).

In addition to the ability for facilitators to learn and process new knowledge and positively interact with teams, it is also critical for facilitators to physically perform procedures that assist in the facilitation process. Therefore the assessment of **psychomotor skills** is essential to understanding the facilitator’s ability to perform procedures that are supportive of team activities. For example, the construction of visual learning aids, or demonstration of tools are often needed in order to teach process improvement concepts to teams. As procedures are demonstrated, teams also learn how to perform these procedures for future application. The psychomotor-related keywords are used in ILFAS items include: act, perform, instruct, explain, and accomplish (Bravo-Sanchez et al., 2017; Kasilingam et al., 2014; Rovai et al., 2009).

In order for facilitators to successfully implement the above skills, they must be able to self - assess implemented strategies and team response, and change facilitation approaches as needed. This is a complex, higher level thinking skill and should also be assessed.

Added Component: Markers of Strategic/Critical Thinking. The act of facilitation can be complex in practice and requires that facilitators self-reflect/assess their thinking as they apply learned knowledge and strategically adapt their thinking processes when guiding teamwork (Krathwohl, 2002; Murray, 2014). **Metacognitive skills** assists in the strategic delivery of facilitation approaches and supports successful team outcomes (Torrez & Rocco, 2015). For example, facilitators learn how to provide demonstrations on the use assessment instruments, or collaborative practices that are important to the teamwork activity. As teams observe these demonstrations and interact, facilitators assess team understanding and think about how they may need to change their approach (think about their thinking) in order to ensure team comprehension and team application of new skills, as well as their ability to collaborate effectively.

Facilitator metacognitive skills are needed to guide teams through the transformational learning and team metacognitive skill developmental process, best preparing teams to evaluate conditions, devise and implement solutions, and evaluate progress while working collaboratively (Duffy et al., 2015). This type of strategic and critical thinking in the process of facilitation is very important to the development of teams, therefore the assessment of performance should include the assessment of metacognitive - related skills (Bonner, Somers, Rivera, & Keiler, 2017).

The ILFAS instrument assesses the ability of facilitators to perform this core skill by including items that focus on their ability to assess in-session team performance outcomes (e.g., understanding learned concepts and practicing new skills), and be able to critically think about how to change facilitation approaches as needed in order to ensure teamwork outcomes. Facilitators can use metacognitive skills in order to ensure teamwork outcomes by self-monitoring their approach to implementing strategies used to provoke and stimulate teamwork interactions, encourage respectful interprofessionalism, monitor team behavior and create positive learning environments through engagement, and changing their facilitation approaches as necessary in order to ensure alignment and progression of all teamwork activities (Bravo-Sanchez et al., 2017).

As facilitators practice the above skills and competencies, it is also important for them to understand their role in transforming and maintaining a culture that is supportive of their goals to improve collaborative practices and improve both quality and efficiency throughout the organization. The effort to cultivate a supportive culture is the focus of the Shingo model.

Added Component: Supporting Organizational Culture. The Shingo Model, developed by Dr. Shigeo Shingo, is an approach to developing a supportive organizational culture (The Shingo Model, 2011). It emphasizes the need for all members of an organization to practice ideal, principle - based behaviors that are supportive of transforming and sustaining a culture that is supportive of organization - wide goals (Kelly, 2016; The Shingo Model, 2011). Facilitators are drivers of this effort, and therefore the assessment of this area of practice is needed when evaluating performance.

Facilitators **enable** teams to practice behaviors that are supportive of the organization's transformation and sustaining of improvement efforts. As they guide teams in a variety of activities, the focus is to continuously **improve** outcomes in support of identified goals and objectives. Since teamwork can be dynamic in nature, it is also very important that facilitators ensure the **alignment** of all efforts with that of the organization - wide goals. In terms of accountability regarding the desired **results**, facilitators continuously emphasize the end purpose and importance of implementing process improvement methodology, and assist teams in maintaining focus to meeting goals and objectives in a timely manner.

ILFAS items are categorized into four sections within the instrument, as an approach to identifying the skills and competencies that reflect Shingo-related ideal behaviors that assist in the development and cultivation of organizational culture that supports organization-wide goals. The four overarching categories include "Enabling", "Improving", "Aligning", and "Results" (Bravo-Sanchez et al., 2017; The Shingo Model, 2011).

Chapter three provides a thorough review of the literature regarding the above discussed skills and competencies, and their relevance to the assessment of facilitator performance.

Expert Review of the ILFAS. The initial draft of the ILFAS was followed by expert and stakeholder reviews in order to further develop the instrument. Psychometric review of the ILFAS resulted the division two items, ensuring that all items are assessing a single skill, along with adding a reverse coding feature for two items, and re-organizing items (Bravo-Sanchez et al., 2017).

The main stakeholder and Lean/Shingo expert reviewed the instrument for redundancies, resulting in a reduction of the number of items (from 18 to 14 items in total) in the final draft of the instrument, and also added additional variables and characteristics for consideration during the facilitation process (Bravo-Sanchez et al., 2017). An IPECP expert reviewed the instrument and confirmed the IPECP - focused items, confirming that the editing process had not resulted in a loss of focus in this area of assessment (Bravo-Sanchez et al., 2017). The ILFAS instrument can be found in Appendix A.

A pilot study was performed to understand the applicability of the ILFAS. Details regarding this pilot, including the analysis and post - analysis revisions to the instrument can be found in chapter 5. The long-term goal of research involving the ILFAS is to develop a standard measurement of facilitator competency that may be transferable to other settings (Bravo-Sanchez et al., 2017). Many of the above discussed skills and competencies can be considered core the practice of facilitation in the clinical setting. However, as discussed in chapter one, when designing an instrument for the classroom setting it is also important to keep in mind the context in which facilitation is taking place.

Chapter Six: Development of the IFPAS

The need to develop a comprehensive facilitator performance assessment instrument for the classroom setting arose from the need to formalize the assessment approach within a IPECP school-wide program at a New Jersey state university. When examining the framework of the ILFAS, and its applicability to the classroom setting, specific changes were needed in order to reflect the context of the setting.

The framework of the IFPAS includes most of the core components used in the ILFAS instrument: IPECP, Bloom's Taxonomy of Learning Domains, Metacognition and Shingo. Considering the differences in context between the clinical and classroom settings, the technical skills and competencies of Lean process improvement were not included, providing an opportunity to reducing the number of Lean - specific items and increase the number of item assessing the previously identified core skills and competencies. This reduction and increase item process resulted in a decrease in items from 14 to 12. Table 2.1 below demonstrates the change in the focus of the assessment components from the ILFAS instrument items to the IFPAS instrument items.

Table 2.1 ILFAS - IFPAS Core Component Item Assessment Comparison

	# Cognitive Items	# Affective Items	# Psychomotor Items	# Metacognition Items	# IPECP Items	# Shingo Items	# Lean Items
ILFAS	7	5	4	6	6	5	7
IFPAS	4	5	4	7	8	4	0

Cognitive focused items were reduced reflecting the deletion of the Lean technical knowledge requirement. The areas of affective and psychomotor remained the same, while metacognition and IPECP - focused items were increased. This increase is an attempt to further assess the ability of the facilitator to self-assess and adjust their approach to guiding teams as they practice IPECP skills and competencies.

Additionally, Shingo-focused overarching categories were reduced since process improvement outcomes (“Results”) are not a part of the IPECP classroom experience. Therefore the “Results” overarching theme in the categorizing process of the items was removed considering the context, resulting in the reduction of the number of categories to three (Enabling, Improving, Aligning).

The IFPAS instrument was pilot - tested in the higher education setting, providing an opportunity to get facilitator feedback on tool applicability and relevance, and understanding the effect of assessment results on facilitator skills development. Details regarding this pilot can be found in chapter 6 of this dissertation. The ILFAS instrument is located in Appendix A of this dissertation. Figure 2.2 (below) is a schematic of the logic of how the different versions of the facilitator assessment tools were developed.

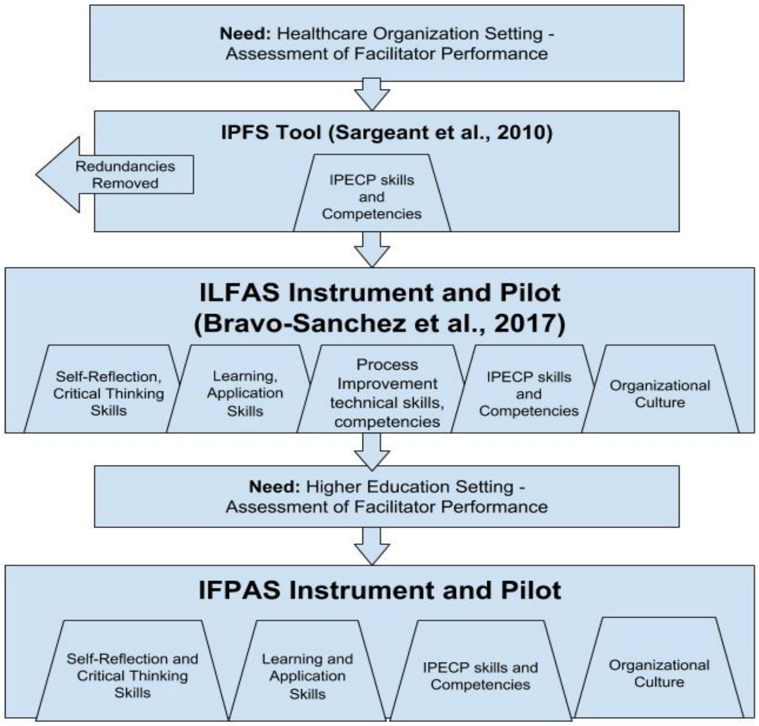

Figure 2.2 Logic of the Development of Facilitator Assessment Tools for Different Contexts

Current knowledge concerning facilitation performance characteristics, and how to comprehensively assess skills and competencies is limited within the literature (Reeves et al., 2016). This dissertation contributes to the literature concerning IPECP facilitator characteristics and provides additional approaches to assessing performance in the clinical and classroom settings.

Dissertation Aims, Objectives, and Hypotheses

Aim 1: Identify a core set of IPECP facilitation skills that can serve as the theoretical grounding for any facilitator assessment tool.

Objective 1: Carry out a thorough literature review across multiple disciplines to identify core facilitator skills.

Aim 2: Identify existing IPECP facilitator assessment tools and evaluate their components relative to the core set of IPECP facilitation skills.

Objective 2. Compare existing IPECP facilitator skills assessment tools using a qualitative comparative approach with regard to their incorporation of the core IPECP facilitator skills identified in Aim 1.

Hypothesis 2.1: The ILFAS and IFPAS instruments contain a larger proportion of higher - level thinking/complex cognitive processes as compared to existing facilitator assessment instruments.

Aim 3: Develop and validate an IPECP facilitator skills assessment tool that can be used in a clinical context.

Objective 3: Develop an IPECP facilitator skills assessment tool (ILFAS) that incorporates the core set of IPECP facilitation skills and pilot test its use within a clinical context.

Hypothesis 3.1: The ILFAS is able to discriminate between facilitators of different competency levels.

Aim 4: Develop and test an IPECP facilitator skills assessment and training tool (IFPAS) that incorporates the core set of facilitator skills but tailored for use in an interprofessional education context.

Objective 4.1: Compare two different methods of providing facilitator feedback using the IFPAS tool.

Hypothesis 4.1: Enhanced (coaching) feedback will result in improved IFPAS scores compared to passive IFPAS use.

Objective 4.2: Examine facilitator perceptions of usability and utility of the IFPAS for assessing and improving IPECP facilitator performance.

Orienting question 4.1: What are different methods by which faculty facilitators incorporate IFPAS focused feedback into practice?

Objective 4.3: Identify student-to-student interactions occurring during SPICE sessions in relationship to IPECP facilitation outcomes.

Hypothesis 4.3: Higher IFPAS item and domain scores will be associated with higher percentage rates of student participation during IPECP sessions.

Table 2.2

Operational Definitions

Interprofessional education and collaborative practice (IPECP)	When two or more health profession students learn with and from each other in an effective collaborative process to enable the improvement of future patient health outcomes (IPEC, 2016, WHO, 2010).
Bloom's Taxonomy of Learning Domains	Educational psychologist, Benjamin Bloom and associated researchers, defined learning domains to be used in the development and assessment of objectives and learning outcomes (cognitive, affective, psychometric domains) (Anderson et al., 2001; Bannister, 2002; Bloom, 1956; Krathwohl, 2002; Simpson, 1966)

Metacognition	The awareness of the knowledge necessary to make decisions/plan tasks, assess learning, evaluate actions, make deductions, implementing different strategies, and evaluate results (Magno, 2010).
Shingo	An approach to developing organizational culture consisting of a framework with dimensions/domains, each containing specific principle-based behaviors (The Shingo Model, 2011).
Healthcare Organizations (HCOs)	General hospitals providing acute and ambulatory care (may specialize in specific services e.g. psychiatry), hospices, medical group and physician practices, home care (Olden, 2015).
Operational Excellence	The relationship between business outcomes and principle-based behaviors (ideal)

	that collectively supports a culture of excellence (The Shingo Model, 2011).
Knowledge Transfer (KT)	KT is defined as the application, practice and exchange of applied knowledge for the purpose of improving health through the delivery of effective health care (Thomas, Menon, Boruff, Rodriguez, & Ahmed, 2014).
Deliberate practice	The improvement of performance that comes as a result of extensive efforts to improve skills, while maintaining motivation and managing external obstacles (Ericsson,

	Krampe, & Tesch-Rmer, 1993).
Constructivist learning theory	A learning environment that supports both interactive learning and knowledge attainment (Eccles, Grimshaw, Walker, Johnston, & Pitts, 2005; French et al., 2012; Michie et al., 2005; Olusegun, 2015; Steffe & Gale, 1995; Thomas et al., 2014).

References

Aij, K. H., Simons, F. E., Widdershoven, G., & Visse, M. (2013). Experiences of leaders in the implementation of lean in a teaching hospital-barriers and facilitators in clinical practices: A qualitative study. *BMJ Open, 3*(10) Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edswsc&AN=000326882800029&site=eds-live

Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., Raths, J., Wittrock, M. C. (2001). *A taxonomy for learning,teaching and assessing:A revision of bloom's taxonomy of educational objectives.* (Complete ed. ed.). New York [u.a.]: Longman.

Banfield, V., & Lackie, K. (2009). Performance-based competencies for culturally responsive interprofessional collaborative practice. *Journal of Interprofessional Care,* *23*(6), 611-620. doi:10.3109/13561820902921654

Baril, C., Gascon, V., Miller, J., & Côté, N. (2016). *Use of a discrete-event simulation in a kaizen event: A case study in healthcare* doi://doi-org.proxy.libraries.rutgers.edu/10.1016/j.ejor.2015.08.036

Barr, H. (2005). *Effective interprofessional education: Argument, assumption and evidence (promoting partnership for health)* (1st ed.). GB: Wiley-Blackwell. Retrieved from http://replace-me/ebraryid=10236649

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives.handbook 1: Cognitive domain*. New York: Longman.

Blue, A. V., Chesluk, B. J., Conforti, L. N., & Holmboe, E. S. (2015). Assessment and evaluation in interprofessional education: Exploring the field. *Journal of Allied Health, 44*(2), 73-82.

Bonner, S., Somers, J., Rivera, G., & Keiler, L. (2017). Effects of student-facilitated learning on instructional facilitators. *Instructional Science; an International Journal of the Learning Sciences, 45*(4), 417-438. doi:10.1007/s11251-017-9410-8

Bravo-Sanchez, C., Parrott, J. S., Dorazio, V., Denmark, R., & Heuer, A. J. (2017). Development of an interprofessional collaborative practice Lean facilitator assessment scale (ILFAS). *Journal of Interprofessional Care,* (December)

Duffy, M. C., Azevedo, R., Sun, N., Griscom, S. E., Stead, V., Crelinsten, L., . . . Lachapelle, K. (2015). Team regulation in a simulated medical emergency: An in-depth analysis of cognitive, metacognitive, and affective processes. *Instructional Science: An*

International Journal of the Learning Sciences, 43(3), 401-426.

Evans, S. M., Ward, C., & Reeves, S. (2018). Online interprofessional education facilitation: A scoping review. *Medical Teacher,* , 1-8. doi:10.1080/0142159X.2018.1460656

Feinstein, A. H., & Cannon, H. M. (2002). Constructs of simulation evaluation. *Simulation & Gaming, 33*(4), 425-40. doi:10.1177/1046878102238606

Fierro, R. S. (2016). Enhancing facilitation skills: Dancing with dynamic tensions. *New Directions for Evaluation, 2016*(149), 31-42. doi:10.1002/ev.20177

Gast, I., Schildkamp, K., & van, d. V. (2017). Team-based professional development interventions in higher education: A systematic review. *Review of Educational Research, 87*(4), 736-767. doi:10.3102/0034654317704306

Kasilingam, G., Ramalingam, M., & Chinnavan, E. (2014). Assessment of learning domains to improve student's learning in higher education. *Journal of Young Pharmacists, 6*(1), 27-33. doi:10.5530/jyp.2014.1.5

Kelly, S. (2016). Creating a culture of continuous improvement and sustainable management systems at abbott diagnostics longford. *Global Business and Organizational Excellence, 36*(1), 6-24. doi:10.1002/joe.21753

Krathwohl, D. R. (2002). *A revision of bloom's taxonomy: An overview* College of Education, The Ohio State University.

Krathwohl, D. R., Bloom, B. S., & Masia, B. B. (1965). *Taxonomy of educational objectives, handbook II: Affective domain (the classification of educational goals)*. New York: David McKay Company. Retrieved from http://catalog.hathitrust.org/Record/008307011

Mason, S. E., Nicolay, C. R., & Darzi, A. (2015). Review: The use of lean and six sigma methodologies in surgery: A systematic review. *The Surgeon, 13*, 91-100. doi:10.1016/j.surge.2014.08.002

Murray, J. W. (2014). Higher-order thinking and metacognition in the first-year core-education classroom: A case study in the use of color-coded drafts. *Open Review of Educational Research, 1*(1), 56-69. doi:10.1080/23265507.2014.964297

Nexus, I. (2018). National center for interprofessional practice and education
. Retrieved from https://nexusipe.org/

Nicol, P. W., & Forman, D. (2014). Attributes of effective interprofessional placement facilitation. *Journal of Research in Interprofessional Practice & Education, 4*(2), 1-11. Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com.proxy.libraries.rutgers.edu/login.aspx?direct=true&db=aph&AN=110370183&site=eds-live

Olson, R., & Bialocerkowski, A. (2014). Interprofessional education in allied health: A systematic review. *Medical Education, 48*(3), 236-246. doi:10.1111/medu.12290

Reeves, S., Fletcher, S., Barr, H., Birch, I., Boet, S., Davies, N., McFayden, A., Rivera, J., Kitto, S. (2016). A BEME systematic review of the effects of interprofessional education: BEME guide no. 39. *Medical Teacher, 38*(7), 656-668. doi:10.3109/0142159X.2016.1173663

Rovai, A. P., Wighting, M. J., Baker, J. D., & Grooms, L. D. (2009). Development of an instrument to measure perceived cognitive, affective, and psychomotor learning in traditional and virtual classroom higher education settings. *The Internet and Higher Education, 12*, 7-13. doi:10.1016/j.iheduc.2008.10.002

Sargeant, J., Hill, T., & Breau, L. (2010a). Development and testing of a scale to assess interprofessional education (IPE) facilitation skills. *The Journal of Continuing Education in the Health Professions, 30*(2), 126. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/20564701

Sargeant, J., Hill, T., & Breau, L. (2010b). Development and testing of a scale to assess interprofessional education (IPE) facilitation skills. *The Journal of Continuing Education in the Health Professions, 30*(2), 126. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/20564701

Simpson, E. J. (1974). In Kibler R. J., Cegala D. J., Barker L. and Miles D. T. (Eds.), *The classification of educational objectives in the psychomotor domain*. United States: Retrieved from http://catalog.hathitrust.org/Record/000354912

Straus, D. (2005). The IAF handbook of group facilitation: Best practices from the leading organization in facilitation. In S. Schuman (Ed.), () Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com.proxy.libraries.rutgers.edu/login.aspx?direct=true&db=awn&AN=HEALTHLINK-035236&site=eds-live http://www.josseybass.com

The Shingo Model. (2011). Shingo model handbook for operational excellence. Retrieved from http://lean.nh.gov/documents/Shingo%20Model%20Handbook.pdf

Torrez, M. A., & Rocco, M. L. (2015). Building critical capacities for leadership learning. *New Directions for Student Leadership, 2015*(145), 19-34.

doi:10.1002/yd.20121

Chapter III: Narrative Literature Review –

Identifying Core Components of IPECP Facilitator Assessment

Introduction

Facilitation of IPECP can be a complex process, regardless of the setting. Failure to understand the core components of facilitation can lead to outcomes, which fall short of expectations, and ultimately, may have negative consequences (Bonner, Somers, Rivera, & Keiler, 2017; Reeves, Scott et al., 2016). In order to avoid poor outcomes, and prepare for the challenges of facilitation, it is important to understand the characteristics of facilitation and the specific theory and methodologies identified in the literature as being contributory to best practices and outcomes.

An overarching theory used throughout this dissertation research is the **theory of social constructivism**, which is recognized in the literature as being important to the success of IPECP efforts (Anderson, E., Smith, & Hammick, 2016a; Barr, 2005; Evans, Ward, & Reeves, 2018; Olusegun, 2015). The practice of IPECP, whether involving healthcare professionals engaged in process improvement initiatives, or healthcare students working together on patient case discussions, involves the facilitation of experiential learning through social constructivist-based activities (Anderson et al., 2016). Therefore, it is important that facilitator training and assessment approaches be grounded in this theory in order to ensure IPECP outcomes.

This dissertation contributes to the literature concerning IPECP facilitation characteristics, and reduces the current knowledge gap in this area of practice by identifying the critical components for effective IPECP facilitation and the development of training and assessment approaches, which can inform IPECP facilitator training programs (Reeves et al., 2016). Although the following areas of study have been previously reviewed in separate bodies of research at this time, this dissertation research represents an original attempt at combining these areas of study in an effort to inform the development of a comprehensive facilitator performance assessment instrument.

This review is divided into three areas of study that contain research, theory and methodology, collectively framing the foundation of the dissertation study. The first area of study is **organizational leadership**, which includes research that provides many of the leadership skills and competencies that are needed in the process of training and guiding of interprofessional teams. Facilitators of IPECP are expected to engage in “relational leadership” by working inclusively, being conscious of team progress, empowering themselves and others towards increasing involvement, and ethically working towards a common goal (Komives, Mainella, Longerbeam, Osteen, & Owen, 2006). The leadership-focused portion of the dissertation framework, which provides guidance regarding facilitator knowledge, skills, and behaviors, includes: IPECP competencies, Lean methodology and Shingo principles.

The second area of study is **hierarchical learning theory**, containing theories that give guidance to the facilitator assessment approach, and further informing training and development. This is important since, many times, faculty and healthcare professionals involved in training and assessing facilitators have not received formal training in the use of learning theories and instructional methods (Khalil & Elkhider, 2016). The use of learning theories strengthens the reliability and predictability of the effectiveness of developed instructional approaches (Khalil & Elkhider, 2016).

The facilitator assessment tools developed in this dissertation research incorporate theories that focus on learning domains that assist in the teaching approach and assessment learned concepts and skills from lower to higher-level thinking abilities. These include Bloom's Taxonomy of learning domains (cognitive, affective, psychomotor), along with metacognitive theory.

The third area of study, **pedagogical training,** contains literature that discusses the use of iterative and deliberate training to develop skills and competencies, in addition to the practice of using assessment findings in the development of training methods. Assessment instruments that help to identify specific areas of improvement can assist trainers with tailoring iterative training approaches for targeted improvement of skills and competencies. This tailored training approach may assist in efficiently streamlining higher-level competency outcomes. Research regarding iterative and assessment-based training, informs the approach to using the IFPAS and ILFAS instruments in IPECP facilitator-training programs.

Methods

Literature Search. The literature search process involved the exploration of numerous contextually related terms and phrases, and was conducted using the online Rutgers University library system-wide searches. Databases included: Biomedical Reference Collection, Business Source Premier, CINAHL, ERIC, Google Scholar, MEDLINE, Nursing & Allied Health Collection, RILM Abstracts of Music Literature, Scopus, Science Citation Index, Science Direct, and Social Sciences Citation. Search terms and phrases used were specific to the numerous elements included in the IFPAS theoretical and methodological framework, as well as the training/assessment intervention approach. Table 3.1 contains all search terms and phrases used:

Table 3.1

Search Terms and Phrases

Core Term/Phrase	Variations/Added terms
Constructivism Theory	Social constructivism, constructivist learning/teaching, IPE, facilitation
Interprofessional	Interdisciplinary, teams, teamwork, collaboration, practice, education
IPECP	Facilitator training, assessment, health care, higher education, healthcare organizations
Facilitation	Small group, interprofessional education (IPE), IPECP, facilitation, higher education, healthcare organizations, assessment
Facilitator	Assessment, training, IPE, IPECP

Leadership	Training, cognition, assessment
Shingo	Model, prize, process improvement, healthcare, methodology
Lean	Methodology, thinking, approach, healthcare organizations, higher education, assessment
Metacognition	Skills, critical thinking, leadership, assessment
Bloom’s Taxonomy of Learning Domains	Cognitive, affective, psychomotor skills, learning domains, assessment
Knowledge Transfer	Knowledge translation, practice of knowledge
Deliberate practice	Iterative, focused, targeted practice, expertise
Assessment-based training	Learning, assessment of training, competency - based training

Additionally, bibliographies from relevant articles identified from the above searches were scanned to identify further relevant research.

Inclusion/Exclusion Criteria. A wide, unlimited range of publication years were searched considering the limitations of the available research concerning the assessment of IPECP facilitation, Shingo, and the need to include historically relevant publications supportive of the proposed research concerning Bloom's Taxonomy of Learning Domains, and deliberate practice. In order to understand current clinical and classroom practices concerning IPECP and Lean, literature searches were limited to a five-year window from the time of this study (2014 - 2019).

Data Extraction and Method of Synthesis. The data extraction process involved the search and review of several areas of study for the purpose of compiling a list of IPECP facilitator characteristics recognized as being effective in the clinical and higher education settings. In order to inform the instrument development process, additional data regarding item structuring and design was also collected. All data were organized into a table of categories using Excel software. The following areas of study were explored for the purposes of data extraction, providing guidance and substance to this dissertation research:

- IPECP facilitation
- Lean process improvement facilitation
- Bloom's Taxonomy of Learning Domains (original and revised)
- Metacognition
- The Shingo Model for improving organizational culture

IPECP data extraction. The IPFS tool provided a starting framework regarding the IPECP specific competencies that are considered to be effective. These competencies were confirmed by the literature (Banfield & Lackie, 2009; Freeth & Reeves, 2004; Hall, L. W. & Zierler, 2015; IPEC, 2016). There were many recurring themes found in the literature concerning IPECP knowledge, skills, abilities, behaviors and attitudes, helping to provide a descriptive summary of IPECP facilitation best practices.

Lean data extraction. The first pilot project involved the assessment IPECP facilitation within the context of Lean process improvement in the healthcare setting. Although the data concerning IPECP skills and competencies is still applicable to this setting, Lean process improvement methodologies, when coupled with IPECP, introduces additional technical skills and competencies that are needed for Lean/IPECP facilitation.

Therefore, the scope of the literature search was expanded to include Lean studies involving interprofessional teams in the healthcare setting that specifically included details regarding effective facilitator characteristics. Additional research data in this area of practice came from discussions with the main stakeholder, a Lean expert and leader.

Bloom's taxonomy of Learning Domains data extraction. In order to ensure proper item structure, design, and focus to the assessment parameters and intended assessment outcomes, Bloom's Taxonomy of Learning Domains was included in the literature search and data extraction framework. All studies that included any or all elements of Bloom's Taxonomy within the development of assessment instruments were included in the data extraction process.

Metacognition data extraction. Literature concerning the importance of metacognition in leadership roles and the management of team dynamics was included in order to understand the complex high-level thinking mechanisms involved in the facilitation of interprofessional teams that support desired outcomes. As an approach to informing the assessment of metacognitive knowledge, skills and abilities, research papers which described the development of instruments using one or more of the identified facets of metacognition was also included in the data extraction framework in order to provide additional structure to the proposed instrument items.

The Shingo Model data extraction. Data regarding this area of study included the input from the main stakeholder involved in the ILFAS pilot, a Lean and Shingo Model expert. A literature search confirmed this data and provided additional examples of the application of the Shingo Model and its overarching principles that help to transform organizational cultures that are supportive of organization-wide improvement initiatives. Literature involving one or all of the Shingo Model principles was included in the data extraction process.

Synthesis methods. The data extraction performed for each area of study was used to produce a descriptive summary identifying best practices in IPECP facilitation, and effective methods for structuring skill assessment instruments. Data from each area of study was examined for patterns and similarities of identified core facilitator characteristics and instrumentation methodologies, which provided a framework for the development of comprehensive facilitator performance assessment instruments. Below you will find the bodies of research concerning the above areas of study, and examples of how they were synthesized in the dissertation research.

Organizational Leadership

IPECP. The Institute of Medicine (2015) discusses interprofessional collaboration as a prerequisite for developing optimal learning environment and effective healthcare workers (Institute of Medicine, 2015). Although a recent review of interprofessional collaboration research provides some positive evidence, the evidence does not strongly demonstrate effective healthcare outcomes (Reeves, S., Perrier, Goldman, Freeth, & Zwarenstein, 2013). Regardless, IPECP has been widely recognized as an important factor in improving healthcare delivery and efficiency, considering the complex network of healthcare professionals and organizations (Reeves et al., 2013). A study by Visser, Johannes, Croiset and Kusurkar (2017) showed that a lack of collaboration among multidisciplinary teams was a barrier to the success of teamwork (Visser, Johannes, Croiset, & Kusurkar, 2017). Faculty facilitators who are competent in IPECP are better prepared to train multidisciplinary student teams in the implementation of teamwork. Evidence shows that facilitation skills are important elements in the complex process of improving performance and development of team members (Manley & Titchen, 2016).

Faculty facilitators assist in the process of navigating through the complex environment of healthcare - related teamwork and collaboration. As such, this process presents specific challenges and obstacles that need to be carefully managed. Poor facilitator performance can cause learner discouragement and overall disinclination to work collaboratively (Freeth & Reeves, 2004).

Facilitators are charged with overcoming these difficulties and guiding teams toward top performance outcomes. Therefore, it is critical to understand which skills and competencies are needed for effective facilitation of interprofessional teams. Many researchers have developed, explored and identified various IPECP competencies, further acknowledging them as being critical to the success of facilitators and teams in the healthcare setting. When reviewing these various skills and competencies, there are some similarities, emphasizing and identifying the evidence for effective facilitation skills and competencies. A list of evidence-based, IPECP-focused facilitation skills and competencies are provided in Table 3, at the end of this section.

The Interprofessional Education Collaborative (IPEC) identified competency domains containing several subcompetencies that provide a framework for delivering IPECP in the healthcare setting (IPEC, 2016). The competency domains include: Teamwork and team-based practice; Interprofessional communication practices; Roles and responsibilities for collaborative practices; values/ethics for interprofessional practice (IPEC, 2016).

Banfield and Lackie (2009) identify interprofessional (IP) facilitation competencies that are evidence-based, expert reviewed, and echo other leadership-focused competencies that are used in IPECP teams (Banfield & Lackie, 2009). These include acting as a champion of IP in education and practice, enhancing competence and skills through continuing education, supporting and manage IP group formation, utilizing knowledge and methods when training others, acknowledges group diversity and individual contributions, and includes multiple team member input in the decision making/problem solving process (Banfield & Lackie, 2009).

Other researchers offer additional insight into the skills needed for IPECP. For example, Knox (2011) discusses the act of facilitation in detail, offering guidance and a variety of teaching tools and approaches, in addition to specifying the characteristics/skills for effective facilitation (Knox, 2011). These include collaborating with teams to set clear goals, explaining goals, group maintenance, managing time and teamwork to attain goals, summarizing completed work, preparing lessons prior to team sessions, responsiveness to group needs, evaluating group work progress, monitoring group behavior/activity, setting the tone of the group session (Knox, 2011).

Additionally, IPECP research has identified facilitation characteristics that can be applied to education leadership roles and are important to consider in the development of training and assessment approaches. Freeth & Reeves (2004) identified the following presage (predictor) facilitator characteristics: Acknowledging prior knowledge and experience of learners; Understand adult problem-based learning approaches; Utilize challenging learning activities, avoiding burn-out; Recognition of possible learner knowledge and experience misconceptions that may influence design and delivery of curriculum; Enthusiasm for IPECP and professional expertise is needed to for successful outcomes as well (Freeth & Reeves, 2004). Successful team collaboration results from the facilitator's ability to be a role model in communication and leadership, as well as the facilitator's ability to understand and guide group formation, monitor dynamics (including conflict management) and promote effectiveness (Freeth & Reeves, 2004).

An article by Chou, Hirschmann, Fortin and Lichstein (2014) identifies core competencies for facilitators involved in healthcare communication training (Chou, Hirschmann, Fortin, & Lichstein, 2014). Those competencies include: Clinical interviewing skills - using inter-relational skills; Small group facilitation - develop a supportive learning environment, monitor group progress, conflict resolution, debriefing; Interpersonal skills - positive and genuine attitude; Self-directed learning - independent and effective performance; and Personal awareness - affective skills (Chou et al., 2014). Similarly, an exploratory study by Ruiz, Ezer, and Purden (2013) showed that a supportive environment, team member appreciation and respect, team building and conflict resolution and self-reflection regarding professional practice are the core strategies for IPECP facilitation (Ruiz, Ezer, & Purden, 2013).

A study investigating the training of interprofessional education facilitators, by Di Prospero and Bhimji-Hewitt (2011) showed that facilitators need to be aware of and practice team building skills such as professional self-identity, creating mutual respect to reduce interprofessional hierarchies, ensure team member participation, monitor group dynamics, and implement problem solving skills (Di Prospero & Bhimji-Hewitt, 2011).

Freeman, Wright and Lindqvist (2010) investigated interprofessional facilitator training and devised a list of necessary skills: Professional neutrality, provide support, motivation and encouragement, active listening, monitoring and responding to group dynamics, encourage collaborativeness and diversity, remain open to ideas, lead team meetings, and debrief (Freeman, Wright, & Lindqvist, 2010).

The above discussed skills and competencies show a pattern of similarities that uncover best practices in IPECP facilitation. In addition, it is clear that IPECP also involves numerous concepts that help to synthesize team outcomes. Hall and colleagues

(2013) explored a variety of theories that are involved in successful IPECP, describing the conglomerate as a weaving of several "threads" that together form key principles for developing IPECP activities (Hall, P., Weaver, & Grassau, 2013). These "threads" include: Team socialization and group dynamics; clarifying understanding and expectations; collaborative activities; reflection of activities; social support; contextual awareness; domains of learning; roles and relationships; fostering of collective learning; and relationship skills building (Hall et al., 2013). Collectively these "threads" create a platform for the facilitation of IPECP.

A systematic review by Reeves et al. (2016) discusses the role of facilitators as being supportive of IPECP by creating safe learning environments, focusing on goals, motivating and managing interactions, while ensuring individual equal participation, value and empowerment (Reeves et al., 2016). This systematic review emphasizes the lack of facilitator-focused research and the need to further explore effective characteristics.

A recent scoping review by Evans, Ward and Reeves (2018), emphasizes the role of the facilitator in creating a positive, enhanced learning environment by encouraging participation, managing team development and dynamics that are supportive of diversity and interprofessional collaborative learning (Evans et al., 2018).

The above evidence reflects many similarities that assist in the identification of effective facilitator behaviors that support IPECP Lean practices in the healthcare setting. The above research provides supportive evidence for the list of facilitator characteristics in table 3.2 below:

Table 3.2

Evidence-Based IPECP Facilitator Characteristics

Evidence	IPECP/Facilitator Characteristics
Banfield & Lackie, 2009; Freeth & Reeves, 2004; Hall et al., 2013;	The use of contextual and problem-based learning knowledge in the construction and delivery of lessons, avoiding misconceptions and conflicts in the process of IPECP
Banfield & Lackie, 2009; Evans et al., 2018; Freeth & Reeves, 2004; Hall et al., 2013; IPEC, 2016; Knox, 2011; Reeves et al., 2016; Ruiz, Ezer, & Purden, 2013; Freeman, Wright,& Lindqvist, 2010	Knowledge of team building and dynamics in order to appropriately prepare time-balanced lessons/experiences, assess knowledge and progress, guiding the team towards completing goals and objectives
Freeth & Reeves, 2004; Hall et al., 2013; IPEC, 2016; Knox, 201l; Ruiz, Ezer, & Purden, 2013; Di Prospero & Bhimji-Hewitt, 2011; Freeman, Wright,& Lindqvist, 2010	Providing effective and respectful communication (towards the team and monitoring of intra-team communication and self-awareness), while providing expectations, instruction and debriefing
Evans et al., 2018; Freeth & Reeves, 2004; Hall et al., 2013; IPEC, 2016; Ruiz, Ezer, & Purden, 2013; Di Prospero & Bhimji-Hewitt, 2011; Freeman, Wright,& Lindqvist, 2010	Understanding and respecting team diversity (ensure team members learn and respect each other's prior knowledge, experience, roles and responsibilities)
Banfield & Lackie, 2009; Evans et al., 2018; Freeth & Reeves, 2004; Hall et al., 2013; Knox, 2011; Reeves et al., 2016; Ruiz, Ezer, & Purden, 2013; Di Prospero & Bhimji-Hewitt, 2011; Freeman, Wright,& Lindqvist, 2010	Creating and monitoring an inclusive and enthusiastic environment that serves as a platform for individuals of diverse professions to equally participate in the process of IPECP
IPEC, 2016	Upholding values and ethics that are aligned with providing quality patient-

	centered care (acknowledging the similarities)
Banfield & Lackie, 2009; Freeth & Reeves, 2004; Hall et al., 2013; Knox, 2011	Act as a role model and advisor in the practice of IPECP

Lean. Process/quality improvement methodology and techniques originated in the manufacturing industry and have been applied by healthcare organizations (HCOs) in order to improve the quality and efficiency of the care delivered (Aij, Simons, Widdershoven, & Visse, 2013; Andersen, Rovik, & Ingebrigtsen, 2014; Baril, Gascon, Miller, & Côté, 2016; Lawal et al., 2014; Schweikhart & Dembe, 2009). Lean methodology is one example, among others, that involves the use of process improvement steps that assess and analyze processes, identifying areas of productivity, efficiency and quality (Baril et al., 2016; Schweikhart & Dembe, 2009).

James Womack, a researcher from the Massachusetts Institute of Technology International Motor Vehicle Program, used the term Lean, to describe the Toyota manufacturing approach. When applied to the healthcare setting, Lean approaches are designed to provide patients with maximized value by reducing wait times and experiences that are not considered valuable, therefore taking away from the quality of the health care delivered (Lawal et al., 2014; Simon & Canacari, 2012).

The inclusion of Lean into this study stems from the need to approach IPECP more as a process and less as a discrete intervention in order to bring more structured solutions to a very complex area of practice (Olson & Bialocerkowski, 2014). Additionally, research shows that Lean methodology not only helps to improve the efficiency and quality of care, it also assists in the application of research findings into clinical practice (Schweikhart & Dembe, 2009).

Moreover, systematic reviews concerning Lean applications in healthcare also reflect the need for further investigation regarding best practices and benefits of implementation (Andersen et al., 2014; Deblois & Lepanto, 2016; Mason, Nicolay, & Darzi, 2014). Although researchers in this area of practice discuss the need for supportive measures involving managers and leaders, facilitation is rarely the focus of the research, creating a gap in the knowledge needed to successfully lead IPECP teams to improve healthcare systems. This study makes contributions to this area of research by focusing on the facilitation skills necessary to successfully teach and guide teams.

Facilitators train IPECP teams during "Quality circle" sessions where they learn to apply Lean principles and the specific tools that will help address the organizational challenges at hand (Chou et al., 2014; White, Ojha, & Kuo, 2010). IPECP in the healthcare setting involves teams that are involved with direct patient care and that face administrative challenges that may impede these efforts. Whatever the challenge, facilitators can apply Lean process improvement methods and use tools to improve all issues related to the delivery and management of patient care.

IPECP Lean sessions are variable in terms of group size, length of time, and project size. While some projects may involve a large number of participants (20+) and last many weeks at a time, others may involve as few as three participants and last one hour. Facilitators are involved in the pre-planning, implementation and debriefing of such sessions. The facilitator skills and competencies needed to perform such tasks are complex and involve lower to higher-level cognitive abilities. The following studies provide evidence supporting effective Lean facilitator skills and competencies.

Shah (2008) published recommendations regarding the central components of Lean methodology. These include: (1) the support of leadership in the process of aligning improvement efforts with the organization's vision, mission and value statements, (2) providing training and development of teams and (3) creating collaborative/inclusive environment where employees receive feedback and are both empowered and appraised (Di Prospero & Bhimji-Hewitt, 2011; Shah, 2008). Simon and Canacari (2012) discuss the following facilitator/leadership characteristics that must be present in order for Lean approaches to be successful (Simon & Canacari, 2012):

- ❖ Logistical preparation for sessions
- ❖ Creating a supportive learning environment in which all participants are involved in the problem solving process
- ❖ Identifying key team members who are knowledgeable and experienced enough to make a contribution to improvement efforts
- ❖ Teaching management techniques that identify and reduce waste; timely implementation of the right tool or approach
- ❖ Involving team members in the direct observation of processes
- ❖ Clarifying misconceptions, cultivating interdepartmental collaborations, assisting in the transformation of the organization
- ❖ Utilizing visual aids to emphasize and explaining key topics
- ❖ Providing guidance being careful not to dictate solutions; use process

flow diagrams

- Time management
- Debriefing and planning next steps
- Understanding when team participation is appropriate
- Assisting team members to focus; helping team members identify areas of waste in processes
- Monitoring teamwork and progress at each session

A study by Toledo, Gonzalez, Lizarelli, and Pelegrino (2018) discusses a leadership model for Lean implementation that focuses on the role of the leader in improving and supporting organization processes and learning. Emphasized are the skills such as coaching, developing the skills of employees (including self-development), support continuous improvement efforts, ensuring the alignment of all efforts to those of the organization's vision and goals (Toledo, Gonzalez, Lizarelli, & Pelegrino, 2018).

Toivonen and Siitonen (2016), discuss the importance of the facilitator role in Lean as being important to producing productive collaboration between participants who are new to the Lean experience (Toivonen & Siitonen, 2016). Key facilitation areas of competency identified for successful Lean implementation include the review and clarification of any assigned work that is expected to be completed for the follow-up session as a way of supporting and motivating teams, use visual aids as an approach to transforming improvement project discussions into concrete processes that can be manipulated; create minimally timed work segments to decrease barriers and improve productivity; debrief results with the team as an approach to effective communication

(Toivonen & Siitonen, 2016).

Aij, Simons, Widdershoven and Visse (2013) researched a training program involving 35 team leaders from four hospital departments who were trained to be Lean facilitators (Aij et al., 2013). The authors identify four major themes for training: introduction to Lean methodology/thinking (recognizing waste and continuous improvement); implementation and management of Lean strategies (tool use, metrics, visual aids); problem solving techniques; leadership skills (standardized leadership approach) (Aij et al., 2013).

Similarly, a study by Maijala, Eloranta, Reunanen, and Ikonen (2018) discuss the importance of specific skills needed by leaders acting as facilitators of Lean processes in the healthcare setting. The skills and abilities emphasized include “problem solving, making changes occur, empowering, communicating, coaching, supporting, facilitating, [and] being democratic” (Maijala, Eloranta, Reunanen, & Ikonen, 2018).

A study by Shaw, Looney, Chase, Navalekar, Stello, Lontok and Crabtree (2010) investigated the impact of facilitators on quality improvement processes and concluded that facilitators skills should include, monitoring group discussions and work progress, team dynamics, conflict resolution, encouragement and supportive feedback (Shaw et al., 2010).

A key aspect of Lean involves the use of a multitude of conceptual and organizational tools and methods that can be applied depending on the improvement project (Industrial Technology Centre, 2004; Poksinska, 2010; Schweikhart & Dembe, 2009; Sundar, Balaji, & Kumar, 2014). The facilitator’s ability to determine which tools are most appropriate to assist the team during a process improvement session are important to the overall success of that team. Some tools provide a visual display of the process in question; other tools are designed to demonstrate Lean concepts for the purposes of participant comprehension, while other tools provide a way of tracking important metrics. Facilitators can use more or less of the available tools in order to teach Lean methodology and guide the team towards an improved process state. Examples of these tools include: "Five whys" - A simple approach asking why a process is structured in its present state five times, each time getting closer to the root of the main issue; "VSM Process map" - A value stream map depicting the current or future state of the process in question and the areas of efficiency/quality opportunities are in that process; "JIT purchasing" - Just in time purchasing is a system of ordering supplies as needed and partnering with suppliers to become part of the flexible supply system; "Visual tracking centers" - These are information displays where daily and trend data on key performance metrics are displayed for all stakeholders to monitor; "A3 process" is a table that contains problem solving steps (see Appendix B) (Belekoukias, Garza-Reyes, & Kumar, 2014; CDOT, ; Industrial Technology Centre, 2004; Poksinska, 2010; Rico, Yalcin, & Eikman, 2015; Schweikhart & Dembe, 2009; White et al., 2010).

Although there are numerous instruments to choose from, facilitators must master these tools in order to know when to implement them, and how to instruct teams in their use. Training regarding technical skills, along with cognitive skills, is an important part of competency development.

Lean initiatives vary depending on the organization, needs, resources and culture.

Similarly, the manner in which employees are trained in Lean methodology varies as well. Generally, Lean training involves the use of certifications that help to identify the level of knowledge and experience accomplished. Since there is variation in the expectation of Lean skills and competencies, it is important to gain an understanding of what skills have been identified in the literature as being effective to the practice of IPECP-Lean facilitation.

Table 3.3 below provides facilitator-focused, Lean associated skills that are needed to improve healthcare processes.

Table 3.3

Lean-derived IPECP/Lean Facilitator Characteristics

Evidence	Lean Facilitator Characteristics
Aij et al., 2013; Maijala et al., 2018; Shah, 2008; Shaw, 2010; Toivonen & Siitonen, 2016; Toledo et al., 2018	Providing leadership support to teams
Shah, 2008; Simon & Canacari, 2012; Toledo et al., 2018	Ability to align teamwork outcomes with vision, mission, values of organization
Shah, 2008; Shaw, 2010; Simon & Canacari, 2012; Toivonen & Siitonen, 2016	Create a supportive and encouraging learning environment
Maijala et al., 2018; Shah, 2008; Simon & Canacari, 2012; Toledo et al., 2018	Empower employees
Maijala et al., 2018;Simon & Canacari, 2012	Session logistics
Aij et al., 2013; Simon & Canacari, 2012; Sundar, Balaji, & Kumar, 2014; Toivonen & Siitonen, 2016; Belekoukias et al., 2014	Implementation of the right tool or continuous improvement approach

Simon & Canacari, 2012	Clarifying misconceptions
Simon & Canacari, 2012	Cultivating interdepartmental collaborations
Simon & Canacari, 2012; Toivonen & Siitonen, 2016	Time management
Maijala et al., 2018; Shaw, 2010; Simon & Canacari, 2012; Toivonen & Siitonen, 2016	Debriefing and planning next steps
Shaw, 2010	Monitoring team dynamics

The evidence-based Lean skills/methods listed above can be applied to improve systems. However, in order to sustain change, a cultural change is also needed. Research shows that process improvement systems, such as Lean, are limited by systemic factors such as a lack in both leadership support and supportive organizational culture/environment (Aij et al., 2013; Andersen et al., 2014; Godfrey, Andersson-Gare, Nelson, Nilsson, & Ahlstrom, 2014). These limitations highlight the need to disseminate organizational strategic plans, and change cultural practices.

Transformational change requires changes in organizational behavior and a receptive environment, as a foundation for implementing and fully integrating process improvement programs (Schweikhart & Dembe, 2009). HCO leaders are responsible for creating an organizational culture that is supportive of Lean transformational changes. A review of reviews by Andersen, Røvik, and Ingebrigtsen (2014), identified leadership engagement and cultural support as being important factors for effective organization-wide Lean implementation (Andersen et al., 2014; Bortolotti, Boscari, & Danese, 2015).

The following area of practice involves an approach to improving organizational culture.

Shingo. An approach to improving the culture of organizations, across all levels of the workforce, for the sustainment of process improvement outcomes, comes from a system of organizational culture improvement called the Shingo Model of Operational Excellence (Kelly, 2016; The Shingo Model, 2011). The Shingo Model of Operational Excellence, created by Dr. Shigeo Shingo, consists of several principles that are derived from over 25 years organizational assessment research and several systems of process improvement (The Shingo Model, 2011).

Shingo methodology offers both operational and cultural improvement approaches. As an approach for changing the culture of an organization, Shingo methodology provides principles regarding ideal behaviors of leaders as well as all other membership levels of an organization, which serve as a framework for developing an organizational culture of excellence (Miller, 2013).

The Shingo methodology framework is categorized into dimensions, which are the overarching themes of the principle-based approaches. When these approaches are practiced collectively, organizational culture improves creating an environment that is supportive of the implementation and longevity of implemented initiatives. The overarching themes applied to this dissertation study include:

1. **Cultural Enablers** - Facilitators are cultural enablers. They have an opportunity to introduce IPECP and explain the reasons why it is important to the team, engaging and allowing them to contribute and practice IPECP, having understood the purpose, the benefits, and how they

can take initiative to contribute to teamwork objectives (The Shingo Model, 2011). As cultural enablers, facilitators teach and guide teams towards practicing ideal behaviors that collectively improve the organizational culture in the learning environment with possible transfer to the clinical environment. An improved IPECP culture allows for the sustainability of efforts and may strengthen the effectiveness of outcomes.

2. **Improvement** - facilitators should devote a great portion of their work ensuring continuous IPECP improvement efforts (The Shingo Model, 2011). Competent facilitators are skillful in the use of collaborative approaches. In order to successfully support the IPECP strategic goals of the organization, facilitators must constantly be applying IPECP competencies as they guide student teams in reaching activity goals and objectives.
3. **Alignment -** Facilitators need to align IPECP goals and objectives with those of the institution, while in the process of guiding student multidisciplinary teams through IPECP activities (The Shingo Model, 2011). Considering the heterogeneous nature of IPECP student teams, it is possible that teams may stray from the main focus and purpose of the session. It is the responsibility of the facilitator to steer the group back on the intended path in order to accomplish goals and objectives.
4. **Results** - all efforts should be focused on bringing value to the patient, by developing metrics that help to monitor progress, creating an environment

and process for employee self-reflection of their values as they relate to those of the organization, understanding that ideal results come from the practice of ideal behavior (The Shingo Model, 2011). Facilitators ensure that all team-based efforts are fully supported and focused on the desired outcomes of quality care and efficiency in the delivery processes.

Table 3.4 below lists facilitator characteristics that are derived from the Shingo model dimensions as they pertain to facilitator principle-based behavior that contributes to a culture, which is supportive of IPECP results.

Table 3.4

Shingo-derived facilitator characteristics (The Shingo Model, 2011)

Shingo Dimensions	IPECP Facilitator Characteristics (Principle-based behavior)
Enabling	Act as coaches and mentors, incorporating feedback into IPECP efforts; listen and learn from others while spending time in the actual learning space; disseminate and clarify information to all students; create a safe and productive activities and programs; assess skills and competencies of students, providing learning opportunities (The Shingo Model, 2011).
Improving	Dedication to supporting IPECP activities by ensuring alignment with ideal, principle-based collaborative behavior; work alongside students on improving IPECP initiatives; knowledgeable of IPECP approaches that are regularly implemented;

	monitor and acknowledge students using ideal behavior and alignment of strategic goals (The Shingo Model, 2011).
Alignment	Dissemination of information to all students/team members, and ensuring clarity of context and goals; develop learning opportunities for understanding strategies and tactics, and how explaining how student contributions, recommendations and actions can have an impact on the outcomes of IPECP and overall organizational culture (The Shingo Model, 2011).
Results	Implement improvement systems that eliminate waste and create value; provide key discussions points explaining how improvement systems produce outcomes; ensure that all metrics are fully aligned and that all accountable individuals understand metric present and future targets (The Shingo Model, 2011).

Shingo principles collectively create a culture that is necessary for IPECP efforts to be sustainable (Kelly, 2016). It is important that facilitators practice Shingo principles while teaching and guiding teams in IPECP. Assessment of the application of Shingo concepts and ideal behaviors is key to ensuring a culturally supportive environment.

Hierarchical Learning Theory

The implementation of the IPECP, Lean, and Shingo require foundational learning skills that allow facilitators to learn and apply these complex strategies.

Cognitive, affective, psychomotor, and metacognitive skills are the fundamental skills needed for facilitators to master and deliver the team training approaches necessary to improve student IPECP. The assessment of these learning skills is important in order to evaluate the ability for facilitators to learn, teach and apply IPECP approaches.

Bloom's Taxonomy of Learning Objectives. Facilitators acquire knowledge and skills that require different levels of understanding and abilities. Bloom's Taxonomy of Learning Domains is a method for classifying the fundamental skills needed to perform facilitation and influence learner skill level (Duffy et al., 2015). Bloom's Taxonomy of Learning Domains is a traditional and frequently used framework for developing expectations of learning, teaching and assessment (Ahmed, Anwar, & Ameen, 2011). Although there has been some disagreement on the application and reliability of the Bloom's taxonomy, it is still widely recognized as being a useful approach to bringing structure and alignment to course objectives and assessment instruments (Fuller et al., 2007; Starr et al., 2008).

The taxonomy includes the following learning domains: Cognitive - knowledge; Affective - attitude; and Psychomotor - hands on or performance skills (Anderson, L. W. et al., 2001; Kasilingam, Ramalingam, & Chinnavan, 2014; Rovai, Wighting, Baker, & Grooms, 2009; Simpson, E. J., 1974). These three domains categorize the processes that are involved the acquisition and implementation of knowledge.

Cognitive domain. Anderson et. al. (2001), revised this domain of Bloom's taxonomy, expanding from one to two hierarchical dimensions: Cognitive Process and Knowledge Dimensions (Anderson et al., 2001; Bloom, Engelhart, Furst, Hill, &

Krathwohl, 1956). These two dimensions are organized into a two-dimensional table called the Taxonomy Table, which has been used widely to classify learning objectives, activities and assessment items from lower to higher level thinking processes (Hwang, Chen, & Huang, 2016; Krathwohl, 2002; Radmehr & Drake, 2018; Starr, Manaris, & Stalvey, 2008; Tíjaro-Rojas, Arce-Trigatti, Cupp, Pascal, & Arce, 2016).

The first dimension, Knowledge, focuses on the central subject matter of course goals and assessment items (Anderson et al., 2001). This dimension incorporates aspects of cognitive psychology that includes learner awareness and self-reflection concerning learned concepts (Krathwohl, 2002). The knowledge dimension contains four categories:

1. **Factual Knowledge** - The foundational segments of information that are needed to understand a discipline or apply problem-solving procedures. This category includes the learner's knowledge of the terminology, details and elements that are used to describe and explain the subject matter (Krathwohl, 2002).
2. **Conceptual knowledge** - Included in this category are any contextually related elements classifications, categories, principles, generalizations, theories, models or structures involved in the subject matter at hand (Krathwohl, 2002).
3. **Procedural Knowledge** - This category includes the various inquiry approaches that help to explain the details behind carrying out procedures. Accomplishment of tasks, approach to inquiry, decision-making regarding skills, algorithms, technical steps and methods (Krathwohl, 2002).

4. **Metacognitive Knowledge** - This area concerns knowledge of cognition in addition to the awareness of personal cognition (Krathwohl, 2002). Included in this category are strategic knowledge, along with contextual, conditional and self-knowledge of cognition, which collectively supports the ability to formulate decisions and take action (Krathwohl, 2002). This area of knowledge, along with other facets of metacognition are expanded upon in the chapter section after Bloom's Taxonomy, further identifying the additional high-level, complex skills and abilities needed in the process of IPECP facilitation.

The Cognitive Process dimension contains six categories that are considered hierarchical, while at the same time having some conceptual overlap and differs in complexity (Krathwohl, 2002).

1. **Remember** - The retrieval of long-term acquired knowledge, involving the acts of recognizing and recalling information, and considered to be less complex than the other categories (Krathwohl, 2002).
2. **Understand** - The determination of oral, written and visual instructions that include such actions as "interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining" (Krathwohl, 2002).
3. **Apply** - The process of situation-specific decision-making leading to the executing and implementing of procedures (Krathwohl, 2002). This category is considered to be more complex than both remember and understand, yet less complex than analyze.

4. **Analyze** - Break down information into individual parts, assessing the interrelationships between them and the broader category or purpose (Krathwohl, 2002). In this category, actions involving "differentiating, organizing and attributing" are considered to be analytical in nature (Krathwohl, 2002).
5. **Evaluate** - Reviewing criteria and standards in the decision-making process (Krathwohl, 2002). Examples of evaluative actions include "checking and critiquing" (Krathwohl, 2002).
6. **Create** - The conglomeration of elements that collectively produce an original product/idea (Krathwohl, 2002). The acts of generating, planning and producing are examples of verbs that fall into the Create category (Krathwohl, 2002).

It is important to note that the Taxonomy Table which was designed to be less rigid than the original Bloom's Taxonomy, having more flexibility to categorize items into more than one dimension (Krathwohl, 2002). Table 3.5 below demonstrates how a coder may use the Taxonomy Table to categorize ILFAS and IFPAS item core verbs and nouns.

Table 3.5

Taxonomy Table Coding Demonstration with Sample IFPAS and ILFAS items

Facilitator observable behavior	**Assessment item linked to performance**	**Core item nouns, verbs (keywords)**	**Knowledge and Cognitive Dimension Classifications**
Facilitators define IPECP	**IFPAS item # 1**	**Core noun**	Core noun

specific terminology, explain the benefits of collaborative practices, reciting goals and objectives as a point of alignment, and presenting information regarding the specific activity. Facilitators assist in the interpretation of mission statements, summarizing or classifying teamwork outcomes, explaining activity steps and components.	- Facilitator is able to clearly explain the purpose and benefits of IPECP.	phrase - purpose and benefits **Core verb** - explain	classification - **Conceptual knowledge** - This category includes contextually-related elements classifications, categories, principles, generalizations, theories, models or structures involved in the subject matter at hand (Krathwohl, 2002). Core verb classification - **Understand** - The determination of oral, written and visual instructions that include such actions as "interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining" (Krathwohl, 2002).
Facilitators are accountable for ensuring each portion of the IPECP process is completed in order to reach goals and objectives. Facilitators demonstrate and guide the implementation of procedures, providing visual learning aids, and debriefing discussions.	**IFPAS item # 12** - Facilitator accomplishes all IPECP instructional objectives as scheduled. (IFPAS item)	**Core noun** - objectives **Core verb** - accomplishes	Core noun classification - **Procedural Knowledge** - This category includes the various inquiry approaches that help to explain the details behind carrying out procedures. Accomplishment of tasks, approach to inquiry, decision-

			making regarding skills, algorithms, technical steps and methods (Krathwohl, 2002). Core verb classification - **Apply** - The process of situation-specific decision-making leading to the executing and implementing of procedures (Krathwohl, 2002).
Facilitators self-assess performance and also assess participant learning outcomes (e.g. return demonstrations, collaborative practices, managing team dynamics), informing the decision-making and critical thinking processes in order to seamlessly adapt to dynamic situations. Facilitators evaluate the quality of the work being done, providing feedback and guidance as needed.	**ILFAS item #12 -** Facilitator continuously assesses progression of teamwork, changing the facilitation approach as necessary (Bravo - Sanchez et al., (2017).	**Core noun phrase** - progression of teamwork, facilitation approach **Core verbs** - assess, changing	Core noun classification **- Metacognitive Knowledge** - This area concerns knowledge of cognition in addition to the awareness of personal cognition (Krathwohl, 2002). Core verb classification - **Evaluate** - Reviewing criteria and standards in the decision-making process (Krathwohl, 2002).
Facilitators are accountable for ensuring each portion of the IPECP process is completed in order to reach goals and objectives.	**ILFAS item # 10 - "**Facilitator implemented all Lean/Break-through methods, events and tools	**Core noun phrase** - methods, events and tools **Core verbs** - implemented,	Core noun classification - **Procedural Knowledge** - This category includes the various inquiry approaches that help

Facilitators organize activities and ensuring each step is followed, provide explanations regarding outcomes (or potential outcomes if using simulation), and linking those outcomes to identified goals and objectives.	appropriately" (Bravo - Sanchez et al., (2017).	appropriately	to explain the details behind carrying out procedures. Accomplishment of tasks, approach to inquiry, decision-making regarding skills, algorithms, technical steps and methods (Krathwohl, 2002). Core verb classification - **Analyze** - Break down information into individual parts, assessing the interrelationships between them and the broader category or purpose (Krathwohl, 2002).

The Taxonomy Table provides a visual assessment summary of the coding classification exercise from table 3.5. The Taxonomy Table is demonstrated in table 3.6 below.

Table 3.6

Demonstration of the Taxonomy Table using sample ILFAS and IFPAS items

	The Cognitive Process Dimension					
The Knowledge Dimension	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create

A. Factual Knowledge						
B. Conceptual knowledge		IFPAS 1				
C. Procedural Knowledge			IFPAS 12	ILFAS 10		
D. Metacognitive Knowledge					ILFAS 12	

Chapter four of this dissertation contains a full empirical analysis using the Taxonomy Table to compare the levels of cognitive and knowledge dimensions incorporated into the item framework of the proposed instruments, and the items of two existing facilitator performance assessment instruments.

Affective domain. Affective or "soft" skills are also important to the process of facilitation of IPECP (Stephens & Ormandy, 2018). The affective learning domain, as explained by the work by Krathwohl, Bloom and Masia (1956), involves attitudes and behavior (Krathwohl, Bloom, & Masia, 1965). For example, affective skills allow facilitators to respond to team morale and motivational spirit, in order to support more collaborative efforts. While facilitators are considered to be context experts, they are also expected to be able to use informal and empathetic forms of communication, and encouraging an open exchange-learning environment (Lessard et al., 2016; Yew & Yong, 2014).

Examples of implementing such skills include: detecting when a team has diverted their attention to the project and are losing focus (facilitators would then call their attention back to the issue at hand), being confronted with a disruptive team member (a private discussion may be needed), or if a team member is not contributing to the team's efforts (facilitators may assign them to a specific task). Overall, facilitators need to continuously monitor for team member buy-in, detect conflict and manage team dynamics, alleviate fatigue, while creating enthusiasm for improving systems.

Krathwohl, Bloom, & Masia (1965) describe the affective domain using five hierarchical levels that describe the behavioral changes that occur as individuals develop values and attitudes (Krathwohl et al., 1965; Morshead, 1965). The five identified levels of the affective learning domain include:

1. **Receiving** - The willingness to participate in the learning process, being attentive to lessons being delivered during training (Krathwohl et al., 1965; Rovai et al., 2009). Faculty facilitator trainees should have an eagerness to learn and develop competencies in order to transfer that same level of willingness to team members.
2. **Responding** - The active participation in learning activities by responding or reacting to instructions and cues (Krathwohl et al., 1965; Rovai et al., 2009). IPECP faculty facilitator and team training involves experiential learning, making the need to actively participate critical to successful training outcomes.
3. **Valuing** - A learner's appreciation of the learning experience and ideas pertaining to new concepts and plans (Krathwohl et al., 1965; Rovai et al., 2009). It is important that facilitator trainees understand and buy-in to the

purpose of applying IPECP approaches, in order to value the process and be able to explain the importance of such work to others.

4. **Organization** - The internal value system regarding self-reflection of abilities and limitations (Krathwohl et al., 1956; Rovai et al., 2009). As facilitators develop metacognitive skills, they are able to reflect on learned concepts and monitor for additional needs that could hinder or assist in the critical thinking process.
5. **Characterization by a value or value set -** Long-term value set defining personal behavior, developing a "lifestyle" (Krathwohl et al., 1956; Rovai et al., 2009). Facilitators are the enablers of cultural change, necessitating a change in their internal value system, increasing the coherence and consistency in the IPECP-focused work approach (Rovai et al., 2009).

Some of the affective skill-related keywords used in the ILFAS and IFPAS instruments include: "act", "willingness", "participate", "stimulate", "advocate", "encourage", and "attitude" (Kasilingam et al., 2014).

Apart from the cognitive and knowledge domains, and the necessary affective, "soft" skills needed in the process of facilitation, an additional learning domain involves the physical ability to perform procedures/tasks during team training sessions. This physical ability/skill involving fine and gross motor skills is the psychomotor domain (Simpson, 1966).

Psychomotor domain. Simpson (1966) explains the **psychomotor** domain (physical skills reflect learning) by seven hierarchical levels that describe the process of initial skills training toward more complex skills acquisition and creative implementation of solutions:

1. **Perception** - initial awareness of surroundings, responding to cues in order to guide physical reactions (Simpson, 1966). Examples of this level during the facilitation process includes recognizing when a team needs a break from an activity, or estimating when to move on to the next item on a list of goals.
2. **Set** - Readiness for action including the use of mental, physical and emotional forms of response to varying situations (Simpson, 1966). Facilitators have to constantly be ready to respond to the needs of the team such as providing them with visual aids and exercises that help to illustrate or demonstrate key concepts, while at the same time, recognizing their skill strengths and abilities (Simpson, 1966).
3. **Guided response** - Involves the initial stages of learning complex skills that involve guided iterative practice. Facilitation examples include building a process map for the first time after an initial demonstration, or following and referring to instructions regarding an group hands-on activity (Simpson, 1966).
4. **Mechanism** - This is the next stage of acquiring new skills, having developed confidence and stronger skills (Simpson, 1966). As facilitators are able to practice more complex skills successfully, the majority of the time, they are getting closer to developing competencies through their

ability to organize, manipulate, construct, build and assemble teaching and guiding tools (Simpson, 1966).

5. **Complex overt response** - This describes the ability to perform more complex skills/movements proficiently with accuracy, coordination and speed, requiring less effort and hesitation (Simpson, 1966). It is important for facilitators to develop this level of performance considering the complex nature of process improvement and IPECP in the healthcare setting.
6. **Adapting** - This level involve the ability to perform skill adaptation according to specific requirements or unexpected situations such as when a facilitator encounters audio or visual technical difficulties and needs to change equipment, room location, or begin to manually demonstrate lessons, avoiding delays (Simpson, 1966).
7. **Origination** - This level describes the highest level of skills that involve the ability to perform creative problem solving (Simpson, 1966). For example, facilitators may initially illustrate the present state of a process in question, and later will need to demonstrate to the team how to identify steps that can be removed in order to create more efficiency and create visual example of a new process to be implemented (Simpson, 1966).

IPECP facilitation may require many physical tasks in order to teach and guide teams. Psychomotor skills are involved when facilitators guide teams through IPECP sessions, as they prepare, construct or demonstrate visual or practical learning aids.

Without psychomotor skills, facilitators would not fully be able to guide teams through the IPECP process, which could have detrimental effects on the team's outcomes. Assessment of these activities is important to the overall skills assessment process. The psychomotor-related keywords are used in ILFAS and IFPAS instruments include “act”, “build”, “perform”, “instruct”, “explain”, and “accomplish” (Kasilingam et al., 2014).

Table 3.7 below summarizes the Bloom's Taxonomy-related keywords used in the proposed instruments.

Table 3.7

Bloom's Taxonomy Keyword Application to the ILFAS and IFPAS instruments

Bloom's Taxonomy Categories	**Bloom's Taxonomy-related Keywords used in ILFAS and IFPAS items**
Cognitive	“explains”, “instructs”, “ensures”, “accomplish”, “implemented” (Kasilingam et al., 2014)
Affective	“act”, “willingness”, “participate”, “stimulate”, “advocate”, “encourage”, and “attitude” (Kasilingam et al., 2014)
Psychomotor	“act”, “build”, “perform”, “instruct”, “explain”, and “accomplish” (Kasilingam et al., 2014)

Metacognitive processes involve the strategic synthesis and purposeful implementation of these foundational skills that result in critical thinking, decision-making and problem solving abilities needed by facilitators for successful performance outcomes.

Metacognition. This skill involves the regulation, monitoring and awareness of cognitive abilities such as “inductive reasoning, deductive reasoning, divergent thinking, information processing skills and verbal reasoning” (Marshall-Mies et al., 2000). Metacognition knowledge and skills (strategic thinking and self-reflection of knowledge) has been studied by many and has been identified as important to leadership development and higher-level critical thinking (Batha & Carroll, 2007; Black, Soto, & Spurlin, 2016; Efklides, 2006; Flavell, 1979; Magno, 2010; Marshall-Mies et al., 2000; Pintrich, 2002).

A study by Batha and Carroll (2007) showed that metacognitive skill leadership training resulted in improved decision-making skills (Batha & Carroll, 2007). Marshall-Mies et al. (2000) emphasize the importance of metacognitive skills as being critical components to effective organizational leadership abilities (Marshall-Mies et al., 2000). Black et al. (2016) found that leaders who have strong metacognitive skills are best able to perform creative problem solving, and, in addition, have a positive effect on the development of team metacognitive skills (Black et al., 2016). Although metacognition has been recognized as an essential component to leadership development, literature discussing the assessment of leadership theories is limited regarding metacognition (Torrez & Rocco, 2015).

Considering the multitude of complex tasks and processes involved in the facilitation of IPECP teams, metacognitive skills can be considered vital, providing the ability to understand the approaches to problem-solving, considering the limitations involved, and monitor the development of plans, while incorporating feedback and making adaptations to changing conditions (Marshall-Mies et al., 2000; Radmehr &

Drake, 2018). When considering the assessment of such complex, high-level thinking processes, it is important to understand the different facets of metacognition that have been recognized in the literature, in order to guide assessment approaches.

Literature regarding the study of metacognition identifies three main facets: "metacognitive knowledge", "metacognitive skills" and "metacognitive experiences" (Efklides, 2006; Flavell, 1979; Krathwohl, 2002; Radmehr & Drake, 2018). *Metacognitive knowledge* involves the awareness and monitoring of the cognitive activities (implicit/explicit knowledge about people, goals and strategic procedures) of self that can be used to help others develop this type of knowledge (Efklides, 2006; Radmehr & Drake, 2018). *Metacognitive skills* focus on the ability to control cognitive activities through the employment of certain procedures that assist in the decision-making process such as, "task orienting, planning, monitoring, regulating, and evaluating" (Efklides, 2006; Krathwohl, 2002; Radmehr & Drake, 2018). *Metacognitive experience* involves the "working" memory involving the awareness of what is felt when needing to perform a task, such as familiarity, difficulty, confidence and satisfaction, and processing the knowledge related to performing that task such as the estimation of time and effort needed to complete the task, and estimating the appropriateness of the task solution (Efklides, 2006; Radmehr & Drake, 2018).

IPECP facilitator performance characteristics involve facets of metacognition and are assessed by the proposed instruments. This is demonstrated in table 3.8 below.

Table 3.8

Facets of Metacognition and related IPECP facilitator performance characteristics

Facets of Metacognition	IPECP Facilitator Metacognition-related Performance Characteristics	ILFAS and IFPAS Sample of Items that assess Facets of Metacognition
Metacognitive knowledge	❖ Instruct and demonstrate the strategic use of tools and methodologies ❖ Provide knowledge regarding methodologies, content, and context ❖ Reviewing learned concepts, defining the problem to be solved ❖ Monitor self-performance, ensuring not to control group consensus or outcomes	**IFPAS item # 8 -** Facilitator does not control group consensus or outcomes
Metacognitive skills	❖ Assess and monitor teamwork conditions and strategic facilitation of teamwork - changing approaches in response to changing conditions ❖ Guiding/assisting teams to develop evidence-based solutions ❖ Implementing the chosen solution ❖ Devising a process for monitoring and evaluating the solution and its outcomes.	**IFPAS item # 6 -** Facilitator observes team behavior and provides feedback to manage team dynamics as needed.
Metacognitive experience	❖ Understand the complexities involved in IPECP processes (team dynamics, problem solving, collaborative practices)	**ILFAS item # 11** - "Facilitator ensures consistent alignment in all stages of process improvement in

	❖ Plan activities within the limits of time and space. ❖ Evaluate problem solving process outcomes for alignment with goals and objectives ❖ Manage the challenges team dynamics ❖ Facilitating with a positive attitude and confidence about the purpose and benefits of IPECP	order to meet organization-wide strategic goals and objectives." (Bravo-Sanchez et al., 2017). **ILFAS item # 12 -** "Facilitator continuously assesses progression of teamwork, changing the facilitation approach as necessary" (Bravo-Sanchez et al., 2017).

It is evident that metacognitive skills are advanced-level skills that are critical to IPECP facilitator performance. Additionally, the performance of metacognitive skills during the facilitation process also has an effect on group metacognitive skills, making it even more critical for facilitators to be highly proficient in this skill area (Black et al., 2016; Efklides, 2006).

Considering the implications of poor facilitator metacognitive skills, assessment procedures should incorporate the evaluation of such skills, in order to inform training and development. An example of including metacognition within the design of assessment items comes from Radmehr and Drake (2018), where they matched the meaning of item phrases to the definitions of each facet of metacognition. They concluded that using items such as these assists educators in performing targeted assessments of high-level learning performance and provides the necessary feedback that best supports students in the process of constructing their knowledge and understanding (Radmehr & Drake, 2018).

Literature regarding metacognitive skills recommends the assessment of metacognitive skills, whether informal (during coaching sessions) or formative by designing assessment instruments using the elements that capture the performance of such complicated, high-level thinking tasks (Baker & Cerro, 2000; Chevron, 2014; Magno, 2010; Marshall-Mies et al., 2000; Murray, 2014; Pintrich, 2002; Radmehr & Drake, 2018).

Pedagogical Training

Iterative - Deliberate Skills Training. Facilitation of IPECP, whether in the higher learning or clinical environment, requires facilitators to use a complex combination of knowledge, skills and abilities in the management of teamwork dynamics for the successful completion of strategic goals (Sargeant et al., 2010). This process requires a transfer of knowledge into practice, an area of study known as **knowledge translation** (KT) (Thomas et al., 2014).

Across the spectrum of IPECP programs, the duration of facilitator training can vary from a brief one-hour session to several days (LeGros, Amerongen, Cooley, & Schloss, 2015). In order for facilitator training to be successful in this complex approach, one-time training is not sufficient and should be long-term and continuous (Ruiz et al., 2013).

A study by Bylund, Brown, di Ciccone, Diamond, Eddington, and Kissane (2009), involving the assessment of facilitator competence in interprofessional communication skills training, concluded that moderate training efforts coupled with minimal practice does not fully support facilitator competence (Bylund et al., 2009). Insufficient training can result in the inability to teach and guide teams, negatively impacting team skills and competencies. As a result, poorly trained teams may struggle to apply IPECP approaches, and may ultimately have an additional impact on the patient population (Edwards, 2012).

Considering these implications, the use of iterative, deliberate practice is important in the development of facilitator skills and competencies, as well as assisting the KT process. Research by Ericsson, Krampe, Tesch-Rmer, (1993) is widely recognized as the first to apply the term “deliberate practice” to the improvement of performance that comes as a result of extensive efforts to improve skills, while maintaining motivation and managing external obstacles (Bronkhorst, Meijer, Koster, & Vermunt, 2014; Ericsson, Krampe, & Tesch-Rmer, 1993). It is through this type of deliberate, focused practice that professional development and expertise is achieved (Bronkhorst et al., 2014; Ericsson et al., 1993; LeGros et al., 2015).

This training method goes beyond mindless repetition of exercises/procedures, and incorporates focusing on overcoming weaknesses by carefully monitoring performance for ways to reach a defined goal and develop from novice to expert (Duvivier et al., 2011).

Considering these benefits, facilitator training programs should incorporate deliberate practice as a focal point, in order to develop high levels of competency. Although most organizations may struggle with logistical issues in scheduling workers for training sessions, it may be most beneficial to incorporate **structured**, **intensive** and **focused** deliberate practice of skills regardless of the limited training opportunities, as an approach to maximizing resources and strengthening outcomes.

Deliberate practice also requires that learners have additional characteristics that allow for the successful acquisition of skills such as:

- **Developing cognitive schemas** by recalling previous practice strategies that help to overcome performance challenges and help improve outcomes. Deliberate practice experiences support short-term skills memory building and contributes to the transfer to long-term skills memory development that can later be used to strategically implement skills in future performances (Edwards, 2012).
- Having the **motivation to practice** with the understanding that deliberate practice may not be inherently enjoyable, however, by applying the effort that is required for this level of practice, it provides a path for the improvement of skills and future performances (Edwards, 2012).
- **Applying metacognitive skills** used to conduct a skills self needs assessment, seek practice opportunities, self-reflect upon performance, and self-evaluate the practice of skills (Edwards, 2012).

These characteristics fall in line with previously discussed skills and competencies, helping to emphasize the need for "soft" skills training and assessment. Additionally, **high quality, structured feedback** is also needed in order ensure the development and refinement of skills and improvement of overall performance.

In order for facilitators to experience effective learning through the deliberate practice process, they need to be provided with:

- ❖ Clear instructions and expectations that are supportive of *accurate* practice and an understanding of the level of performance that is needed in order to obtain competency in skills (Edwards, 2012; Ericsson et al., 1993).
- ❖ Direct observation of performance, allowing for the opportunity to detect strengths and weaknesses that would not ordinarily be noted if left to self-assessment alone (Edwards, 2012; Ericsson et al., 1993).
- ❖ Detailed debriefing concerning areas of improvement, providing the learner with an opportunity to further discuss ways in which to improve performance (Edwards, 2012; Ericsson et al., 1993).
- ❖ Training tasks that target identified weaknesses, developing a structured training approach that allows for the improvement of skills in a structured approach (Edwards, 2012; Ericsson et al., 1993).
- ❖ Continuous monitoring of performance for the progressive improvement and determination of readiness for transitioning into higher levels of skill and competency training (Edwards, 2012; Ericsson et al., 1993).

The requirement of providing structured feedback is a critical element in the development of skills. Facilitator performance assessments carried out after each deliberate practice or on-the-job facilitation session, provides an opportunity for structured feedback. This form of training coupled with formative assessment has been found to be more beneficial to training outcomes than providing a summative assessment after several deliberate practice sessions (Garfield, 1994; Sindelar, 2011). The next section of the training theme explains this approach to training.

Assessment-Based Training. Assessment can be used as a single point of information gathering where skill and competency levels are captured and results reflecting a specific moment in time are recorded. Alternatively, assessment results can be used in conjunction with iterative skills training in order to provide continuous reference points for the progressive development of skills, by using assessment outcomes to target areas in need of improvement during the training process (Garfield, 1994). Facilitator training occurring in a repeated pattern of assessment and performance allows for several opportunities to progressively develop skills and receive feedback. This form of iterative training and assessment has been found to enhance the learning process in the attainment of both knowledge and practical skills (Sennhenn-Kirchner et al., 2016).

A book by Sindelar (2011) titled *Assessment Powered Teaching* discusses the use of assessment results as a way of using data to drive instruction (Sindelar, 2011). By using results to tailor the teaching approach, instruction becomes less about “teaching to the test”, and is more concerned about the readiness of the learner to continue with more difficult concepts and any identified needs that then become the new focus of follow-up lessons/training (Sindelar, 2011).

Hutchinson, Francis and Griffin (2014) discuss the use of assessment to map strengths and weaknesses in the continuous developmental process, in order to identify the readiness of learning (Hutchinson, Francis, & Griffin, 2014). By using this approach, facilitation instructors avoid prematurely advancing to the next topic or area of the curriculum, and leaving knowledge gaps that cause increasing difficulties in learning more advanced material (Hutchinson et al., 2014).

Constructivism learning/teaching theory and assessment. Apart from designing instruments that assess specific facilitator technical and/or soft skills that have been found to be effective to the facilitation of IPECP efforts, the literature also recognizes the importance of incorporating constructivism learning/teaching theory within the theoretical foundation of IPECP research, in order to ensure intended IPECP outcomes (Anderson, E., Smith, & Hammick, 2016b; Bonner et al., 2017; Evans et al., 2018; Olusegun, 2015; Piaget & Elkind, 1968; Sargeant, Hill, & Breau, 2010). In addition, the theory of constructivism has been linked to the cognitive theories involved in adult learning (Brandon & All, 2010). For example, Brandon & All (2010) describe an aspect of constructivist learning where the role of the learner is to use cognitive skills in the selection and processing of information, in order to formulate ideas and devise plans (Brandon & All, 2010; Thomas, Menon, Boruff, Rodriguez, & Ahmed, 2014).

This describes the intended learner IPECP experience and facilitators are charged to ensure the constructivist learning process, not as controllers of the learning process, however as guides ensuring an interactive learning environment (Brandon & All, 2010; Olusegun, 2015). As facilitators practice constructivist teaching, they support the benefits of constructivist learning which include: an increase in knowledge and satisfaction in learning, a strengthening of cognitive skills, improves knowledge transfer, and promotes social and communication skills (Olusegun, 2015).

This dissertation research includes the constructivist theory assumptions of creating a learning environment that supports both interactive learning and knowledge attainment, and includes the development of assessment instruments which evaluate the practice of facilitating constructivist learning as part of an intervention, elements strongly considered to be important to the development of best practices (Eccles, Grimshaw, Walker, Johnston, & Pitts, 2005; French et al., 2012; Michie et al., 2005; Olusegun, 2015; Steffe & Gale, 1995; Thomas et al., 2014).

The ILFAS and IFPAS instrument items are developed with the underpinnings of social constructivism, as demonstrated in table 3.9 below.

Table 3.9

Theory of constructivism - related items in the ILFAS and IFPAS instruments

Observable behaviors linked to the theory of Constructivism	**ILFAS constructivism - related items**	**IFPAS constructivism - related items**
"Rather than using the teacher's knowledge and textbooks for solving problems, the student invents solutions and constructs knowledge in the learning process. The student and the educator engage in an active dialogue, and the educator encourages students to discover principles by	"3. Facilitator provokes and stimulates teamwork interactions" (Bravo-Sanchez, et al., 2017). "4. Facilitator encourages team members to learn with, from and about each other's roles and responsibilities during the process improvement session(s)"	8. Facilitator does not control group consensus or outcomes. 5. Facilitator encourages team members to learn collaboratively about each other's roles and

themselves" (Brandon & All, 2010). "emphasis on how social constructivist perspectives support clinicians in expressing this knowledge in their professional interactions" (Thomas, et al, 2014). "Particular skills for IPE facilitation include creating supportive learning environments, explicitly valuing IPE, showing appreciation for the roles of diverse health professionals, and promoting team formation and conflict resolution" (Sargeant et al., 2010).	(Bravo-Sanchez, et al., 2017).	responsibilities during the process improvement session(s).
"A facilitator is involved as needed" (Brandon & All, 2010). "The educator becomes a facilitator and coach. Recognizing students' pre-existing conceptions, educators guide activities to build upon students' knowledge, using techniques such as experiments, problem- solving, reflective exercises, concept mapping, and dialogue to create more knowledge and understanding" (Brandon & All, 2010). "Facilitators are expected to become more aware and reflective about their use of learning and teaching strategies as they gain practice in the	"12. Facilitator continuously assesses progression of teamwork, changing the facilitation approach as necessary" (Bravo-Sanchez, et al., 2017). "9. Facilitators engage and guide all team members in the development of the process improvement plan" (Bravo-Sanchez, et al., 2017).	2. Facilitator is able to instruct and guide participants through IPECP activities. 6. Facilitator observes team behavior and provides feedback to manage team dynamics as needed

pedagogy of teaching through interaction"(Bonner, et al., 2017).		
"students who generate their own explanations to problems experience the largest academic gains" (Bonner, et al., 2017)		8. Facilitator does not control group consensus or outcomes.
"Both facilitators and learners engage in error management, cognitive restructuring, and co-construction of new knowledge" (Bonner, et al., 2017).	"12. Facilitator continuously assesses progression of teamwork, changing the facilitation approach as necessary" (Bravo-Sanchez, et al., 2017).	6. Facilitator observes team behavior and provides feedback to manage team dynamics as needed.
	"5. Facilitator displays a positive attitude during process improvement session(s). (e.g., willingness to listen, participate, value contributions, advocate)" (Bravo-Sanchez, et al., 2017).	5. Facilitator encourages team members to learn collaboratively about each other's roles and responsibilities during the process improvement session(s)

The ILFAS and IFPAS instruments listed above describe some of the ways in which facilitators support constructivist learning processes. Facilitators can create a constructivist learning environment by including the following goals: conduct learning activities that allow for student-derived knowledge construction in various forms (video, text, etc.); create a collaborative environment that is open to multiple perspectives and student-centered; to link learned knowledge to real-world application; and encourage students to self-reflect on what they learned and how to apply it (metacognitive skills)

(Honebein, 1996; Olusegun, 2015). Chapter six of this dissertation presents an IFPAS pilot study, which demonstrates of how the above goals can be a part of an IFPAS-centered intervention designed to improve IPECP facilitator skills.

The above evidence provides support for the use of comprehensive performance assessment instruments such as the ILFAS and IFPAS as part of training and development of facilitators in healthcare organizations and higher education. This dissertation demonstrates how these instruments assist in the assessment and development process through the identification of facilitator skill strengths and weaknesses, allowing for the tailoring of follow-up coaching and facilitator self - development efforts. Theory-based performance assessment instruments, such as the ILFAS and IFPAS, can inform interventions that support the transfer of knowledge, by targeting the skills development process, and close the knowledge-to-practice gap (Thomas et al., 2014). The IFPAS pilot involving assessment-based coaching is an example of an intervention that supports the transfer of knowledge and skills into practice. Full IFPAS pilot details can be reviewed in chapter 6 of this dissertation.

Conclusion

The facilitation of IPECP requires the strategic use of learned knowledge, skills, and abilities to assist healthcare professionals and students achieve similar learning and practice strategies that are supportive of the safe, efficient, effective delivery of healthcare. Currently, there is a gap in the literature that describes the facilitator characteristics needed for successful IPECP implementation, and best practices for training and assessment of those characteristics, providing little guidance to leaders of

IPECP programs. This dissertation research is intended to inform IPECP leaders in both healthcare organizations and institutions of higher learning, regarding the development of IPECP facilitator training and assessment.

This dissertation research contributes to the current IPECP literature by identifying facilitation best practices within the context of the clinical and classroom settings, expanding beyond the currently identified IPECP skills and recognizing the need for technical/physical skills that are required for successful facilitation practices. Much of what is discussed in IPECP literature regarding the practice of facilitation involves the impact of local teams and teamwork. This research provides additional guidance regarding overarching facilitation practice principles that are considered to be important to the improvement of organizational culture, helping facilitators have a wider impact on the community of their organizations or institutions.

Additionally, this research expands upon what is known about IPECP facilitator training and assessment, emphasizing the need for rich iterative training experiences that are coupled with targeted assessment feedback after each practice attempt as a best practice. The critical component to this type of training and development approach is the use of a comprehensively designed and structured instrument, which encompasses the above hierarchical identified effective performance characteristics and practice methodologies, and is structured using learning theory that targets the assessment of specific competency levels.

The ILFAS and IFPAS proposed instruments contain the above-discussed framework. As a way of demonstrating this framework design, chapter four provides an empirical examination and comparison between existing facilitator performance assessment instruments and the proposed instruments to determining how well they map to the hierarchical learning assessment components identified in the research above.

References

Ahmed, N., Anwar, M. A., & Ameen, A. M. A. (2011). A database application for bloom's taxonomy-driven assessment instruments development. *International Journal of Arts & Sciences, 4*(11), 1.

Aij, K. H., Simons, F. E., Widdershoven, G., & Visse, M. (2013). Experiences of leaders in the implementation of lean in a teaching hospital-barriers and facilitators in clinical practices: A qualitative study. *BMJ Open, 3*(10) Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edswsc&AN=000326882800029&site=eds-live

Andersen, H., Rovik, K. A., & Ingebrigtsen, T. (2014). Lean thinking in hospitals: Is there a cure for the absence of evidence? A systematic review of reviews. *BMJ Open, 4*(1) Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edswsc&AN=000337363700002&site=eds-live

Anderson, E., Smith, R., & Hammick, M. (2016a). Evaluating an interprofessional education curriculum: A theory-informed approach. *Medical Teacher, 38*(4), 385. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/26079669

Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., Raths, J., Wittrock, M. C. (2001). *A taxonomy for learning,teaching and* *assessing:A revision of bloom's taxonomy of educational objectives*. (Complete ed. ed.). New York [u.a.]: Longman.

Baker, L., & Cerro, L. (2000). 3. assessing metacognition in children and adults. *Issues in the Measurement of Metacognition,* Retrieved from http://digitalcommons.unl.edu/burosmetacognition/4

Banfield, V., & Lackie, K. (2009). Performance-based competencies for culturally responsive interprofessional collaborative practice. *Journal of Interprofessional Care, 23*(6), 611-620. doi:10.3109/13561820902921654

Baril, C., Gascon, V., Miller, J., & Côté, N. (2016). *Use of a discrete-event simulation in a kaizen event: A case study in healthcare* doi://doi-org.proxy.libraries.rutgers.edu/10.1016/j.ejor.2015.08.036

Barr, H. (2005). *Effective interprofessional education: Argument, assumption and evidence (promoting partnership for health)* (1st ed.). GB: Wiley-Blackwell. Retrieved from http://replace-me/ebraryid=10236649

Batha, K., & Carroll, M. (2007). Metacognitive training aids decision making. *Australian Journal of Psychology, 59*(2), 64-69. doi:10.1080/00049530601148371

Belekoukias, I., Garza-Reyes, J., & Kumar, V. (2014). The impact of lean methods and tools on the operational performance of manufacturing organisations. *International Journal of Production Research, 52*(18), 5346.

Black, H., Soto, L., & Spurlin, S. (2016). Thinking about thinking about leadership: Metacognitive ability and leader developmental readiness. *New Directions for Student Leadership, 2016*(149), 85-95. doi:10.1002/yd.20164

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives.handbook 1: Cognitive domain*. New York: Longman.

Bonner, S., Somers, J., Rivera, G., & Keiler, L. (2017). Effects of student-facilitated learning on instructional facilitators. *Instructional Science; an International Journal of the Learning Sciences, 45*(4), 417-438. doi:10.1007/s11251-017-9410-8

Bortolotti, T., Boscari, S., & Danese, P. (2015). Successful lean implementation: Organizational culture and soft lean practices. *International Journal of Production Economics, 160*, 182-201. doi:10.1016/j.ijpe.2014.10.013

Brandon, F., A., & All, C., A. (2010). Constructivism theory analysis and application to curricula. *Nursing Education Perspective, 31*(2), 89-92.

Bronkhorst, L. H., Meijer, P. C., Koster, B., & Vermunt, J. D. (2014). Deliberate practice in teacher education. *European Journal of Teacher Education, 37*(1), 18-34. Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com.proxy.libraries.rutgers.edu/login.aspx?direct=true&db=edswss&AN=000329897900003&site=eds-live

Bylund, C. L., Brown, R. F., di Ciccone, B. L., Diamond, C., Eddington, J., & Kissane, D. W. (2009). Assessing facilitator competence in a comprehensive communication skills training programme. *Medical Education, 43*(4), 349 8p. doi:10.1111/j.1365-2923.2009.03302.x

CDOT.Lean A3 problem solving process
. Retrieved from https://www.codot.gov/business/process-improvement/self-service/tools/a3

Chevron, M. (2014). A metacognitive tool: Theoretical and operational analysis of skills exercised in structured concept maps. *Perspectives in Science, 2*, 46-54. doi:10.1016/j.pisc.2014.07.001

Chou, C. L., Hirschmann, K., Fortin, A. H., & Lichstein, P. R. (2014). The impact of a faculty learning community on professional and personal development: The facilitator training program of the American academy on communication in healthcare. *Acad Medicine, 89*(7), 1051-1056.

Deblois, S., & Lepanto, L. (2016). Lean and six sigma in acute care: A systematic review of reviews. *International Journal of Health Care Quality Assurance, 29*(2), 192-208. doi:10.1108/IJHCQA-05-2014-0058

Di Prospero, L., & Bhimji-Hewitt, S. (2011). Learning is in the facilitation: Faculty perspectives with facilitated teaching and learning-recommendations from informal discussions. *Journal of Allied Health, 40*(4), 61.

Duvivier, R. J., van Dalen, J., Muijtjens, A. M., Moulaert, V., van, d. V., & Scherpbier, A. (2011). The role of deliberate practice in the acquisition of clinical skills. *Bmc Medical Education, 11*(101) Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com.proxy.libraries.rutgers.edu/login.aspx?direct=true&db=edswsc&AN=000301449900001&site=eds-live

Eccles, M., Grimshaw, J., Walker, A., Johnston, M., & Pitts, N. (2005). Changing the behavior of healthcare professionals: The use of theory in promoting the uptake of research findings. *Journal of Clinical Epidemiology, 58*(2), 107-112. doi:10.1016/j.jclinepi.2004.09.002

Edwards, O. W. (2012). Deliberate practice to advance teaching and learning of college-level applied skills. *American Journal of Educational Studies, 5*(1), 41. Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com.proxy.libraries.rutgers.edu/login.aspx?direct=true&db=edb&AN=79324291&site=eds-live

Efklides, A. (2006). Metacognition and affect: What can metacognitive experiences tell us about the learning process? *Educational Research Review, 1*(1), 3-14. doi:10.1016/j.edurev.2005.11.001

Ericsson, K. A., Krampe, R. T., & Tesch-Rmer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review, 100*(3), 363-406.

Evans, S. M., Ward, C., & Reeves, S. (2018). Online interprofessional education facilitation: A scoping review. *Medical Teacher,* , 1-8. doi:10.1080/0142159X.2018.1460656

Flavell, J. (1979). *Metacognition and cognitive monitoring: A new area of cognitive - developmental inquiry*. Arlington, Va.: American Psychological Association.

Freeman, S., Wright, A., & Lindqvist, S. (2010). Facilitator training for educators involved in interprofessional learning. *Journal of Interprofessional Care, 24*(4), 375-385. doi:10.3109/13561820903373202

Freeth, D., & Reeves, S. (2004). Learning to work together: Using the presage, process, product (3P) model to highlight decisions and possibilities. *Journal of Interprofessional Care, 18*(1), 43-56. doi:10.1080/13561820310001608221

French, S., Green, S., O'Connor, D., Mckenzie, J., Francis, J., Michie, S., Buchbinder, R., Schattner, P., Spike, N., Grimshaw, J. (2012). Developing theory-informed behaviour change interventions to implement evidence into practice: A systematic approach using the theoretical domains framework. *Implementation Science, 7*, 38. doi:10.1186/1748-5908-7-38

Garfield, J. B. (1994). Beyond testing and grading: Using assessment to improve student learning *Journal of Statistics Education, 2*(1)

Godfrey, M. M., Andersson-Gare, B., Nelson, E. C., Nilsson, M., & Ahlstrom, G. (2014). Coaching interprofessional health care improvement teams: The coachee, the coach and the leader perspectives. *Journal of Nursing Management, 22*(4), 464 13p. doi:10.1111/jonm.12068

Hall, L. W., & Zierler, B. K. (2015). Interprofessional education and practice guide no. 1: Developing faculty to effectively facilitate interprofessional education. *Journal of Interprofessional Care, 29*(1), 3-7. doi:10.3109/13561820.2014.937483

Hall, P., Weaver, L., & Grassau, P. A. (2013). Theories, relationships and interprofessionalism: Learning to weave. *Journal of Interprofessional Care, 27*(1), 73-80. doi:10.3109/13561820.2012.736889

Honebein, P. C. (1996). Seven goals for the design of constructivist learning environments. In B. G. Wilson (Ed.), *Constructivist learning environments: Case studies in instructional design* (pp. 11-23). Englewood Cliffs, NJ: Educational Technology.

Hutchinson, D., Francis, M., & Griffin, P. (2014). Developmental teaching and assessment
. In P. Griffin (Ed.), *Assessment for teaching* (pp. 26-57) doi:10.1017/edp.2014.8

Industrial Technology Centre. (2004). *Principles of lean thinking* National Research Council Canada.

Institute of Medicine. (2015). *Measuring the impact of interprofessional education on collaborative practice and patient outcomes* National Academies Press. Retrieved from http://nationalacademies.org/hmd/reports/2015/impact-of-ipe.aspx

IPEC. (2016). *Core competencies for interprofessional collaborative practice: 2016 update*. Washington DC: Interprofessional Education Collaborative.

Kasilingam, G., Ramalingam, M., & Chinnavan, E. (2014). Assessment of learning domains to improve student's learning in higher education. *Journal of Young Pharmacists, 6*(1), 27-33. doi:10.5530/jyp.2014.1.5

Kelly, S. (2016). Creating a culture of continuous improvement and sustainable management systems at Abbott Diagnostics Longford. *Global Business and Organizational Excellence, 36*(1), 6-24. doi:10.1002/joe.21753

Khalil, M. K., & Elkhider, I. A. (2016). Applying learning theories and instructional design models for effective instruction. *Advances in Physiology Education, 40*(2), 147-156.

Knox, R. (2011). Facilitating a small group teaching session. *InnovAiT, 4*(6), 360.

Komives, S. R., Mainella, F. C., Longerbeam, S. D., Osteen, L., & Owen, J. E. (2006). A leadership identity development model: Applications from a grounded theory. *Journal* *of College Student Development,* (4), 401.

Krathwohl, D. R. (2002). *A revision of bloom's taxonomy: An overview* College of Education, The Ohio State University.

Krathwohl, D. R., Bloom, B. S., & Masia, B. B. (1965). *Taxonomy of educational objectives, handbook II: Affective domain (the classification of educational goals).* New York: David McKay Company. Retrieved from http://catalog.hathitrust.org/Record/008307011

Lawal, A. K., Rotter, T., Kinsman, L., Sari, N., Harrison, L., Jeffery, C., Kutz, M., Khan, M.F., Flynn, R. (2014). Lean management in health care: Definition, concepts, methodology and effects reported (systematic review protocol). *Systematic Reviews, 3*(1) doi:10.1186/2046-4053-3-103

LeGros, T. A., Amerongen, H. M., Cooley, J. H., & Schloss, E. P. (2015). Using learning theory, interprofessional facilitation competencies, and behavioral indicators to evaluate facilitator training. *Journal of Interprofessional Care,* , 7p. doi:10.3109/13561820.2015.1040874

Lessard, S., Bareil, C., Lalonde, L., Duhamel, F., Hudon, E., Goudreau, J., & Lévesque, L. (2016). External facilitators and interprofessional facilitation teams: A qualitative study of their roles in supporting practice change. *Implementation Science : IS, 11*(1), 97. doi:10.1186/s13012-016-0458-7

Magno, C. (2010). The role of metacognitive skills in developing critical thinking. *Metacognition and Learning, 5*(2), 137-156.

Maijala, R., Eloranta, S., Reunanen, T., & Ikonen, T. S. (2018). Successful implementation of lean as a managerial principle in health care: A conceptual analysis from systematic literature review.*34*(2), 134-146. doi:10.1017/S0266462318000193

Manley, K., & Titchen, A. (2016). Facilitation skills: The catalyst for increased effectiveness in consultant practice and clinical systems leadership. *Educational Action Research,* , 1-24. doi:10.1080/09650792.2016.1158118

Marshall-Mies, J., Fleishman, E. A., Martin, J. A., Zaccaro, S. J., Baughman, W. A., & McGee, M. L. (2000). Development and evaluation of cognitive and metacognitive measures for predicting leadership potential. *Leadership Quarterly, 11*(1), 135.

Mason, S. E., Nicolay, C. R., & Darzi, A. (2014). The use of lean and six sigma methodologies in surgery: A systematic review. *Surgeon,* doi:10.1016/j.surge.2014.08.002

Michie, S., Johnston, M., Abraham, C., Lawton, R., Parker, D., & Walker, A. (2005). *Making psychological theory useful for implementing evidence based practice: A consensus approach* BMJ Publishing Group Ltd. doi:10.1136/qshc.2004.011155

Miller, R. (2013). A continuing lean journey: The Shingo prize at 25 -- discovering the power of principles in culture change. Retrieved from http://www.lean.org/common/display/?o=2257

Morshead, R. W. (1965). "TAXONOMY OF EDUCATIONAL OBJECTIVES HANDBOOK II: AFFECTIVE DOMAIN" by D. Bloom, B. Bloom and B. B. Masia. *Studies in Philosophy and Education, 4*(1), 164. Retrieved from http://search.proquest.com/docview/1298007877

Murray, J. W. (2014). Higher-order thinking and metacognition in the first-year core-education classroom: A case study in the use of color-coded drafts. *Open Review of Educational Research, 1*(1), 56-69. doi:10.1080/23265507.2014.964297

Olson, R., & Bialocerkowski, A. (2014). Interprofessional education in allied health: A systematic review. *Medical Education, 48*(3), 236-246. doi:10.1111/medu.12290

Olusegun, B. S. (2015). Constructivism learning theory: A paradigm for teaching and learning. *IOSR Journal of Research & Method in Education, 5*(6 Ver I.), 66-70.

Piaget, J., & Elkind, D. (1968). *Six psychological studies*. New York: Vintage Books.

Pintrich, P. R. (2002). *The role of metacognitive knowledge in learning, teaching, and assessing* College of Education, The Ohio State University.

Poksinska, B. (2010). The current state of lean implementation in health care: Literature review. *Quality Management in Health Care, 19*(4), 319-329. doi:10.1097/QMH.0b013e3181fa07bb

Radmehr, F., & Drake, M. (2018). *An assessment-based model for exploring the solving of mathematical problems: Utilizing revised bloom's taxonomy and facets of metacognition* Elsevier Ltd. doi:10.1016/j.stueduc.2018.02.004

Reeves, S., Perrier, L., Goldman, J., Freeth, D., & Zwarenstein, M. (2013). *Interprofessional education: Effects on professional practice and healthcare outcomes (update)*

Reeves, S., Fletcher, S., Barr, H., Birch, I., Boet, S., Davies, N., McFayden, A., Rivera, J., Kitto, S. (2016). A BEME systematic review of the effects of interprofessional education: BEME guide no. 39. *Medical Teacher, 38*(7), 656-668. doi:10.3109/0142159X.2016.1173663

Rico, F., Yalcin, A., & Eikman, E. A. (2015). Technology integration performance assessment using lean principles in health care. *American Journal of Medical Quality, 30*(4), 374-381. doi:10.1177/1062860614536767

Rovai, A. P., Wighting, M. J., Baker, J. D., & Grooms, L. D. (2009). Development of an instrument to measure perceived cognitive, affective, and psychomotor learning in traditional and virtual classroom higher education settings. *The Internet and Higher Education, 12*, 7-13. doi:10.1016/j.iheduc.2008.10.002

Ruiz, M. G., Ezer, H., & Purden, M. (2013). Exploring the nature of facilitating interprofessional learning: Findings from an exploratory study. *Journal of Interprofessional Care, 27*(6), 489-495. Retrieved from http://informahealthcare.com/jic

Sargeant, J., Hill, T., & Breau, L. (2010). Development and testing of a scale to assess interprofessional education (IPE) facilitation skills. *The Journal of Continuing Education in the Health Professions, 30*(2), 126. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/20564701

Schweikhart, S. A., & Dembe, A. E. (2009). *The applicability of lean and six sigma techniques to clinical and translational research*

Sennhenn-Kirchner, S., Kirchner, B., Goerlich, Y., Schiekirka, S., Simmenroth, A., Notbohm, M., & Raupach, T. (2016). The effect of repeated testing vs repeated practice on skills learning in undergraduate dental education. *European Journal of Dental Education,* doi:10.1111/eje.12254

Shah, H. A. (2008). *A role delineation study for the SME/AME/Shingo lean* *manufacturing certification program* (Ph.D.). Available from ProQuest Dissertations & Theses A&I. (89126673). Retrieved from http://search.proquest.com.proxy.libraries.rutgers.edu/docview/89126673?accountid=13626

Shaw, E., Looney, A., Chase, S., Navalekar, R., Stello, B., Lontok, O., & Crabtree, B. (2010). 'In the moment': An analysis of facilitator impact during a quality improvement process. *Group Facilitation: A Research & Applications Journal, 10*, 4-16.

Simon, R. W., & Canacari, E. G. (2012). A practical guide to applying lean tools and management principles to health care improvement projects. *AORN Journal, 95*(1), 85-103. doi:10.1016/j.aorn.2011.05.021

Simpson. (1966). *The classification of educational objectives, psychomotor domain*. United States: University of Illinois, Urbana.

Simpson, E. J. (1974). In Kibler R. J., Cegala D. J., Barker L. and Miles D. T. (Eds.), *The classification of educational objectives in the psychomotor domain*. United States: Retrieved from http://catalog.hathitrust.org/Record/000354912

Sindelar, N. W. (2011). *Assessment-powered teaching*. Thousand Oaks, Calif: Corwin Publishing. Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com.proxy.libraries.rutgers.edu/login.aspx?direct=true&db=nlebk&AN=690919&site=eds-live

Steffe, L. P., & Gale, J. E. (1995). *Constructivism in education*. Hillsdale, NJ, US: Lawrence Erlbaum Associates, Inc.

Stephens, M., & Ormandy, P. (2018). Extending conceptual understanding: How interprofessional education influences affective domain development. *Journal of Interprofessional Care, 32*(3), 348-357. doi:10.1080/13561820.2018.1425291

Sundar, R., Balaji, A. N., & Kumar, R. M. S. (2014). A review on lean manufacturing implementation techniques. *Procedia Engineering, 97*(-), 1875-1885. doi:10.1016/j.proeng.2014.12.341

The Shingo Model. (2011). Shingo model handbook for operational excellence. Retrieved from http://lean.nh.gov/documents/Shingo%20Model%20Handbook.pdf

Thomas, A., Menon, A., Boruff, J., Rodriguez, A. M., & Ahmed, S. (2014). *Applications of social constructivist learning theories in knowledge translation for healthcare professionals: A scoping review*

Toivonen, T., & Siitonen, J. (2016). Value stream analysis for complex processes and systems. *Procedia CIRP, 39*, 9-15. doi:10.1016/j.procir.2016.01.035

Toledo, J. C., Gonzalez, R. V. D., Lizarelli, F. L., & Pelegrino, R. A. (2018). Lean production system development through leadership practices. *Management Decision,* doi:10.1108/MD-08-2017-0748

Visser, C. L., Johannes, C. K., Croiset, G., & Kusurkar, R. A. (2017). Perceptions of residents, medical and nursing students about interprofessional education: A systematic review of the quantitative and qualitative literature. *BMC Medical Education, 17*, n/a. doi://dx.doi.org.proxy.libraries.rutgers.edu/10.1186/s12909-017-0909-0

White, R. E., Ojha, D., & Kuo, C. (2010). A competitive progression perspective of JIT systems: Evidence from early US implementations. *International Journal of Production Research, 48*(20), 6103.

Yew, E., & Yong, J. (2014). Student perceptions of facilitators' social congruence, use of expertise and cognitive congruence in problem-based learning. *Instructional Science, 42*(5), 795-815. doi:10.1007/s11251-013-9306-1

Chapter IV: Comparative Analysis

Current State of IPECP Implementation and Research

Literature concerning assessment and best practices of IPECP facilitation in the healthcare setting is limited and the use of theory is minimal, leaving an unclear pathway to understanding the effects and goals of IPECP (Reeves et al., 2016). IPECP facilitator performance assessment approaches are strengthened by the use of theory, clarifying evaluation assumptions, sharpening the focus of course design and evaluation approaches, while increasing the quality of the findings towards the generalizability of the intended and unintended effects of IPECP (Reeves, Boet, Zierler, & Kitto, 2015; Thomas, Menon, Boruff, Rodriguez, & Ahmed, 2014).

This research contributes to the body of knowledge concerning effective IPECP facilitation characteristics. The ILFAS and IFPAS proposed instruments contain theory-based, skill and competency components that collectively form a comprehensive approach to the assessment of the facilitator performance characteristics considered to be crucial to the success of IPECP in the clinical and classroom settings. Each proposed instrument contains a unique framework of theory and structure, in comparison to existing facilitator performance assessment tools.

Currently, no other IPECP instrument includes the combination of theory and methodology components contained within the ILFAS and IFPAS proposed instruments (Lean, IPECP, Shingo, Bloom's original and revised Taxonomy of Learning Domains, Metacognition). However, a recent study by Rahmehr and Drake (2018)--focusing on mathematics education--did include the revised version of Bloom's Taxonomy along with the facets of metacognition within the framework of their student mathematics performance assessment instruments, designed for the higher education setting (Radmehr & Drake, 2018). They found that using assessment items designed with this framework resulted in the ability for educator to target aspects of intended student learning and "activate different cognitive processes in a student's mind" (Radmehr & Drake, 2018).

This chapter provides an empirical examination of and comparative assessment between three existing facilitator assessment approaches (PP/SF, CFACS, IPFS) and the proposed ILFAS and IFPAS instruments, demonstrating the extent to which each instrument contains high-level complex knowledge and cognitive process assessment items (evaluated using the revised Bloom's Taxonomy - The Taxonomy Table), as well as the range of classified item assessment outcomes using the modified Kirkpatrick's educational outcomes framework (Barr, 2005; Bylund et al., 2009; Krathwohl, 2002; Pittenger, Fierke, Kostka, & Jardine, 2016; Sargeant, J., Hill, & Breau, 2010).

Methods

Facilitator training provides trainees with knowledge and skills, and can target specific learning outcomes that range from an individual level (attitudes/perceptions and changes in practice), to a broader level (organizational/population), collectively supporting similar learning outcomes for student receivers of the facilitation experience. For example, facilitators guide participants in collaborative practices that may help them develop new IPECP skills, influencing them to utilize new collaborative approaches in their everyday practice (outside of the IPECP session), and as participants (and facilitators) use IPECP more widely, there is a collective shift in organizational culture in support of IPECP, with possible positive end-effects on patient care outcomes. It is important for facilitators to understand and demonstrate how their role supports this process, therefore it is important that facilitator performance assessment instruments be designed to evaluate these core aspects of IPECP facilitation.

The following two methods help to uncover the approach of each facilitator performance assessment instrument to evaluating various level of facilitator knowledge and skills (using the Taxonomy Table), as well as the range of expected facilitator learning outcomes (using the modified Kirkpatrick's model). Considering the complexities involved in IPECP facilitation, it is important that facilitator performance assessment instruments be able to comprehensively assess a wide level of knowledge and skills, as well as facilitator learning outcomes.

The Taxonomy Table. An empirical analysis of the proposed and existing facilitator performance assessment instruments is conducted as a way of uncovering areas of strengths, weaknesses, and opportunities for improvement. In order to perform a detailed comparison, facilitator assessment tool items are classified using a revised version of Bloom's Taxonomy in the form of the Taxonomy Table (Anderson et al., 2001).

The original Taxonomy was designed as a hierarchical framework for classifying statements or questions by the type of knowledge expected to be learned by students as a result of instruction and how that knowledge is expected to be used (Krathwohl, 2002). The categories in the original Taxonomy include the following: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956).

The revised version of Bloom's Taxonomy, developed by Anderson et al. (2001), expands from the original to a two dimensional model, placing the type of knowledge expected/intended to be learned into its own dimension (the Knowledge Dimension), and how the learned knowledge is expected/intended *to be used* as a second dimension (the Cognitive Process Dimension) (Anderson et al., 2001). The Knowledge Dimension includes the following categories: Factual Knowledge, Conceptual Knowledge, Procedural Knowledge, Metacognitive Knowledge (Krathwohl, 2002). The Cognitive Process Dimension includes the following categories: Remember, Understand, Apply, Analyze, Evaluate, Create (Krathwohl, 2002).

Both dimensions are still considered to be hierarchical, however, not rigidly cumulative as in the original Taxonomy, therefore one level is not necessarily a prerequisite for the next level, however, each level is more complex than the other (Anderson, 2005). In addition, when categorizing items that contain more than one cognitive process, the item is ultimately classified according to the most complex cognitive process present within the structure of the item (Anderson, 2005).

Both dimensions are organized as a table that provides for a visual display of the analysis and classification of the cognitive and knowledge dimensions contained within the framework of assessment instrument items. This classification framework can be used to develop learning objectives, activities, and assessment approaches that are aligned according to the intended level of knowledge (basic to complex) and proficiency (low to high-levels) (Radmehr & Drake, 2018). This system of classification provides educators (or in this case, tool evaluators) with an efficient, standardized approach to designing course objectives, curriculum and assessment instruments, providing learners with clear and consistent expectations, making the learning and development process less turbulent and more focused (Anderson, 2005; Radmehr & Drake, 2018). The revised Bloom's Taxonomy has been used to construct assessment instruments in a variety of practice areas (Hwang, Chen, & Huang, 2016; Radmehr & Drake, 2018; Tíjaro-Rojas, Arce-Trigatti, Cupp, Pascal, & Arce, 2016).

Hwang et al., (2016), used the revised version of Bloom's Taxonomy to design an electronic tutoring system using coded exam questions (designed for an introductory course, purposely designed to measure lower-level knowledge and cognitive dimensions). The system was used as a student subject intervention, which provided immediate feedback regarding their level of knowledge and cognitive performance when questions were answered. The results showed that those students who were part of the intervention group performed better than those in the control group.

Radmehr & Drake (2018) used the Taxonomy Table to design math exam items for a higher education course. The Table was not used as a cross tabulation assessment instrument, however each dimension was used individually in order to tailor each assessment item to categories within each dimension, using keywords related to each category. In doing so, they concluded that assessment question banks can be created or redesigned using Bloom's revised Taxonomy, informing institutional teaching approaches to best develop, explore and expose thinking processes and promote genuine thinking among students (Radmehr & Drake, 2018).

Tíjaro-Rojas, Arce-Trigatti, Cupp, Pascal, and Arce (2016) used the Taxonomy Table in order to design engineering core course objectives that expand to the higher-level thinking cognitive processes (analyze, evaluate), and aligning these to learning activities and assessment questions in order to improve student motivation, understanding and retention in courses (Tíjaro-Rojas et al., 2016). The integration of the Taxonomy Table into these course components was accomplished by using keywords within their design.

Applying the Revised Bloom's Taxonomy to IPE Facilitator Assessment. The classification process demonstrated in the following comparative analysis utilizes a similar approach as those used in the above examples. Each instrument item is closely examined in order to identify the keywords (verbs and nouns) related to each dimension category. For example, an IFPAS item number one (1) states: "Facilitator is able to clearly explain the purpose and benefits of IPECP". The word "explains" is the key verb that involves understanding the topic in order to explain it to others, therefore the Taxonomy Table column assignment is "Understanding". However, it may also be considered as "Apply" since the word "explains" may be associated with the cognitive process of "Executing" (Krathwohl, 2002; Radmehr & Drake, 2018). This example helps to illustrate one of the design features of the revised Taxonomy, which Anderson et al. (2001) explains as a hierarchical classification system that is less rigid, with each level being more complex than the next, however allowing for some overlap (Anderson et al., 2001).

Next the key noun phrase “purpose and benefits” is classified as “Conceptual knowledge” since it involves the understanding of a conceptual topic (IPECP), completing the cross-tabulation assessment and placing the location of this item in the B2 intersection of the Taxonomy Table See the location of item one of the IFPAS instrument in table 4.1 below.

Table 4.1

Taxonomy Table using the revised Bloom’s Taxonomy (Krathwohl, 2002)

	The Cognitive Process Dimension					
The Knowledge Dimension	1 Remember	2 Understand	3 Apply	4 Analyze	5 Evaluate	6 Create
A. Factual Knowledge						
B. Conceptual knowledge		IFPAS 1				
C. Procedural Knowledge						
D. Metacognitive Knowledge						

IFPAS - Interprofessional Facilitator Performance Assessment Scale

The complete analysis of each instrument provides a visual determination of the extent to which the items are representative of the facilitator’s levels of knowledge and cognitive processes, reflecting the expected level of knowledge and performance designed within the framework of each assessment instrument (Krathwohl, 2002). The Taxonomy Table analysis results can inform both facilitator training and assessment, providing an opportunity for IPE program leadership to examine their facilitator training approach, align that training to IPE program objectives, facilitation objectives, and assessment instruments, providing clarity and direction to facilitators' regarding expectations. See appendix B for the full details of Krathwohl's revised version of Bloom's Cognitive Process and Knowledge Dimension, and the Taxonomy Table with sample keywords.

Modified Kirkpatrick's educational outcomes. Education/training program outcomes from course/session objectives, activities and assessment procedures, can collectively have an impact on learners, organizations, and the patients they serve (Reeves et al., 2015). In other words, IPECP activities are not merely about facilitator performance, but also may have targeted student, organizational, and patient care quality outcomes as well. In order to ensure that IPECP activity sessions are targeting the intended educational outcomes, it is important to examine the performance of the facilitator for alignment with the targeted goals. As a second method for the comparative analysis in this chapter, the educational outcomes of the proposed and existing facilitator performance assessment instruments will be examined using a modified version of Kirkpatrick's educational outcomes model, revealing and comparing the various levels of learning outcomes from the individual level to the organizational level.

Donald Kirkpatrick first introduced an outcomes assessment model in 1959, providing an approach for educators to develop and confirm the intended educational outcomes (Kirkpatrick, 1996). The original Kirkpatrick model includes the following four hierarchical education outcomes levels: Level 1-Reaction (a change in the way learners feel), Level 2-Learning (acquired knowledge, skills and attitudes), Level 3-Behavior (behavior changes in response to training), and Level 4-Results (measurable outcomes such as cost efficiency, higher productivity and improved quality) (Kirkpatrick, 1996).

The modified version of Kirkpatrick's educational outcomes model, by Barr Koppel, Reeves, Hammick, and Freeth (2005), expands upon levels two and four in order to further delineate how IPE event or program components can impact interprofessional education learning and results (Barr, 2005). This modification resulted in 6 hierarchical levels (Barr, 2005; Kirkpatrick, 1996; Reeves et al., 2016) (see appendix B for more details regarding each level):

- Level 1 – **Reaction** [learner feedback]: for example, did the facilitator enjoy the IPE event?
- Level 2a – **Modification of attitudes/perceptions**: for example, do facilitators have a positive attitude when explaining and demonstrating IPECP?
- Level 2b – **Acquisition of knowledge/skills**: for example, are facilitators able to guide and demonstrate respectful collaborative communication skills?
- Level 3 – **Behavioral change**: for example, are facilitators able to explain and demonstrate how IPECP can be incorporated into professional

practice?

- Level 4a – **Change in organizational practice**: for example, are facilitators able to discuss and demonstrate how IPECP can change organizational culture when widely practiced?
- Level 4b – **Benefits to patients/clients** [eg. patient care outcomes]: for example Can facilitators explain and demonstrate the connection between learning and practicing IPECP in the classroom and how these practices can be transferred to the clinical setting in order to improve the quality of patient care?

Levels 1-2b are usually sufficient to meet the needs of local stakeholders such as educators and professional organizations, though not sufficient enough to explain how IPECP changes behavior or has an impact on patients and organizations (levels, 3, 4a, and 4b) (Reeves et al., 2016). These higher-level learning outcomes may have more of an impact on national stakeholders who can respond through changes in policy, funding and regulations (Reeves et al., 2015).

Considering the importance of IPECP in the effort towards improving the quality of healthcare, it is important for IPE facilitators to achieve these educational outcomes in order to support the achievement of the same educational outcomes in students. Thus, a facilitator assessment tool should include the evaluation of these educational outcomes.

The modified version of Kirkpatrick's model has been used within the contexts of IPECP, healthcare professions and medical education. Several papers by Reeves and associates have used this model in order to examine the outcome scope of IPECP studies through systematic and scoping reviews, providing guidance for assessing programs and developing evaluation instruments (Reeves et al., 2015; Reeves et al., 2016; Reeves, Palaganas, & Zierler, 2017). In using this model, they consistently demonstrate and confirm that the majority of IPECP research involved assessment approaches at levels 1, 2a and 2b, focusing on reactions, attitudes, perceptions, and knowledge, limiting what is known about the impact on behaviors, organizations and patient care (Reeves et al., 2017).

A systematic literature review by Miller and Archer (2010), used Barr's adaptation of the Kirkpatrick model to evaluate the educational impact of medical education performance assessments (Miller & Archer, 2010). They found that the majority of studies in their review used assessment approaches that focused on learner self-reported outcomes (level one), and as such, did not provide strong evidence regarding changes in behavioral practice (Miller & Archer, 2010).

Buckley, Coleman, Davison, Khan, Zamora, Malick, Morley, Pollard, Ashcroft, Popovic and Sayers (2009) used the modified version of Kirkpatrick's model to assess the scope of the educational outcomes in a systematic review of papers regarding the use of education portfolios as learning assessment instruments. The majority of the papers assessed their outcomes at level one (Reaction) on the modified Kirkpatrick's scale, and the authors emphasized a need to strengthen the evidence base by broadening the outcomes assessment beyond the Reaction level, along with including the direct observational assessments of student knowledge and abilities (Buckley et al., 2009).

The above examples demonstrate how the modified Kirkpatrick outcomes assessment model has been used to evaluate the educational outcomes of assessment frameworks, helping to examine program objectives or provide an opportunity for alignment and strengthening of intended educational outcomes for further program development. Similarly, this chapter will demonstrate the use of this outcomes assessment model to evaluate and compare the ILFAS and IFPAS instruments and three existing IPECP facilitator performance assessment instruments (PP/SF, IPFS, C-FACS), which are the few instruments available today.

Structure of the Analysis

The comparative analysis below is structured as follows. The content and context of each instrument will be described, followed by a cross-tabulation analysis using the Taxonomy Table and an analytical examination of the assessment framework using the modified version of Kirkpatrick's outcomes assessment model. After each analysis, findings are reviewed and recommendations are made regarding any areas of weakness. The results are then summarized in a table in order to visually compare and contrast the analytical outcomes framework of each instrument, and the ability of each instrument to capture the assessment of the higher, more complex levels of the cognitive and knowledge dimensions (Apply, Analyze, Evaluate, Create; Procedural, Metacognitive Knowledge).

SF and PP: Assessment of Student Facilitator Training

Background and description. The first example of an existing facilitator performance assessment instrument comes from Pittenger, Fierke, Kostka, & Jardine

(2016), which present a mixed-methods study that investigates an IPECP facilitator training program called the Interprofessional Leadership and Facilitation Course (ILFC), a course designed to train advanced healthcare profession students (dentistry, medicine, pharmacy, and occupational therapy) to facilitate a first-year student IPECP program called the (Foundations of Interprofessional Communication and Collaboration (FIPCC) at the University of Minnesota (Pittenger et al., 2016). The study was performed over two years, involving a total of 119 faculty and 82 advanced-level healthcare profession students.

Although social constructivism theory is offered as an explanation of the approach of using advanced peers in the educational process, additional details as to how this or any other theory is incorporated into the design of the training program is not provided (Pittenger et al., 2016).

Analysis. In order to assess facilitator performance, two assessment instruments were developed: The peer/participant evaluation (PP) (used for student participants to evaluate faculty and student facilitators), and the student facilitator self-evaluation (SF) (student facilitator self-reflection and experience feedback) (Pittenger et al., 2016). Both instruments use an electronic format with a 7-point Likert scale (Strongly disagree, disagree, somewhat disagree, neither agree or disagree, somewhat agree, agree, and strongly agree). No details regarding the development, validation, reliability testing or psychometrics of assessment instruments were provided.

The analysis of these facilitator performance assessment instruments, using the revised Bloom's Taxonomy, reveal the learning expectations of the assessment framework. The PP and SF instrument items, key verbs and nouns, and the revised Bloom's Taxonomy analysis are listed in table 4.2 below. The complete Taxonomy Table analysis is further below in table three (4.3).

Table 4.2

Peer Participant (PP) and Student Facilitator (SF) assessment items (Pittenger et al., 2016), key verb and nouns, and the revised Bloom's Taxonomy analysis

PP Items	**Key Verbs/ Verb Phrases**	**Key Nouns/ Noun Phrases**	**Revised Taxonomy analysis and Table Cell Coordinates**
1. Overall I would rate my facilitator as effective	Rate	Facilitator	Evaluate/ Conceptual Knowledge (B5)
2. My facilitator showed an interest in and commitment to interprofessional education and the FIPCC course	Showed	Interest and commitment	Apply/Conceptual Knowledge (B3)
3. My facilitator encouraged participation and facilitated discussion by all members of my small group	Encouraged, facilitated	Participation, discussion	Create/Procedural Knowledge (C6)
4. My facilitator was prepared and effective in engaging the course material	Engaging	Course material	Apply/Procedural Knowledge (C3)
SF Items	**Key Verbs/ Verb Phrases**	**Key Nouns/ Noun Phrases**	**Revised Taxonomy analysis and Table Cell Coordinates**
1. Being a FIPCC facilitator was a valuable	Being, was	Facilitator, experience	Evaluate/Conceptual Knowledge

experience			(B5)
2. I would recommend that other students in my program volunteer to be a FIPCC facilitator	Recommend	A FIPCC facilitator	Evaluate/Procedural Knowledge (C5)
3. Being a FIPCC facilitator positively influenced my understanding of other professions	Being, influenced	A FIPCC, understanding	Understand/ Conceptual Knowledge (B2)
4. Being a FIPCC facilitator positively influenced my future role as a collaborative health professional	Being, influenced	FIPCC, role	Apply/ Conceptual Knowledge (B3)

FIPCC-Foundations of Interprofessional Communication and Collaboration; PP-Peer Participant; Student Facilitator (SF)

The two ILFC facilitator performance assessment instruments will be collectively considered a single assessment framework for the purposes of the following analysis. The cognitive and knowledge dimension cross-tabulation analysis of the PP and SF evaluation items are found in table 4.3 below.

Table 4.3

Taxonomy Table analysis of performance assessment items (Krathwohl, 2002)

	The Cognitive Process Dimension					
The Knowledge Dimension	1 Remember	2 Understand	3 Apply	4 Analyze	5 Evaluate	6 Create
A. Factual Knowledge						

B. Conceptual knowledge		SF 3	PP 2 SF 4		SF1 PP1	
C. Procedural Knowledge			PP4		SF 2	PP3
D. Metacognitive Knowledge						

PP - Peer/participant evaluation of facilitators; SF - Student facilitator self-evaluation

The examination of both facilitator performance evaluation instruments within the table, shows that 38% of the items fall within the cross-tabulations of the higher, more complex levels of the cognitive and knowledge dimensions (Apply, Analyze, Evaluate, Create; Procedural and Metacognitive Knowledge), and the majority of the items are categorized in the lower-level cross tabulation cells. This analysis did not result in any items categorized in the "Analyze" or "Metacognitive Knowledge" dimensions.

The analysis of facilitator trainee expected learning outcomes of the PP instrument, using the modified Kirkpatrick model, reveals a strong focus on Reaction (level one), emphasizing effectiveness of course delivery, commitment to IPE, encouragement of participants, and preparedness. This level indicates the general views and perspectives of the facilitator trainee regarding quality of teaching/training methods, and the overall learning experience (Reeves et al., 2016).

The SF instrument item expected learning outcomes assessment can be categorized as levels 2a-change in facilitator trainee attitudes/perception, and level 3-

behavioral change (Barr, 2005). Level 2a is indicated for questions one, two, and three since they capture the student facilitator's attitude towards the experience, and perspective regarding the participation and expertise of others. Question four translates into the facilitator trainee's willingness to incorporate learned concepts into the practice of IPECP (Level 3) (Reeves et al., 2016).

Review and recommendations. The Taxonomy Table analysis reflects this program's limitations regarding the assessment of facilitator performance. Omitted areas of this assessment framework include the skills and knowledge levels of the "Analyze" category column, and the "Metacognitive Knowledge" row, signaling missed opportunities to assess the facilitator's ability to analyze basic to complex levels of knowledge, and self-reflect on learned knowledge in order to modify the facilitation approach as necessary (Krathwohl, 2002).

Considering that these skills are critical to the success of the facilitation process, a recommendation would be to redesign or add items which help to capture these important Cognitive and Knowledge Dimension areas. The inclusion of these types of assessment items would help to inform facilitator training efforts towards developing these advanced skills, therefore an important recommendation would be to redesign or add additional items which help to capture the mastery of advanced facilitator knowledge and skills. A final recommendation is to validate and test present tools for reliability, or seek tools that are valid, reliable, and comprehensive in order to best inform the facilitator training and development process.

The modified Kirkpatrick assessment outcomes analysis of the PP instrument reveals a narrow focus on level one (Reaction) outcomes. Although the PP tool is intended to be used as a second-person assessment instrument (by the learner), helping to capture their reactions to the facilitation experience, it is also an important opportunity to gather additional information regarding facilitator knowledge, skills, attitudes, role model behavior, and the ability to explain and demonstrate how IPECP may have an organizational-wide impact on patient care outcomes (Reeves et al., 2016). Therefore, a recommendation would be to increase the number of PP instrument items that expand beyond Level one (Reaction) outcomes.

The SF instrument does expand beyond Level one, as a first-person assessment instrument intended to capture the feedback of student facilitators. The outcomes assessment for this instrument ranges from level 2a (changes in attitudes/perceptions) to level 3 (change in behavior). Questions one, two and three are categorized at level 2a since they all provide insight as to how the training and facilitation experience has changed their personal views and their willingness to recommend the same experience to others. Overall, the SF instrument adds to the assessment framework of the ILFC, however, a recommendation would be to expand the outcomes assessment approach to capture if the learner has understood how their newly acquired knowledge, skills, attitudes and behaviors (as facilitators) have an overall impact on the organization's culture and how that collectively impact the quality of patient care.

IPFS: Assessment of Faculty Facilitator Training

Background and description. A mixed-methods study by Jones, Schuer, Ballard, Taylor, Zephyr, and Jones (2015) explores an IPECP faculty facilitator training program based at the University of Kentucky (UK), Colleges of Pharmacy and Health Sciences (Jones et al., 2015). The study involves 12 faculty-facilitator trainees (Pharmacy and Physician Assistant), evaluated by 174 Pharmacy and Physician Assistant students, using a validated facilitator performance assessment instrument called the interprofessional facilitation scale (IPFS), developed by Sargeant & Breau (2010) (Sargeant, Joan, Hill, & Breau, 2010).

The program was modeled after the IPECP facilitator training program developed by the University of Washington (UW) and the University of Missouri (UM) called the Interprofessional Faculty Development in Team-Based Care program (Jones et al., 2015). Implementation of this program at the UK was in response to faculty feedback reflecting the need to receive formal training in IPECP and facilitation after receiving minimal facilitator training prior to IPECP events (Jones et al., 2015).

Analysis. Facilitator performance assessment takes place during an interprofessional student team simulation activity, using a standardized patient family member, demonstrating the process of harmful medical error disclosure. Facilitators lead planning discussions and debriefing sessions regarding the medical disclosure session.

This program utilizes three points of self-assessment: baseline facilitator characteristics survey capturing previous experience and perceived confidence level (not provided in this publication), and pre-post completion of the IPFS for comparison. Additional assessment of facilitator performance is derived from healthcare profession student participants who also complete the IPFS.

The IPFS was developed by Sargeant, Hill & Breau (2010), and incorporates

IPECP facilitator competencies developed by Banfield & Lackie (2009), social learning theory, social identity and professionalism theory, which supports the collaborative approach and respect for individual team member social identity, and utilizes a 4 point-Likert scale (poor, fair, good, and excellent) (Banfield & Lackie, 2009; Sargeant et al., 2010). The validation process of this instrument included a literature search, expert review and feasibility testing, healthcare practitioner use and assessment, along with psychometric testing, which reflected reliability in the assessment items (Sargeant et al., 2010).

The Taxonomy Table analysis of the IPFS provides an opportunity to examine the cognitive and knowledge dimension levels that make up the assessment framework. Table for (4.4) below contains a list of the IPFS items, key verbs and nouns, the revised Taxonomy analysis results, and Taxonomy Table coordinates. The completed Taxonomy Table is located in table 4.5 further below.

Table 4.4

IPFS items, keywords, revised Taxonomy analysis results, and table coordinates (Sargeant et al., 2010)

IPFS Items	**Key Verbs/ Verb Phrases**	**Key Nouns/ Noun Phrases**	**Revised Taxonomy analysis and Table Cell Coordinates**
1. Describe why interprofessional education is important.	Describe	Interprofessional education	Understand/ Conceptual Knowledge (B2)

2. Explain how interprofessional collaboration can enhance patient-centered practice.	Explain	Interprofessional collaboration	Apply/ Conceptual Knowledge (B3)
3. Help participants work through differences in a spirit of openness and collaboration when opinions differ (e.g. lead discussion and ensure that all participants have an opportunity to express their views openly).	Help, lead, ensure	Participants, discussion, opportunity	Apply/ Conceptual Knowledge (B3)
4. Use effective communication skills to clarify and resolve misunderstanding and conflict.	Use, clarify and resolve	Communication, misunderstanding and conflict	Apply/ Metacognitive Knowledge (D3)
5. Discuss issues related to hidden power structures, hierarchies, and stereotypes that may exist among different healthcare professionals.	Discuss	Issues	Understand/ Conceptual Knowledge (B2)
6. Role-model positive interactions with other health professionals and how professionals can work together.	Role-model	Interactions	Apply/ Conceptual knowledge (B3)
7. Create a learning environment in which the principles of interprofessional education are	Create	A learning environment	Create/ Conceptual knowledge (B6)

demonstrated or clearly explained (e.g. does not focus on one provider group; acknowledge all professional contributions; acknowledge, respect, celebrate diversity in group).			
8. Openly encourage participants to learn from other health providers' views, opinions, and experiences (e.g. ask questions that generate free exchange of ideas, openness, and sharing among professionals).	Encourage, ask	Participants, questions	Apply/ Procedural Knowledge (C3)
9. Use learning and facilitation methods that encourages participants from different professions to learn with, from, and about each other (e.g. use of icebreaker games, case studies, group discussions).	Use	Learning and facilitation methods	Apply/ Procedural Knowledge (C3)
10. Invite other professions to comment and share their experiences/perspectiv es as questions or comments are made in the large group.	Invite	Other professions	Apply/ Procedural Knowledge (C3)
11. Use appropriate facilitator skills to	Use	Facilitator skills	Evaluate/ Metacognitive

keep discussion topics on track.			Knowledge (D5)
12. Acknowledge and respect others' experiences and perceptions.	Acknowledge and respect	Others' experiences and perceptions	Analyze/ Conceptual Knowledge (B3)
13. Encourage members of all professions to contribute to decisions and seek opinions from others in the group during case or patient discussions and decision-making activities.	Encourage	Members of all professions	Apply/ Procedural Knowledge (C3)
14. Ask participants to share their professional opinions, perspectives, and values relative to patient care and collaborative practice.	Ask	Professional opinions, perspectives, and values	Apply/ Conceptual Knowledge (B3)
15. Identify professional differences in a positive manner as participants offer their professional experiences and perceptions.	Identify	Professional differences	Analyze/ Metacognitive Knowledge (D4)
16. Ask health professions students to indicate their profession and discuss each other's roles and responsibilities in the delivery of patient care.	Ask	Health professions students	Apply/ Procedural Knowledge (C3)

17. Listen to and acknowledge participants' ideas without judgment or criticism.	Listen to and acknowledge	Ideas without judgement or criticism	Evaluate/ Metacognitive Knowledge (D5)
18. Ask questions to encourage participants to consider how they might use each other's professional skills, knowledge, and experiences.	Ask, encourage	Participants	Apply/ Procedural Knowledge (C3)

4-point Likert Scale: 1 - poor, 2 - fair, 3 - good, 4 - excellent.

The completed Taxonomy Table analysis of the IPFS items is found in table 4.5 below.

Table 4.5

Taxonomy Table analysis of IPFS items

	The Cognitive Process Dimension					
The Knowledge Dimension	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
A.Factual Knowledge						
B. Conceptual knowledge		IPFS 1, 5	IPFS 2, 3, 6	IPFS 12		IPFS 7
C. Procedural Knowledge			IPFS 8, 9, 10, 13, 14, 16		IPFS 18	

D. Metacognitive Knowledge	IPFS 4	IPFS 15	IPFS 11, 17

IPFS - Interprofessional Facilitator Scale

Overall the IPFS item assessment approach ranges from the second to the highest Cognitive Dimension levels, with 61% of items falling within the higher - level cognitive and knowledge dimensions (Apply, Analyze, Evaluate, Create; Procedural, Metacognitive). The analysis of the assessment approaches in this faculty facilitator training program reveals a wide range of assessment levels within the cognitive domain (Understand - Create), with emphasis on the application of conceptual and procedural knowledge.

Kirkpatrick's model assists in the classification of the outcomes measured by the IPFS (Kirkpatrick, 1996). The IPFS assesses the modification of attitudes/perceptions in items 3, 15, and 17 (level 2a) (Kirkpatrick, 1996). Eight out of the fourteen items were more focused on assessing the acquisition of IPECP facilitator knowledge and skills (items 1, 2, 4, 5, 9, 10, 11, 18) - level 2b (Kirkpatrick, 1996). Items 6, 7, 8, 12, and 13 measure the ability of facilitators to practice behaviors that are supportive to the goals of IPECP (level 3 - behavioral change) (Kirkpatrick, 1996). Lastly, items 14 and 16 assess the ability of facilitators to ensure and guide patient - focused teamwork (level 4b - benefits to patients/clients [eg. patient care outcomes]) (Kirkpatrick, 1996).

Review and recommendations. The analysis of the IPFS instrument demonstrates the ability to capture a wide range of levels within the Cognitive and

Knowledge Dimensions. One recommendation would to be expand the assessment framework in order to capture the more advanced knowledge and skills within the "Create" category column. This is important since much of what makes facilitation performance successful is the ability to develop new ways of instructing and guiding interprofessional teams to implement IPECP methodologies, and adjusting those approaches to meet the needs of the learners and successfully reach goals and objectives.

An additional notable omission is the absence of items in the cross-tabulation cell "Analyze/Procedural Knowledge". A recommendation is to include the assessment of the facilitator to analyze procedural knowledge during the facilitation process in order to ensure a detailed comprehensive approach to guiding IPECP teams in the implementation of new methodologies or approaches to teamwork.

When examining item assessment outcomes, using the modified Kirkpatrick model, this instrument contains a wide range of expected outcomes within the assessment framework (2a, 2b, 3, and 4b). Aside from being used as a second-person performance assessment instruments (by student learners), it was also used as a pre-post self-assessment instrument, which provided an opportunity to capture the reactions of facilitator trainees (level 1). As a recommendation, adding items that help to capture personal reactions to training would give insight regarding the quality of the facilitator training experience and how well it prepared them to transfer the knowledge into practice, helping to inform the training development process.

An additional recommendation would be to include items that assess the ability of facilitators to explain and demonstrate how the practice of IPECP can have a wide impact on the culture of the organization (level 4a - change in organizational practice). This is important since one of the characteristics identified as being critical to the success of IPECP initiatives is the development of an organizational culture that is supportive of such efforts (The Shingo Model, 2011).

C-FACS: Assessment of Facilitator Training in the Clinical Setting

Background and description. A study by Bylund, Brown, Lubrano di Ciccone, Diamond, Eddington and Kissane (2009), focuses on the assessment of facilitator competence, within the context of IPECP groups receiving communication skills training (Bylund et al., 2009). Thirty-two facilitators consisting of 21 doctors, eight psychiatrists and psychologists, and three social workers participated in the study. As part of their initial training, they all participated in the communication skills workshop as a prerequisite to facilitator training (Bylund et al., 2009). The facilitator training was provided in a single-day, over a three to four hour session involving role play, where each participant had an opportunity to facilitate the group learning (Bylund et al., 2009).

Analysis. The assessment of performance in this study involved audio recordings of the first three performances, post-training. The majority of the sessions (26 out of 32) included the use of interprofessional co-facilitators, and each facilitator was individually assessed. The assessment instrument, called the Comskil facilitator assessment coding system (C-FACS), was developed by researchers and designed using training session objectives. The C-FACS was used to triple code facilitator performance audio recordings, categorizing them according to single occurrence items (specific ideal behaviors that are either present or not present) and cumulative frequency ratings (behaviors expected to be demonstrated two or more times during a facilitation session) (Bylund et al., 2009).

The C-FACS instrument contains 26 items under two overarching categories. Table 4.6 below displays all C-FACS items, and provides the revised Bloom's Taxonomy analysis, including item key verbs and nouns, as well as the resulting Taxonomy Table coordinates. The fully plotted Taxonomy Table analysis is in table 4.7 further below.

Table 4.6

C-FACS items, keywords, revised Taxonomy analysis results, and table coordinates (Bylund et al., 2009)

C-FACS Items	**Key Verbs/Verb phrases**	**Key Nouns/Noun Phrases**	**Revised Taxonomy analysis and Table Cell Coordinates**
Single occurrence items (coded as present, if applicable)			
1. Orienting to role play	Orienting	Role play	Apply/Procedural Knowledge (C3)
2. Makes introductions	Makes	Introductions	Apply/Procedural Knowledge (C3)
3. Establishes rules of role	Establishes	Rules	Apply/Proc

play			edural Knowledge (C3)
4. Normalizes anxiety	Normalises	Anxiety	Apply/Metacognitive Knowledge (D3)
5. Structuring learning	Structuring	Learning	Apply/Procedural Knowledge (C3)
6. Allows enough time for reading ⁄ discussing role-play scenario	Allows	Reading/ Discussing role-play	Apply/Procedural Knowledge (C3)
7. Discusses the patient's potential needs	Discusses	Patient's needs	Analyze/Procedural Knowledge (C4)
8. Summarizes learning at the end of the session	Summarises	Learning	Apply/Procedural Knowledge (C3)
Cumulative frequency ratings (rated as ≥ 2)			
9. Maintaining a learner-centered environment	Maintaining	Environment	Evaluate/Conceptual Knowledge (B5)
10. Invites learner's feedback first	Invites	Learner's feedback	Apply/Procedural Knowledge (C3)
11. Elicits learning goals	Elicits	Learning goals	Apply/Procedural Knowledge (C3)

12. Stays focused on the learner's needs and agendas	Stays focused	Learner's needs and agendas	Evaluate/Procedural Knowledge (C5)
13. Assess if learning goals were met	Assess	Learning goals	Evaluate/Procedural Knowledge (C5)
14. Managing the role play	Managing	Role play	Evaluate/Procedural Knowledge (C5)
15. Gives actor direction	Gives	Direction	Apply/Procedural Knowledge (C3)
16. Ensures learner understands starting point	Ensures	Learner	Evaluate/Procedural Knowledge (C5)
17. Facilitating feedback	Facilitating	Feedback	Apply/Procedural Knowledge (C3)
18. Facilitates a balance of positive and constructive feedback	Facilitates	Positive and constructive feedback	Apply/Metacognitive Knowledge (D3)
19. Invites positive feedback first	Invites	Positive feedback	Analyze/Procedural Knowledge (C4)
20. Reinforces specific communication skills	Reinforces	Communication skills	Analyze/ Conceptual Knowledge (B4)
21. Uses video playback to reinforce learning	Uses, reinforce	Playback, learning	Analyze/ Conceptual Knowledge (B4)
22. Involving the group	Involving	Group	Apply/Procedural Knowledge

			(C3)
23. Invites all group members to give feedback	Invites	feedback	Apply/Procedural Knowledge (C3)
24. Involves group members in addressing challenges or solving problems	Involves	Addressing challenges or solving problems	Analyze/ Metacognitive Knowledge (D4)
25. Managing time	Managing	Time	Analyze/Procedural Knowledge (C4)
26. Allocates time equally among learners	Allocates	Time	Analyze/Procedural Knowledge (C4)

The completed Taxonomy Table analysis of the C-FACS provides a visual analysis of the range in Cognitive and Knowledge Dimensions with the instrument framework. See table 4.7 below.

Table 4.7

Taxonomy Table analysis of the C-FACS items

	The Cognitive Process Dimension					
The Knowledge Dimension	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
A. Factual Knowledge						
B. Conceptual knowledge				C-FACS 20, 21	C-FACS 9	

C. Procedural Knowledge	C-FACS 1, 2, 3, 5, 6, 8, 10, 11, 15, 17, 22, 23	C-FACS 7, 19, 25, 26	C-FACS 12, 13, 14, 16
D. Metacognitive Knowledge	C-FACS 4, 18	C-FACS 24	

The above analysis shows a strong concentration of items in higher-level cognitive **(**Apply, Analyze, Evaluate, Create**)** and knowledge domains **(**procedural, metacognitive**)**, with 89% of all items falling within the cross-tabulations of these cells. Further examination reveals 46% of total items concentrated on the assessment of the facilitator's ability to apply procedural knowledge during the facilitation process (cell C3), and no items are categorized within the higher-levels of the Cognitive Dimension as they relate to Metacognitive Knowledge, as well as the entire Create column has been omitted.

The modified Kirkpatrick assessment of this instrument shows a wide range of targeted outcomes (2a, 2b, 3, 4b), with a strong emphasis on the development of facilitator knowledge and skills, Level 2b (62% of items). The two areas of omission include the assessment of facilitator trainee views and perspectives, Reaction (Level 1), and changes in organizational practice (Level 4a).

Review and recommendations. The C-FACS instrument framework reveals a strong emphasis on the assessment of higher-level facilitation skills, while at the same time targeting a wide range of outcomes. This assessment approach strongly acknowledges and brings focus to the complexities of the IPECP facilitation process and the overall impact on educational outcomes of learners.

The areas of omission can be considered missed opportunities, and a recommendation would be to add or edit items heavily concentrated in the C3 cell (Apply/Procedural Knowledge), in order to widen the instrument's assessment scope towards capturing the facilitators ability to evaluate and adjust the facilitation approach in response to changing conditions (cell D5), as well as the facilitators ability to generate, plan, or produce new ideas and approaches during the facilitation of IPECP (Create column). Considering the highly complex nature of the facilitation process, it is important to include assessment items that capture these advanced level of knowledge and skills, in order to provide facilitators with targeted detailed feedback, in order to assist in the self-development process and inform training programs.

An additional recommendation regarding omitted areas of assessment would be to include items that target the proficiency of lower-level skills that would help to provide developmental feedback to novice learners, who may not be able to perform at the higher-level as of yet.

When it comes to the range of assessment outcomes, an additional recommendation is to include the assessment of the impact of facilitation practices on the overall culture of the organization. For example, including items which assess the facilitator's ability to discuss and demonstrate how the practice of IPECP can create overall positive change in an organization's culture that supports high-quality patient care practices. The inclusion of this outcome focus during IPECP sessions positively influences learners, helping them to understand how they can have a positive impact at the organization-level.

ILFAS and IFPAS: Assessment of the Proposed Instruments

Background and description. The ILFAS instrument was designed specifically for the clinical setting, containing both technical and soft competencies considered to be effective in the practice of IPECP facilitation within the context of process improvement in healthcare organizations (Bravo-Sanchez, Parrott, Dorazio, Denmark, & Heuer, 2017). The ILFAS was later adapted for the classroom setting as the IFPAS, retaining many of the same theories and methodologies found to be effective in the facilitation of IPECP within the context of the classroom setting (Anderson et al., 2001; Banfield & Lackie, 2009; Black, Soto, & Spurlin, 2016; The Shingo Model, 2011). The ILFAS and IFPAS instruments have been validated and pilot-tested and the results are located in chapters five and six, respectively.

The analysis of these instruments will be presented separately, demonstrating how the framework of each instrument targets the various levels within the Cognitive and Knowledge Domains, as well as the outcomes assessment reach. The results from each instrument analysis will then be compiled alongside the previously presented facilitator performance assessment instruments in order to compare and contrast the comprehensiveness of each framework.

Analysis - ILFAS. The ILFAS instrument contains 14 items that assess technical and soft skills (Lean, Shingo, IPECP, Learning Domains, Metacognition), including four overarching themes (Enabling, Improving, Alignment, and Results), and utilizes a five-point Likert scale (strongly disagree, disagree, neither agree/disagree, agree, strongly agree) (see Appendix A) (Bravo-Sanchez et al., 2017). The revised Bloom's Taxonomy assessment methodology including ILFAS items, key verbs and nouns, and analysis results are in table 4.8 below. The full Taxonomy Table assessment is provided in table 4.9 further below.

Table 4.8

ILFAS items, key verbs and nouns, and revised Taxonomy assessment results

ILFAS Items	**Key Verbs/ Verb Phrases**	**Key Nouns/ Noun Phrases**	**Revised Taxonomy analysis and Table Cell Coordinates**
Enabling	Overarching assessment theme for items 1-6		
1. Facilitator acts as a role-model when applying principles of continuous process improvement.	Applying	Principles	Apply/Conceptual knowledge (B3)
2. Facilitator is NOT ABLE TO explain the Lean/Breakthrough Pillars and Principles: Respect for people, Continuous Improvement, Customer defines value, deliver value on demand, standardize and solve to improve, transformational learning requires deep	Explain	Principles	Understand/ Conceptual Knowledge (B3)

personal experience, mutual respect and shared responsibility enables higher performance.			
3. Facilitator provokes and stimulates teamwork interactions.	Provokes and stimulates	Teamwork interactions	Create/Procedural Knowledge (C6)
4. Facilitator encourages team members to learn with, from and about each other's roles and responsibilities during the process improvement session(s)	Encourages	Learn	Create/Procedural Knowledge (C6)
5. Facilitator displays a positive attitude during process improvement session(s). (e.g., willingness to listen, participate, value contributions, advocate).	Displays	Attitude	Apply/ Metacognitive Knowledge (D3)
6. Facilitator is able to effectively perform oral presentations (lectures and demonstrations)	Perform	Oral presentations	Apply/ Procedural Knowledge (C3)
Improving	Overarching assessment theme for items 7-10		
7. Facilitator is able to accurately explain and translate Lean methodology/process improvement steps and instructions to the team.	Explain and translate	Methodology, steps	Analyze/ Procedural Knowledge (C4)
8. Facilitator is NOT ABLE TO build and explain visual aids/management (maps, charts, boards, constructs	Build and explain	Visual aids/ management	Create/Procedural Knowledge (C6)

value stream, etc.) during the instructional process.			
9. Facilitators engage and guide all team members in the development of the process improvement plan.	Engage and guide	Members, process improvement plan	Create/Procedural Knowledge (C6)
10. Facilitator implemented all Lean/Breakthrough methods, events and tools appropriately.	Implemented	Methods, events, and tools	Evaluate/ Metacognitive Knowledge (D5)
Aligning	Overarching assessment theme for items 11-12		
11. Facilitator ensures consistent alignment in all stages of process improvement in order to meet organization-wide strategic goals and objectives.	Ensure	Stages of process improvement	Evaluate/ Procedural Knowledge (C5)
12. Facilitator continuously assesses progression of teamwork, changing the facilitation approach as necessary.	Assesses, changing	Teamwork, facilitation approach	Evaluate/ Metacognitive Knowledge (D5)
Results	Overarching assessment theme for items 13-14		
13. Facilitator explains the purpose and benefits of Lean/Breakthrough methodology.	Explains	Purpose and benefits	Understand/ Conceptual Knowledge (B2)
14. Facilitator accomplished all instructional and procedural daily/weekly objectives.	Accomplished	Objectives	Evaluate/ Procedural Knowledge (C5)

The fully plotted Taxonomy Table assessment of the ILFAS instrument is in table

4.9 below.

Table 4.9

Taxonomy Table analysis of the ILFAS items (Krathwohl, 2002)

	The Cognitive Process Dimension					
The Knowledge Dimension	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
A. Factual Knowledge						
B. Conceptual knowledge		ILFAS 2, 13	ILFAS 1			
C. Procedural Knowledge			ILFAS 6	ILFAS 7	ILFAS 11, 14	ILFAS 3, 4, 9, 8
D. Metacognitive Knowledge			ILFAS 5		ILFAS 10, 12,	

ILFAS - Interprofessional Lean Facilitator Assessment Scale

Upon visual inspection of the above analysis, there is a wide range from the Understand to the Create levels of the Cognitive Dimension. Seventy nine (79%) percent of the items (11 out of 14) assess cognitive functions and knowledge dimensions of higher level thinking processes (Apply, Analyze, Evaluate, Create; Procedural, Metacognitive). Noticeably, there are two areas of omission within these higher-level cross tabulation cells, including three cells within the Conceptual Knowledge row, and two cells within the Metacognitive Knowledge Dimension.

The assessment framework outcome measures of the ILFAS are classified as including five of the six Kirkpatrick's outcome levels: 2a - Items 1 and 5 measure the ability of facilitators to be a positive role model; 2b - Items 4, 6, 9, 10, 12 and 14 focus on the acquisition of new skills; Level 3 - Items 2, 3, 7, 8, 9, 11, and 12 assess IPECP supportive behaviors/actions; Level 4a – Items 11 and 13 focus on the facilitator's understanding of the impact on the organization; Level 4b – Item 2 measures the facilitator's ability to understand, and therefore explain the benefits to the patients and overall organization (Kirkpatrick, 1996).

Review and opportunities. As demonstrated in the analysis above, the ILFAS instrument contains items that measure a wide range of advanced cognitive and knowledge dimensions, involving thinking processes that go beyond remembering and reciting learned factual knowledge, and at the same time being comprehensive enough to detect foundational skills, such as the ability to understand/explain IPECP concepts during the facilitation process (B2). This wide assessment range is considered to be supportive of long-term training outcomes (Krathwohl, 2002).

Additionally, there are two areas of omission in the Metacognitive Knowledge Dimension (cross-tabulation with the Analyze and Create columns), which can be considered as opportunities to develop or reconstruct items to assess the ability of facilitators to self-examine their facilitation approaches, and be able to devise new approaches as necessary. These skills are considered to be very important to the success of facilitation procedures (Black et al., 2016).

The modified Kirkpatrick's assessment demonstrates a wide-range of outcomes that help to fully capture the educational impact of the facilitation performance. In addition, items 2, 11 and 12 measure more than one outcome demonstrating how facilitator performance can have a multi-layered impact on teams, patients, and organizational culture.

Level one is not covered by the ILFAS since it is intended to be a second or third party assessment tool, and therefore does not contain items which capture facilitator feedback. However, this does not imply that facilitator feedback is not important to the development of skills and competencies. This dissertation research demonstrates the importance of discussing performance assessment results with trainees and listening to their feedback, as part of an enhanced coaching approach, and contributing to the self - development process (Garfield, 1994; Sennhenn-Kirchner et al., 2016).

Analysis - IFPAS. The IFPAS instrument was derived from the ILFAS instrument and adapted for the classroom setting. As a result, it contains many of the same skills and competencies (Shingo, IPECP, Bloom's Learning Domains, metacognition), without the process improvement component (Lean). Although process improvement methodology has been integrated into graduate medical education, and has been acknowledged by literature as important for healthcare students to learn, few programs include methodology such as Lean as part of the curriculum (Armstrong, Lauder, & Shepherd, 2015; Jenson et al., 2009; Ogrinc et al., 2015).

The development of the IFPAS resulted in 12 items, including three overarching themes (Enabling, Improving, and Aligning), and uses a five-point Likert scale (strongly disagree, disagree, neither agree/disagree, agree, strongly agree), intended as a second or third party assessment instrument (see Appendix A). The assessment of the IFPAS demonstrates how it retains a similar assessment framework as the ILFAS.

Table 4.10 (below) contains the IFPAS items, key verbs and nouns, and the revised Bloom's Taxonomy assessment results. The completed Taxonomy Table assessment of the IFPAS is located further below in table 4.11.

Table 4.10

IFPAS items, key verbs and nouns, and the revised Bloom's Taxonomy assessment results

IFPAS Items	**Key Verbs/ Verb Phrases**	**Key Nouns/ Noun Phrases**	**Revised Taxonomy analysis and Table Cell Coordinates**
Enabling	Overarching assessment theme for items 1-4		
1. Facilitator is able to clearly explain the purpose and benefits of IPECP	Explain	Purpose and benefits	Understand/ Conceptual Knowledge (B2)
2. Facilitator is able to instruct and guide participants through IPECP activities	Instruct and guide	IPECP activities	Analyze/Procedural Knowledge (C4)
3. Facilitator displays a positive attitude during IPECP session(s). (e.g., willingness to listen, participate, value contributions, advocate)	Displays	Attitude	Apply/Metacognitive Knowledge (D3)
4. Facilitator is able to effectively perform oral	Perform	Oral presentations,	Apply/Procedural Knowledge

presentations (lectures, demonstrations)		demonstrations	(C3)
Improving	Overarching assessment theme for items 5-8		
5. Facilitator encourages team members to learn collaboratively about each other's roles and responsibilities during the process improvement session(s)	Encourages	Learn about roles and responsibilit ies	Create/Conceptual Knowledge (B6)
6. Facilitator observes team behavior and provides feedback to manage team dynamics as needed	Observes, provides, manage	Team behavior, feedback, team dynamics	Evaluate/Metacogni tive Knowledge (D5)
7. Facilitator stimulates and encourages respectful interprofessional collaborative communication	Stimulates and encourages	Interprofessi onal communicat ion	Create/Metacogniti ve Knowledge (D6)
8. Facilitator does not control group consensus or outcomes	Control	Consensus or outcomes	Evaluate/ Metacognitive Knowledge (D5)
Aligning	Overarching assessment theme for items 9-12		
9. Facilitator acts as a role-model when practicing IPECP skills and competencies	Acts as, practicing	Role model, skills and competencie s	Apply/Procedural Knowledge (C3)
10. Facilitator ensures consistent alignment in all IPECP activities in order to meet organization-wide strategic goals and objectives	Ensures, meet	Alignment, organization -wide goals and objectives	Evaluate/Procedural Knowledge (C5)

11. Facilitator provides debriefing at the conclusion of all activities, explaining purpose and practical application	Provides, explaining	Debriefing, purpose, and practical application	Apply/Procedural Knowledge (C3)
12. Facilitator accomplishes all IPECP instructional objectives as scheduled	Accomplishes	Objectives	Apply/Procedural Knowledge (C3)

The fully plotted Taxonomy Table assessment of the IFPAS items are assessed in the table 4.11 below.

Table 4.11

Taxonomy Table analysis of the IFPAS items (Krathwohl, 2002)

	The Cognitive Process Dimension					
The Knowledge Dimension	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
A. Factual Knowledge						
B. Conceptual knowledge		IFPAS 1				IFPAS 5
C. Procedural Knowledge			IFPAS 4, 9, 11, 12	IFPAS 2	IFPAS 10	
D. Metacogniti ve Knowledge			IFPAS 3		IFPAS 6, 8	IFPAS 7

IFPAS - Interprofessional Facilitator Performance Assessment Scale

The Taxonomy Table analysis of the IFPAS instrument shows a wide range within the Cognitive Dimension from Understand to Create, and three out of four Metacognitive Knowledge Dimension levels have been identified. When examining the higher - level cognitive and knowledge processing dimension levels (Apply, Analyze, Evaluate, Create; Procedural, and Metacognitive), the IFPAS contains 83% percent of items categorized within these cells. Upon closer inspection of the higher-level dimension sections of the table, there are no items categorized in two of the four cognitive levels of the Metacognitive Knowledge Domain. The Table also uncovers an apparent assessment focus among instrument items, with cell C3 (Apply/Procedural Knowledge) containing the greatest concentration of items.

The breakdown of the modified Kirkpatrick assessment of outcomes shows that items 3, and 9 focus on the modification of attitudes and perceptions (level 2a) (Kirkpatrick, 1996). Items 1, 2, 4, 7, 10, 11,12 all involve the acquisition of IPECP knowledge and skills as an outcome (level 2b). Behavior change outcomes are assessed by items 3, 5, 6, 7, 8, 9 (level 3). Items 1 and 10 assess the facilitator's ability to understand and explain the purpose and impact of IPECP on the organization, supporting changes in organizational practice (level 4a). Lastly, items 1, 10, and 11 assess the ability of the facilitator to understand and explain the impact of IPECP on the patient and the organizational community (level 4b). Similarly to the ILFAS instrument, the IFPAS contains items that cross over into more than one outcomes assessment category, demonstrating the ability of the IFPAS to assess the multi-level impact of facilitator performance.

Review and opportunities. The IFPAS assessment demonstrates a wide range in cognitive and knowledge dimensions, reflective of its comprehensive approach to facilitator performance assessment. Although the instrument items can be categorized on many levels in both dimensions, there are areas of omission that signal a need to further expand the assessment reach. There are missed opportunities to assess the ability to use metacognitive knowledge when applying or analyzing facilitation processes, and the ability to use creativity while performing procedures (cells D3, D4, and C6). These skills are important in developing solutions supportive of improvement efforts.

Considering the heavy concentration of items regarding levels 2b and 3 of the modified Kirkpatrick's outcomes assessment model, a better approach may be to consider bringing more of a balance to the number of items per category, since including the additional outcome levels may have an impact on both local and national stakeholders (Reeves et al., 2015). The pattern of the IFPAS assessment outcomes noted is similar to those of the ILFAS instrument. The next section provides a comparative analysis that further identifies the differences and similarities between the proposed and existing instruments, regarding facilitator learning expectations and intended outcomes.

Comparative Analysis

The above assessments provided many details about each assessment framework regarding facilitator learning expectations and intended outcomes. Table 4.12 below summarizes these findings into two sections. The upper section contains the side-by side display of the modified Kirkpatrick's outcome assessment results, and the lower section contains the percentage of higher - level Cognitive and Knowledge Dimensions found within the assessment framework of each instrument. The modified Kirkpatrick outcomes section of the table allows for the comparison of the educational scope of each instrument. Since the facilitation process is so complex, a comparison of the high-level Cognitive and Knowledge Dimensions is also provided in order to demonstrate how well each instrument targets the higher-level skills needed for successful performance.

This comparative analysis provides a breakdown of the differences and similarities between these instruments, highlighting important assessment components and demonstrating how the framework of the proposed instruments compare in terms of structure and purpose. The comparative table also provides an opportunity to visually identify the strengths and weaknesses of each framework, allowing for an empirical analysis that will help to identify the instruments that are most demonstrative of a comprehensive assessment model.

Table 4.12

Comparison of outcome scale classifications and the higher-level Knowledge and Cognitive Dimensions across all models

Modified Kirkpatrick's Non-Hierarchical Outcome Classifications (Barr et al 2005; Reeves et al. 2016)	**PP and SF instruments (Pittenger et al. (2016)**	**IPFS (Jones et al. 2015; Sargeant et al., 2010)**	**C-FACS (Bylund et al. 2009)**	**ILFAS (Bravo-Sanchez et al., 2017)**	**IFPAS**
Level 1- Reaction	X (PP)				
Level 2a - Modification	X (SF)	X	X	X	X

of attitudes/perceptions					
Level 2b - Acquisition of Knowledge/Skills		X	X	X	X
Level 3 - Behavioral change	X (SF)	X	X	X	X
Level 4a - Change in organizational practice				X	X
Level 4b - Benefits to patients/clients		X	X	X	X
Taxonomy Table Assessment (Krathwohl, 2002): Percent of High-Level Knowledge (procedural, metacognitive) and Cognitive Dimensions **(**Apply, Analyze, Evaluate, Create**)**	38%	61%	89%	79%	83%

PP-Peer participant; SF-Student facilitator; IPFS-Interprofessional facilitator Scale; C-FACS-Comskil facilitator assessment coding system; Interprofessional Lean facilitator assessment scale; IFPAS-Interprofessional facilitator performance assessment scale

Modified Kirkpatrick's outcomes comparative analysis. When comparing the five instruments, there are some commonalities between outcome scales. All five assessment approaches contain items which have outcome elements classifying them as level 2a-change in attitudes and perceptions, and 3 - behavioral change. This outcomes trend shows an emphasis on the importance of measuring how IPECP affects individuals and how the experience translates into practice, regardless of the setting and context in which IPECP is taking place.

When comparing the two proposed instruments, they demonstrate many similarities in assessment outcomes. Both the ILFAS and IFPAS instruments contain items that include the same outcomes assessment categories (levels 2a, 2b, 3, 4a, and 4b). This demonstrates the ability of both instruments to assess the multi-level impact of facilitator performance. The comparison between the IPFS and the proposed instruments uncovers additional similarities between the outcome classifications (common levels 2a, 2b, 3, and 4b). This is not surprising considering that the ILFAS instrument was derived from the IPFS (Bravo-Sanchez et al., 2017).

A noticeable difference is evident when comparing the IPFS, C-FACS, ILFAS and IFPAS instruments since all do not include the Level 1 Reaction category items within their framework. This may be explained by the intended functional design as second and third party assessment instruments. However, the omission of level 1 in the IPFS instrument may be an important factor in the case of Jones et al. (2015), since the instrument was used for before and after self-assessment procedures, making this a missed opportunity to capture learner reactions (Jones et al., 2015; Sargeant et al., 2010).

The IPFS instrument lacks items that measure changes in organizational practice (level 4a), in contrast to the proposed instruments, which both contain items and categorical themes that focus on aspects organizational culture change and support (Bravo-Sanchez et al., 2017; The Shingo Model, 2011). It is important to also make an important distinction between the proposed instruments and the existing instruments regarding the outcomes assessments, noting that the proposed instruments contain five (5) out of the six (6) outcomes assessment categories, the most in comparison to all other instruments presented here.

An important contrast between the advanced student training program and the rest of the instruments is its use of classification of level 1 - Reaction, a level not utilized by any other instrument. The use of the Reaction classification reflects the focus of the SF instrument, which contains self-assessment items. The PP instrument (a second - party assessment instrument) broadens the outcomes scope of this assessment framework. This is an important balance since, instruments that solely focus on self - assessment learning outcomes limit practice change effects to local stakeholders only (Reeves et al., 2015).

Taxonomy table comparative analysis. The performance assessment of IPECP facilitation should be able to capture the complex skills and knowledge needed to master its delivery. This Taxonomy Table comparative analysis helps to uncover how well each instrument is able to capture the most advanced facilitation knowledge and skills, helping to best inform the developmental training process.

The SF and PP instruments are presented as a two-step approach to the assessment of facilitator performance (SF: self-assessment, and PP: second-party assessment), as discussed in the Pittenger et al. (2016) paper. Collectively, these instruments contain the lowest percentage of items that can be categorized into the high - level cognitive and knowledge dimensions (38%), in comparison to all other instruments. However, it is important to also note that these two instruments also contain the least amount of items (8 in total), compared to all other instruments, limiting the ability of these instruments to assess additional levels of knowledge and cognitive abilities.

When comparing the IPFS instrument to the ILFAS and IFPAS instruments, there is an increase in the percentage of high-level Dimensions, reflecting the framework changes and improvements occurring with each instrument transformation (61% IPFS, 79% ILFAS, 83% IFPAS). Lastly, it is important to note that the instrument with the highest percentage of high-level Dimensions is the C-FACS instrument (89%), suggesting that this instrument has a strong ability to capture more high-level knowledge and cognitive abilities, comparison to the rest.

Although the above percentages comparison is suggestive of developing facilitator performance assessment instruments containing an increased percentage of items containing high-level knowledge and skills, careful consideration should be taken regarding the percentage of lower, intermediate and high-level knowledge and skills to be included in the development of a single assessment instrument. Depending on the developmental stages of a facilitator trainee, it is also important to assess lower and intermediate-level knowledge and skills, and confirm the readiness to transition to the next developmental training stage (Sindelar, 2011).

Limitations

This empirical comparative analysis utilizes two assessment approaches that have flexible parameters, allowing for some variations and limitations to the reproducibility of the results. The literature acknowledges challenges in using the revised Bloom's Taxonomy and the modified Kirkpatrick's outcomes assessment model, while at the same time supporting their use as important guidelines to improving assessment instruments

(Fuller et al., 2007; Reeves et al., 2016; Starr, Manaris, & Stalvey, 2008; Yardley & Dornan, 2012). This analysis also includes the use of a single researcher in all the assessment processes of this comparative analysis, creating the likelihood of bias, and the resulting in the inability to demonstrate reproducibility of findings.

In addition, the literature concerning IPECP facilitator characteristics and the instruments available for assessing facilitator performance is limited and the available literature may not provide sufficient evidence to guide the development and assessment of facilitator performance assessment instruments (Reeves et al., 2016).

Conclusion

The comparative assessment of existing and proposed instruments helps to reveal commonalities and differences within their frameworks that can help to confirm and further identify the effective components needed for a comprehensive assessment approach. Although each IPECP program is different in context, there are many commonalities in the performance of facilitators that can be considered as core to the practice. Assessment of that practice should include an instrument which encompasses the complex skills and competencies involved in the facilitation of IPECP, as well as the intended learning outcomes. Considering the implications of poor facilitation and the need for the facilitation of interprofessional teams both in the classroom and clinical settings, it is important to continue to investigate the facilitator role and the assessment process in the effort to best inform training and development (Freeth & Reeves, 2004).

References

Anderson, L. W. (2005). Objectives, evaluation, and the improvement of education.

Studies in Educational Evaluation, 31(2), 102-113. doi:10.1016/j.stueduc.2005.05.004

Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., Raths, J., Wittrock, M. C. (2001). *A taxonomy for learning,teaching and assessing:A revision of bloom's taxonomy of educational objectives.* (Complete ed. ed.). New York [u.a.]: Longman.

Armstrong, L., Lauder, W., & Shepherd, A. (2015). *An evaluation of methods used to teach quality improvement to undergraduate healthcare students to inform curriculum development within preregistration nurse education: A protocol for systematic review and narrative synthesis* doi:10.1186/2046-4053-4-8

Banfield, V., & Lackie, K. (2009). Performance-based competencies for culturally responsive interprofessional collaborative practice. *Journal of Interprofessional Care, 23*(6), 611-620. doi:10.3109/13561820902921654

Barr, H. (2005). *Effective interprofessional education: Argument, assumption and evidence (promoting partnership for health)* (1st ed.). GB: Wiley-Blackwell. Retrieved from http://replace-me/ebraryid=10236649

Black, H., Soto, L., & Spurlin, S. (2016). Thinking about thinking about leadership: Metacognitive ability and leader developmental readiness. *New Directions for Student Leadership, 2016*(149), 85-95. doi:10.1002/yd.20164

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives.handbook 1: Cognitive domain*. New York: Longman.

Bravo-Sanchez, C., Parrott, J. S., Dorazio, V., Denmark, R., & Heuer, A. J. (2017).

Development of an interprofessional collaborative practice lean facilitator assessment scale (ILFAS). *Journal of Interprofessional Care,* (December)

Bylund, C. L., Brown, R. F., di Ciccone, B. L., Diamond, C., Eddington, J., & Kissane, D. W. (2009). Assessing facilitator competence in a comprehensive communication skills training programme. *Medical Education, 43*(4), 349 8p. doi:10.1111/j.1365-2923.2009.03302.x

Freeth, D., & Reeves, S. (2004). Learning to work together: Using the presage, process, product (3P) model to highlight decisions and possibilities. *Journal of Interprofessional Care, 18*(1), 43-56. doi:10.1080/13561820310001608221

Fuller, U., Johnson, C., Ahoniemi, T., Cukierman, D., Hernán-Losada, I., Jackova, J., . . . Thompson, E. (2007). Developing a computer science-specific learning taxonomy. *ACM SIGCSE Bulletin, 39*(4), 152-170. doi:10.1145/1345375.1345438

Garfield, J. B. (1994). Beyond testing and grading: Using assessment to improve student learning *Journal of Statistics Education, 2*(1)

Jenson, B., H., Dorner, B., D., Hinchey, B., K., Ankel, B., F., Goldman, B., S., & Patow, B., C. (2009). Integrating quality improvement and residency education: Insights from the AIAMC national initiative about the roles of the designated institutional official and program director. *Academic Medicine, 84*(12), 1749-1756. doi:10.1097/ACM.0b013e3181bf686f

Jones, M., Schuer, K. M., Ballard, J. A., Taylor, S. A., Zephyr, D., & Jones, M. D. (2015). Original article: Outcomes of an immersive pilot faculty development program for interprofessional facilitation: A mixed methods study. *Journal of Interprofessional Education & Practice, 1*, 83-89. doi:10.1016/j.xjep.2015.10.001

Kirkpatrick, D. (1996). *Revisiting kirkpatrick's four-level model*

Krathwohl, D. R. (2002). *A revision of bloom's taxonomy: An overview* College of Education, The Ohio State University.

Ogrinc, G., Davies, L., Goodman, D., Batalden, P., Davidoff, F., Stevens, D., . . . Wollersheim, H. (2015). *SQUIRE 2.0 (standards for QUality improvement reporting excellence) : Revised publication guidelines from a detailed consensus process* BMJ Publishing Group Ltd. doi:10.1136/bmjqs-2015-004411

Pittenger, A. L., Fierke, K. K., Kostka, S., & Jardine, P. J. (2016). Research: Developing interprofessional facilitators and leaders: Utilization of advanced health profession students as interprofessional (IPE) facilitators. *Currents in Pharmacy Teaching and Learning, 8*, 52-58. doi:10.1016/j.cptl.2015.09.004

Radmehr, F., & Drake, M. (2018). *An assessment-based model for exploring the solving of mathematical problems: Utilizing revised bloom's taxonomy and facets of metacognition* Elsevier Ltd. doi:10.1016/j.stueduc.2018.02.004

Reeves, S., Boet, S., Zierler, B., & Kitto, S. (2015). Interprofessional education and practice guide no. 3: Evaluating interprofessional education. *Journal of Interprofessional Care, 2015, Vol.29; 29*(4; 4), 312; 312. doi:10.3109/13561820.2014.1003637

Reeves, S., Fletcher, S., Barr, H., Birch, I., Boet, S., Davies, N., McFayden, A., Rivera, J., Kitto, S. (2016). A BEME systematic review of the effects of interprofessional education: BEME guide no. 39. *Medical Teacher, 38*(7), 656-668. doi:10.3109/0142159X.2016.1173663

Sargeant, J., Hill, T., & Breau, L. (2010). Development and testing of a scale to assess interprofessional education (IPE) faciliation skills. *Journal of Continuing Education in the Health Professions, 30*(2), 126-131. doi:10.1002/chp.20069

Sargeant, J., Hill, T., & Breau, L. (2010). Development and testing of a scale to assess interprofessional education (IPE) facilitation skills. *The Journal of Continuing Education in the Health Professions, 30*(2), 126. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/20564701

Sennhenn-Kirchner, S., Kirchner, B., Goerlich, Y., Schiekirka, S., Simmenroth, A., Notbohm, M., & Raupach, T. (2016). The effect of repeated testing vs repeated practice on skills learning in undergraduate dental education. *European Journal of Dental Education,* doi:10.1111/eje.12254

Sindelar, N. W. (2011). *Assessment-powered teaching*. Thousand Oaks, Calif: Corwin Publishing. Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com.proxy.libraries.rutgers.edu/login.aspx?direct=true&db=nlebk&AN=690919&site=eds-live

Starr, C., Manaris, B., & Stalvey, R. (2008). *Bloom's taxonomy revisited: Specifying assessable learning objectives in computer science* ACM. doi:10.1145/1352135.1352227

The Shingo Model. (2011). Shingo model handbook for operational excellence. Retrieved from http://lean.nh.gov/documents/Shingo%20Model%20Handbook.pdf

Thomas, A., Menon, A., Boruff, J., Rodriguez, A. M., & Ahmed, S. (2014). *Applications of social constructivist learning theories in knowledge translation for healthcare professionals: A scoping review*

Yardley, S., & Dornan, T. (2012). Kirkpatrick's levels and education 'evidence'. *Medical Education, 46*(1), 97-106. doi:10.1111/j.1365-2923.2011.04076.x

Chapter V: ILFAS Pilot

Development of an Interprofessional Lean Facilitator Assessment Scale

(Bravo-Sanchez, Parrott, Dorazio, Denmark, & Heuer, 2017)

Introduction

Healthcare organizations (HCOs) are implementing process improvement programs such as Lean, as an interprofessional education and collaborative practice (IPECP) approach towards developing high reliability. IPECP involves team members from different disciplines collaborating to enhance clinical and operational outcomes. IPECP competencies include concrete elements such as sharing knowledge of respective clinical scopes-of-practice, as well as enhancing interpersonal and psychosocial attributes such as mutual respect, effective communication techniques, and relationship coordination (Gittell, Godfrey, & Thistlethwaite, 2013).

When applied to the healthcare setting, additional competencies are needed, which supply the methodology to improving the processes involved in the delivery of patient care and integrate the IPECP processes into the larger organizational goals. An example of that methodology is Lean. Lean methodology relies on IPECP and seeks to improve process by the use of organizational tools and approaches to reduce waste, improve quality, reduce costs, and ensure close alignment of operational processes with organizational goals and objectives (Schweikhart & Dembe, 2009).

Effective facilitation is vital to the overall success of IPECP efforts such as Lean. While facilitators are an essential component of these programs, the assessment of their performance has not been well studied, and presently, few tools for assessing IPECP facilitators exist and their practical value remains uncertain (Reeves et al., 2016; Sargeant, J., Hill, & Breau, 2010). Additionally, although Lean facilitator training has been implemented in many organizations, no validated, comprehensive tool for assessing Lean facilitator performance currently exists. The purpose of this report is to describe the development of a comprehensive facilitator assessment instrument, known as the Interprofessional Lean Facilitator Assessment Scale (ILFAS).

The ILFAS is grounded in the following theory and research: (1) Lean methodology, (2) a Lean complementary organisational improvement approach called The Shingo Model, (3) IPECP competencies, (4) Bloom's Taxonomy of Learning Domains, (5) metacognition-based theory, and (6) constructivist learning/teaching theory. The detailed conceptual mapping of the above-mentioned methodologies that gave rise to the coding schematics of this instrument is described in chapter 3.

Methods

A New York City municipal acute care hospital has implemented a system-wide Lean program to increase interprofessional collaboration. As part of that Lean program, IPECP

facilitators undergo extensive training in Lean methodology. Up to the time of this study, the Lean IPECP facilitator performance assessment approach was informal, and did not include the use of a formal evaluation instrument. The development and evaluation of the ILFAS occurred in the following four stages.

Stage 1: Development of the scale. The development of ILFAS initially involved a literature search for similar IPECP instruments, resulting in the modification of the Interprofessional Facilitation Scale (IPFS) items (Sargeant et al., 2010). Tool modification involved shifting the focus from general IPECP facilitator assessment towards more specific Lean/Shingo focused IPECP facilitation, which integrated the use of Lean practice competencies and Shingo leader-specific principles (The Shingo Model, 2011). The combination of Lean and Shingo helps to drive the improvement of care by aligning all efforts towards collectively transforming organizational culture that is supportive of process improvement and organizational excellence (The Shingo Model, 2011). In order to assess lower and higher functioning learning capacities, specific Bloom's Taxonomy of Learning Domain-specific keywords, which relate to the increasing levels of complexity of each domain (Kasilingam, Ramalingam, & Chinnavan, 2014), were used in tool items.

Research regarding organizational leadership emphasizes metacognitive skills as being critical factors for effectiveness (Marshall-Mies et al., 2000). Facilitator metacognitive skills are imperative to the organizational leadership of Lean teams and so the ILFAS incorporated specific items designed to identify the presence of these meta-cognitive skills. The constructivist learning theory is also included within the assessment framework of the ILFAS, ensuring the assessment of the facilitator's ability to create collaborative, learner-centered environments where participants of the IPECP experience learn with and from each other (Honebein, 1996; Olusegun, 2015).

The ILFAS uses a 5-point Likert type symmetrical scale design with an ordinal 100 ranking order (1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, and 5: Strongly agree) for each item (see table 5.1 below).

Table 5.1

ILFAS items with categories (Bravo-Sanchez et al. 2017)

Enabling
1. Facilitator acts as a role-model when applying principles of continuous process improvement.[5, 2, 7]
2. Facilitator is NOT ABLE TO explain the Lean/Breakthrough Pillars and Principles: Respect for people, Continuous Improvement, Customer defines value, deliver value on demand, standardize and solve to improve, transformational learning requires deep personal experience, mutual respect and shared responsibility enables higher performance.[6, 1]
3. Facilitator provokes and stimulates teamwork interactions.[6, 7, 4, *]
4. Facilitator encourages team members to learn with, from and about each other's roles and responsibilities during the process improvement session(s).[2, 6, 7, 4, *]
5. Facilitator displays a positive attitude during process improvement session(s). (e.g., willingness to listen, participate, value contributions, advocate).[2, 5, 7, 4, *]
6. Facilitator is able to effectively perform oral presentations (lectures and

demonstrations).[3]

Improving

7. Facilitator is able to accurately explain and translate Lean methodology/process improvement steps and instructions to the team.[1, 6]

8. Facilitator is NOT ABLE TO build and explain visual aids/management (maps, charts, boards, constructs value stream, etc.) during the instructional process.[1, 6 3]

9. Facilitators engage and guide all team members in the development of the process improvement plan.[2, 5, 4, 7, *]

10. Facilitator implemented all Lean/Breakthrough methods, events and tools. appropriately.[1, 6]

Aligning

11. Facilitator ensures consistent alignment in all stages of process improvement in order to meet organization-wide strategic goals and objectives.[1, 5, 4, 7]

12. Facilitator continuously assesses progression of teamwork, changing the facilitation approach as necessary.[1, 4, *]

Results

13. Facilitator explains the purpose and benefits of Lean/Breakthrough methodology.[5, 1]

14. Facilitator accomplished all instructional and procedural daily/weekly objectives.[1, 6, 3]

Note: [1]Cognitive item; [2]Affective item; [3]Psychomotor item; [4]Metacognition item; [5]Shingo item; [6]Lean/HHC Breakthrough item; [7]Interprofessional education and collaborative practice item (IPECP); *Constructivist learning/teaching theory; 5-point Likert scale: strongly disagree, disagree, neither agree/disagree, agree, strongly agree

Stage 2: Expert reviews. The expert and stakeholder reviews confirmed face and content validity concerning Lean/Shingo, and IPECP. A review of tool items was performed by an expert in psychometrics, resulting in the division of two items, which were found to have more than one assessment focus, along with reverse coding of two items and the re-organization of items. A gold belt certified Lean/Shingo expert was the main stakeholder involved in the development process and pilot procedures. This stakeholder review of the items helped to identify redundancies (reducing items from 18 to 14), and additional variables and characteristics were also suggested. The IPECP expert review of the instrument, performed by an interprofessional education/practice expert, confirmed the IPECP-themed items, and provided reassurance that the initial editing process had not resulted in a loss of IPECP recognized items.

Stage 3: Pilot testing. The ILFAS pilot testing involved two evaluators, including one researcher (content novice and less experienced evaluator) and one stakeholder (content expert and experienced evaluator), performed tool-testing procedures over 4 days and during six Lean sessions. A total of five facilitators (one facilitator trained two sessions) were assessed individually, and two evaluators assessed each facilitator simultaneously and independently via an electronic form on hand-held electronic devices (smart phones).

Stage 4: Analysis and post-analysis revision. The post-pilot evaluation involved two steps in the tool evaluation: quantitative evaluation of the agreement of the evaluator responses, and debriefing sessions with the primary stakeholder. Quantitative measures of agreement were computed, including proportion agreement and weighted kappa statistics for the overall tool. Post-pilot debriefing was conducted through a semi-structured, recorded interview with the main stakeholder. As a result of the iterative nature of this project, such feedback formed the basis for uncovering minor concerns, leading to additional tool refinement and strengthening of face and content validity, as well as enhancement of usability.

Ethical considerations. This study was IRB approved by two universities, and permission was granted from the participating HCO. Subject consent was waived given that the daily facilitator assessment is part of the normal employment procedures and program evaluation efforts.

Results

The inter-rater observed overall agreement regarding the assessment of facilitator performance was high, 92%, with a $\kappa w = 0.36$ (item-by-item κw scores presented in Table 2 below). The κw statistic was interpreted as having a fair measure of agreement. The discord between the high level of agreement but relatively moderate κw can be explained by the intrinsic paradoxes involved in the calculation of the κw, which is affected by the unbalanced and symmetrical characteristics of the cross-table calculation end totals (Cunningham, 2009).

Post-analysis expert review revealed the need to further clarify overarching categories among the items in order to increase comprehension for future evaluators. Items were categorised according to their related Shingo Dimensions: 6-items enabling, 4-items continuous improvement, 2-items alignment, and 2-items results (see Table 2). In addition, expert post-assessment review of the instrument confirmed the appropriateness of items for the assessment of facilitator training, and the overall usability and electronic user-friendliness of the tool.

Table 5.2

ILFAS pilot percent agreement and kappa values

Item #	P_o	P_e	κ_w	Item #	P_o	P_e	κ_w
1	81.48%	74.07%	0.2857	9	79.17%	79.17%	0.0000
2	87.04%	74.69%	0.4878	10	83.33%	78.40%	0.2286
3	75.00%	75.00%	0.0000	11	83.33%	77.78%	0.2500
4	75.00%	66.67%	0.2500	12	83.33%	76.39%	0.2941
5	77.78%	85.19%	-0.5000	13	87.04%	76.46%	0.5116
6	81.48%	80.86%	0.0323	14	83.33%	81.94%	0.0769
7	91.67%	84.03%	0.4783	Total Analysis	92.26%	87.89%	0.3611
8	77.78%	83.33%	-0.3333				

P_o = Observed agreement; P_e = Expected agreement; κ_w = Weighted kappa

Discussion

The ILFAS is an evidence and theory-based assessment instrument, designed to capture facilitator skills and competency measures. We drew on several bodies of research to extend the evaluation of interprofessional team facilitation within a process improvement framework. This, we believe, is vital since interprofessional teams can be used as an integral part of HCO improvement. Our initial findings indicate that while inter-rater agreement was high, the weighted kappa statistics indicated only fair agreement. However, more detailed analysis of the patterns of agreement leads us to question the accuracy of the kappa statistics.

Patterns of facilitator ratings indicate the presence of the kappa paradox (Feinstein & Cicchetti, 1990). In short, when ratings are not balanced (e.g., when all facilitators tend to be rated high or low by all raters) the κ is artificially decreased. This artificial lowering of κ is exacerbated when raters are in high agreement (their answers are 'symmetric'—as was the case in our study) (Feinstein & Cicchetti, 1990). Thus, in cases where facilitators are all either highly skilled (as was the case in this pilot study) or poorly skilled and where evaluators have a similar level of training, measures of agreement besides κ are recommended when evaluating the ILFAS (Viera & Garrett, 2005).

While our analyses indicate high inter-rater reliability, the findings are preliminary and, considering the known paradox and small n, the kappas are unlikely to be an accurate measure of agreement. Alternative methods of agreement requiring larger

n and a more diverse sample of both facilitators and evaluators are needed. Regardless, the preliminary examination provides
initial support for the ability of ILFAS to discriminate between facilitators of different competency levels. The ILFAS falls within a small constellation of facilitator assessment tools (Bylund et al., 2009; Sargeant, Joan, Hill, & Breau, 2010). While these tools share some core characteristics, the ILFAS has a unique scope and properties that set it off from other tools that may be used to assess the performance of facilitators of interprofessional teams and work groups. For example, both the Interprofessional Facilitation Scale (IPFS) (Sargeant et al., 2010) and the Comskil Facilitator Assessment Coding System (C-FACS) (Bylund et al., 2009) instruments were designed to be used in educational settings. In contrast, the ILFAS is designed to be used in a non-educational organizational setting where interprofessional team activities are linked to specific organizational goals and processes. Hence, the ILFAS contains items that evaluate the facilitator's ability to explicitly link interprofessional team activities to organizational goals and processes.

Additionally, a unique feature of the ILFAS is its explicit mapping to a hierarchical framework of learning and the creation of knowledge. This may be particularly important as it targets the facilitator's ability to use higher order skills when working with actual interprofessional practice teams with different clinical functions (e.g. emergency room, women's health clinic, ICU) and where the teams are developing their own process improvement plans. In short, the ILFAS includes items specifically designed to evaluate the facilitator's ability to flexibly improvise to meet unique and changing interprofessional team needs. Although both the IPFS and C-FACS instruments assess important facilitator skills and competencies, they contain gaps in other evidence-based skills and competency areas that would be most supportive of effective facilitator performance, and teamwork outcomes especially in real world settings.

The framework of the ILFAS contains evidence and theory-based core components that provide a more comprehensive approach to the assessment process. A limitation of the ILFAS is its focus on the Lean approach to process improvement. While the Lean methodology is widely used in healthcare, it is not ubiquitous (Bortolotti, Boscari, & Danese, 2015). While we believe the Lean specific items of the ILFAS could be modified to refer to different process improvement approaches, research is required to understand how flexibly the ILFAS can be adapted. Further investigations related to this instrument are needed and warranted considering the lack of reliable and valid facilitator assessment instruments in existence at this time (Reeves et al., 2016). The development of such an instrument may provide opportunities to contribute to this area of study, improve upon facilitator training and assessment programs, along with contributing to organisation-wide transformational outcomes.

Concluding comments

HCOs and quality oversight organizations consider IPECP and quality/process improvement to be critical factors for achieving high organizational reliability. Thus, Lean facilitator assessment can be used as an integral tool for the success of performance improvement/IPECP efforts of HCOs that use the Lean/Shingo improvement approach. While Lean facilitator evaluation instruments do exist, none provide a validated, comprehensive theoretical grounding. Comprehensive assessment tools, such as the ILFAS, contribute targeted assessment points, which can shape specific skill development and streamline competency training. Given the pilot nature of this research, there were several limitations. A limited number of facilitators were available for evaluation at the facility. The types of Lean sessions differed in terms of length of time, purpose, and the number of participants, resulting in variability of facilitator workload.

While the analysis identified some potential differences in tool use by novice versus experienced assessors, the sample was too small to confirm any patterns. Expanded research on the ILFAS is needed in order to specifically explore instrument performance with a larger number of facilitators and in different types of IPECP/Lean facilitation training sessions. Further development and testing of such an instrument is likely to assist in facilitator training efforts and supporting team outcomes.

References

Bortolotti, T., Boscari, S., & Danese, P. (2015). Successful lean implementation: Organizational culture and soft lean practices. *International Journal of Production Economics, 160*, 182-201. doi:10.1016/j.ijpe.2014.10.013

Bravo-Sanchez, C., Parrott, J. S., Dorazio, V., Denmark, R., & Heuer, A. J. (2017). Development of an interprofessional collaborative practice lean facilitator assessment scale (ILFAS). *Journal of Interprofessional Care,* (December)

Bylund, C. L., Brown, R. F., di Ciccone, B. L., Diamond, C., Eddington, J., & Kissane, D. W. (2009a). Assessing facilitator competence in a comprehensive communication skills training programme. *Medical Education, 43*(4), 349 8p. doi:10.1111/j.1365-2923.2009.03302.x

Bylund, C. L., Brown, R. F., di Ciccone, B. L., Diamond, C., Eddington, J., & Kissane, D. W. (2009b). Assessing facilitator competence in a comprehensive communication skills training programme. *Medical Education, 43*(4), 349 8p. doi:10.1111/j.1365-2923.2009.03302.x

Cunningham, M. (2009). *More than just the kappa coefficient: A program to fully characterize inter-rater reliability between two raters* SAS.

Feinstein, A. R., & Cicchetti, D. V. (1990). High agreement but low kappa: I. the problems of two paradoxes. *Journal of Clinical Epidemiology, 43*(6), 543-549.

Gittell, J. H., Godfrey, M., & Thistlethwaite, J. (2013). Interprofessional collaborative practice and relational coordination: Improving healthcare through relationships. *Journal of Interprofessional Care, 27*(3), 210-213. doi:10.3109/13561820.2012.730564

Honebein, P. C. (1996). Seven goals for the design of constructivist learning environments. In B. G. Wilson (Ed.), *Constructivist learning environments: Case studies in instructional design* (pp. 11-23). Englewood Cliffs, NJ: Educational Technology.

Kasilingam, G., Ramalingam, M., & Chinnavan, E. (2014). Assessment of learning domains to improve student's learning in higher education. *Journal of Young Pharmacists, 6*(1), 27-33. doi:10.5530/jyp.2014.1.5

Marshall-Mies, J., Fleishman, E. A., Martin, J. A., Zaccaro, S. J., Baughman, W. A., & McGee, M. L. (2000). Development and evaluation of cognitive and metacognitive measures for predicting leadership potential. *Leadership Quarterly, 11*(1), 135.

Olusegun, B. S. (2015). Constructivism learning theory: A paradigm for teaching and learning. *IOSR Journal of Research & Method in Education, 5*(6 Ver I.), 66-70.

Reeves, S., Fletcher, S., Barr, H., Birch, I., Boet, S., Davies, N., McFayden, A., Rivera, J., Kitto, S. (2016). A BEME systematic review of the effects of interprofessional education: BEME guide no. 39. *Medical Teacher, 38*(7), 656-668. doi:10.3109/0142159X.2016.1173663

Sargeant, J., Hill, T., & Breau, L. (2010). Development and testing of a scale to assess interprofessional education (IPE) faciliation skills. *Journal of Continuing Education in the Health Professions, 30*(2), 126-131. doi:10.1002/chp.20069

Sargeant, J., Hill, T., & Breau, L. (2010). Development and testing of a scale to assess interprofessional education (IPE) facilitation skills. *The Journal of Continuing Education in the Health Professions, 30*(2), 126. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/20564701

Schweikhart, S. A., & Dembe, A. E. (2009). *The applicability of lean and six sigma techniques to clinical and translational research*

The Shingo Model. (2011). Shingo model handbook for operational excellence. Retrieved from http://lean.nh.gov/documents/Shingo%20Model%20Handbook.pdf

Viera, A. J., & Garrett, J. M. (2005). Understanding interobserver agreement: The kappa statistic. *Family Medicine, 37*(5), 360. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/15883903

Chapter VI: IFPAS Pilot

Development of an Interprofessional Facilitator Performance Assessment Scale

Introduction

Interprofessional education and collaborative practices (IPECP) are considered to be an important part of the trajectory from healthcare profession student education through to post-licensure clinical team-based practice (Institute of Medicine, 2015; IPEC, 2016). Although interprofessional education has not historically been a core component of healthcare education, institutions have slowly been integrating interprofessional learning experiences since the 1980s, with a more concerted effort in the 2010s (Ascione et al., 2019; Brandt, Lutfiyya, King, & Chioreso, 2014; IPEC, 2011).

In an effort to support the integration of IPECP into higher education, faculty facilitator training is needed in order to develop programs, increase capacity and sustain outcomes (Ascione et al., 2019; Evans, Ward, & Reeves, 2018). The literature concerning the training and development of faculty facilitators is minimal, limiting what is known regarding the effective facilitator characteristics needed for the successful facilitation of IPECP (Bylund et al., 2009; El-Awaisi, Joseph, El Hajj, & Diack, 2018; Reeves et al., 2016).

In addition, the few performance assessment instruments available involve minimal or no use of theory in their framework, which can lead to weak assumptions and poor guidance for training and development efforts (Reeves, Boet, Zierler, & Kitto, 2015). Comprehensive, theory-based performance assessment instruments are needed in order to develop facilitator training programs and provide targeted feedback to facilitator trainees. Literature regarding assessment - based training,emphasizes the importance of using performance assessment results to inform the training and development of skills (Sennhenn-Kirchner et al., 2016; Sindelar, 2011).

This report describes the development and testing of a comprehensive, theoretically-based IPECP facilitator assessment tool known as the Interprofessional Facilitator Performance Assessment Scale (IFPAS). The IFPAS framework integrates aspects of the following theory and research: (1) IPECP competencies, (2) Bloom's Taxonomy of Learning Domains, (3) metacognition-based theory, (4) an organizational culture improvement approach called The Shingo Model, and (5) constructivist learning/teaching theory. The conceptual construction of the instrument framework containing these methodologies is described in chapter three of this dissertation.

Methods

The Rutgers School of Biological and Health Sciences implemented a school - wide initiative to integrate IPECP into the curriculum. The Special Populations Interprofessional Care Experiences (SPICE) initiative, through the Rutgers School of Dental Medicine, is an IPECP student program made possible through a grant from the United States Health Resources and Services Administration (HRSA, Grant Number D85HP28497.). This pilot study is an extension of the SPICE initiative, and was approved by the Rutgers University Internal Review Board (Pro20160000035).

SPICE program faculty facilitators and student participants come from a variety of professional backgrounds (dental, dental hygiene, social work, medicine, pharmacy and nutrition). Faculty facilitators of various levels of teaching and facilitation experience are provided with a one-day online training session, meant to prepare them to facilitate patient case student discussions regarding interprofessional dental care management of special needs patients. The training process has not previously included the assessment of facilitator performance nor any participant (student) feedback to the facilitators.

This pilot study provides an opportunity to provide faculty with comprehensive performance assessment results (passive feedback) and feedback that includes coaching to specific areas of improvement (enhanced feedback), as well as an opportunity for faculty to provide critical feedback regarding the IFPAS instrument, facilitator training process, and SPICE program activities. The development and testing of the IFPAS instrument is described in the following stages.

Stage 1: Development of the scale. The IFPAS instrument was derived from the ILFAS instrument, an instrument designed for the clinical setting (Bravo-Sanchez, Parrott, Dorazio, Denmark, & Heuer, 2017). Although many of the same theoretical and methodological components used to develop the ILFAS instrument remain within the framework of the IFPAS instrument, the contextual focus was shifted towards the higher education classroom setting. The IFPAS instrument is grounded in the following theory and methodology.

The **IPECP** - specific skills and competencies identified in the literature as being critical to the success of IPECP, such as ensuring interprofessional collaborative communication, and management of team dynamics and teamwork logistics are included as core assessment components (Banfield & Lackie, 2009; Freeth & Reeves, 2004; Hall, Weaver, & Grassau, 2013; IPEC, 2016). **Bloom's Taxonomy of Learning Domains** are included to provide structure to each item, ensuring the assessment of the hierarchical levels of knowledge processing and transfer (Krathwohl, Bloom, & Masia, 1965; Krathwohl, 2002; Simpson, 1966). As an additional approach to assessing high - level cognitive functions, the IFPAS also includes **metacognition** items that assess the facilitator's ability to self-evaluate performance in order to strategically implement facilitation skills (Black, Soto, & Spurlin, 2016; Magno, 2010; Pintrich, 2002).

The IFPAS instrument also assesses the ability of the facilitator to have an impact on organizational culture and practice by including items that can be categorized into culture improvement principles from **The Shingo Model** (The Shingo Model, 2011). These principles are used as overarching themes for the items contained in the IFPAS and they include: Enabling, Improving, and Aligning (The Shingo Model, 2011).

Finally, since one of the main goals of facilitated IPECP student activities is to have students learn with and from each other, it is also important to assess the facilitator's ability to support of the constructivist learning process where students, through discussion with each other, share knowledge and learning experiences, providing a platform for collaboration and respectful communication practices.

The IFPAS structure includes the use of an ordinal ranking order, 5-point Likert type symmetrical scale for each item (1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, and 5: Strongly agree).

Stage 2: Tool transition from clinical to classroom focus. The transformation process from the ILFAS, an instrument for the clinical setting (described in chapter 5), to the IFPAS, an instrument designed for the classroom setting, involved a change in the contextual focus and number of items, as well as testing to ensure the retainment of cognitive processing levels and intended learning outcomes.

The shifting of the contextual focus, from the clinical to classroom setting, is demonstrated by a change in the number items of some of the core components used in the final draft of the IFPAS (see table 6.1 below).

Table 6.1

ILFAS - IFPAS Core Component Item Assessment Comparison

	# Cognitive Items	# Affective Items	# Psychomotor Items	# Metacognition Items	# IPECP Items	# Shingo Items	# Lean Items
ILFAS	7	5	4	6	6	5	7
IFPAS	4	5	4	7	8	4	0

ILFAS – Interprofessional Lean Facilitator Assessment Scale
IFPAS – Interprofessional Facilitator Performance Scale

One theme of the Shingo Model principle, Results, was not included in the development of the IFPAS, since this theme focuses on process improvement outcomes, a feature of IPECP in the clinical setting, and included in the original design of the ILFAS instrument (Bravo-Sanchez, Parrott, Dorazio, Denmark, & Heuer, 2017). This resulted in a decrease in the number of items by one.

An additional transitional approach towards changing the context is the removal of the Lean process improvement technical skills and competencies included in the ILFAS instrument (a total of 7 items). Few health profession student programs include process improvement methods within the curriculum, although this area of competency has been included within graduate medical education, and the benefits of teaching process improvement methods in healthcare professions higher education have been acknowledged in the literature (Armstrong, Lauder, & Shepherd, 2015; Jenson et al., 2009; Ogrinc et al., 2015).

This decrease in the number of items provided an opportunity to add additional focus on the assessment of IPECP - focused areas of practice, cognitive, and metacognitive skills, in an attempt to change the contextual focus away from process improvement and closer to the IPECP classroom context, and assess advanced high-level thinking skills. This contextual shift resulted in a decrease in the total number of items from 14 to 12.

Table 6.2 below contains all of the IFPAS items along with concrete behaviors that serve as examples of how each item can be used to assess performance.

Table 6.2

Interprofessional Facilitator Performance Assessment Scale (IFPAS)

IFPAS Items	**Examples of Concrete Behaviors**
Enabling	
1. Facilitator is able to clearly explain the purpose and benefits of IPECP [1, 6]	*The facilitator explains how each member of the interprofessional team is an important part of delivering quality care.*
2. Facilitator is able to instruct and guide participants through IPECP activities.[1, 3, 4, *]	*The facilitator asks students to read portions of the case, then ask*

	each profession to respond to questions
3. Facilitator displays a positive attitude during IPECP session(s). (e.g., willingness to listen, participate, value contributions, advocate) [2, 4, 5]	*The facilitator responds positively when a student explains their patient care approach from the perspective of their professional focus.*
4. Facilitator is able to effectively perform oral presentations (lectures, demonstrations).[3]	*The facilitator explains a patient diagnosis to support further discussion among the student group.*
Improving	
5. Facilitator encourages team members to learn collaboratively about each other's roles and responsibilities during the session [2, 6, 4, *]	*The facilitator directs students from each profession to contribute to the formulation of a patient care plan.*
6. Facilitator observes team behavior and provides feedback to manage team dynamics as needed [3, 5, 6, *]	*The facilitator notices several students are not participating and purposely directs an open-ended question to those students to spark discussion.*
7. Facilitator stimulates and encourages respectful interprofessional collaborative communication [2, 4, 6]	*The facilitator notices a student dominating the conversation and respectfully interjects in order to allow for others to respond or ask questions.*
8. Facilitator does *not* control group consensus or outcomes [2, 4, 6, *]	*The facilitator allows for students to direct/control the conversation, as each portion of the session is facilitated.*
Aligning	
9. Facilitator acts as a role-model when practicing IPECP skills and competencies [2, 5, 6]	*The facilitator practices respectful collaborative communication when interacting with the student*

	group.
10. Facilitator ensures consistent alignment in all IPECP activities in order to meet organization-wide strategic goals and objectives [1, 4, 5, 6]	*The facilitator informs and reminds students of the goals and objectives, as needed, in order to ensure alignment.*
11. Facilitator provides debriefing at the conclusion of all activities, explaining purpose and practical application [4, 6]	*The facilitator directs the group to reflect on the session, and explains how IPECP can transfer into their clinical practice.*
12. Facilitator accomplishes all IPECP instructional objectives as scheduled [1, 3]	*The facilitator completes the course objectives within the allotted time.*

Note: [1]Cognitive item; [2]Affective item; [3]Psychomotor item; [4]Metacognition item; [5]Shingo item; [6]Interprofessional education and collaborative practice item (IPECP); * Constructivist learning/teaching theory; 5-point Likert scale: strongly disagree, disagree, neither agree/disagree, agree, strongly agree

In order to confirm that the theory - based core components derived from the ILFAS for use in the IFPAS instrument retained their ability to assess facilitator knowledge and cognitive processing, an assessment using the Taxonomy Table by Krathwohl (2002) was completed (see table 6.3 below) (Krathwohl, 2002).

Table 6.3

Taxonomy Table comparative analysis of the ILFAS and IFPAS items (Krathwohl, 2002)

	The Cognitive Process Dimension					
The Knowledge Dimension	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
A.Factual						

Knowledge					
B. Conceptual knowledge	**IFPAS-** 1* **ILFAS-** 2, 13	**ILFAS-** 1			**IFPAS-** 5
C. Procedural Knowledge		**IFPAS-** 4, 9, 11, 12 **ILFAS-** 6	**IFPAS-** 2 **ILFAS-** 7	**IFPAS-** 10 **ILFAS-** 11, 14	**ILFAS-** 3, 4, 9, 8
D. Metacognitive Knowledge		**IFPAS-** 3 **ILFAS-** 5		**IFPAS-** 6, 8 **ILFAS-** 10,12	**IFPAS-** 7

IFPAS-Interprofessional Facilitator Performance Assessment Scale; **ILFAS**-Interprofessional Lean Facilitator Assessment Scale
*Numbers refer to the item number in the IFPAS instrument

This comparative analysis demonstrates the retainment of the majority of the ILFAS core components in the development of the IFPAS instrument, with six out of ten cells in common, and the ILFAS and IFPAS emphasizing the assessment of two different aspects of metacognitive knowledge (application, creation), along with a heavy focus on the assessment of skills requiring procedural knowledge. Overall, the proposed instruments contain a large proportion of high-level knowledge (Procedural, Metacognitive) and cognitive dimensions (Apply, Analyze, Evaluate, Create) - ILFAS 79%; IFPAS 83%.

An additional comparative analysis was performed using a modified version of Kirkpatrick's classic educational outcomes model developed by Barr et al. (2005). This model helps to categorize the different learning outcomes of the IPECP experience from the individual level (attitudes, skills/knowledge, behavioral), to the organizational level (organizational culture change, impact on patient care). Below, each assessment instrument has been categorized in order to compare how each instrument assesses the ability of the facilitator to support these learning outcomes (see table 6.4 below).

Table 6.4

Modified Kirkpatrick's comparative assessment of the proposed instruments

Modified Kirkpatrick's Non-Hierarchical Outcome Classifications (Barr et al 2005; Reeves et al. 2016)	**ILFAS (Bravo-Sanchez et al., 2017)**	**IFPAS**
Level 1- Reaction		
Level 2a - Modification of attitudes/perceptions	X	X
Level 2b - Acquisition of Knowledge/Skills	X	X
Level 3 - Behavioral change	X	X
Level 4a - Change in organizational practice	X	X
Level 4b - Benefits to patients/clients	X	X

As demonstrated above, the focus of the educational outcomes remained the same and was not altered in the transition from a clinical setting to a classroom setting. Both instruments did not include the Reaction learning outcomes since they are designed to be used by an evaluator and not for self-assessment purposes. It is evident that the IFPAS instrument retained many of the comprehensive features of the ILFAS, and is contextually structured for use in the classroom setting.

Stage 3: Pilot Testing. The central hypothesis of the proposed study is that providing performance feedback to faculty will result in stronger IPECP facilitation skills, which in turn will result in immediate positive outcomes such as increased student communication/participation levels. This hypothesis is based on the literature, which concludes that facilitator IPECP skills and competencies are important to the success of IPECP (Reeves et al., 2016). Success of IPECP outcomes has been the focus of much research. A major goal of this study is to identify facilitator components that can be considered critical to the success of IPECP. The results may serve as a guide for facilitator training programs and contribute to IPECP outcomes.

Aims, objectives, hypotheses

Aim 1: Develop and test an IPECP facilitator skills assessment and training tool (IFPAS) that incorporates the core set of facilitator skills but tailored for use in an interprofessional education context.

Objective 1: Compare two different methods of providing facilitator feedback using the IPFAS tool.

Hypothesis 1: Enhanced (coaching) feedback will result in improved IFPAS scores compared to passive IFPAS use.

Aim 2: Examine facilitator perceptions of usability and utility of the IFPAS for assessing and improving IPECP facilitator performance, training, and SPICE program activities.

Orienting question 2: What are different methods by which faculty facilitators incorporate IFPAS focused feedback into practice?

Aim 3: Identify student-to-student interactions occurring during SPICE sessions in relationship to IPECP facilitation outcomes.

Objective 3: Identify whether percent IPECP student-to-student interactions are associated with IFPAS competency item and domain scores.

Hypothesis 3: Higher IFPAS item and domain scores will be associated with higher percentage rates of student-to-student participation during IPECP sessions.

Figure 6.1 below describes the aims and purpose of this pilot study.

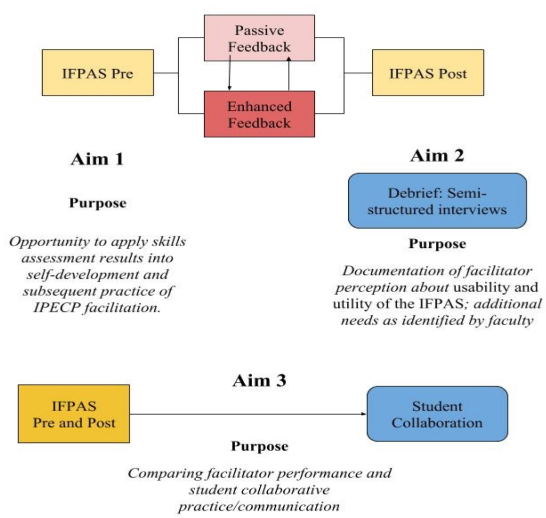

Figure 6.1 Study Aims.
IFPAS - Interprofessional Facilitator Performance Assessment Scale

Study Design. The initial design of the study involved the comparison of the passive (IFPAS results only) to the enhanced feedback (coaching based on IFPAS results) group total IFPAS scores, and an additional comparison of the group IFPAS performance results to the results of a student interaction analysis of the IPECP sessions. While the original conception of the study was to randomize participants into either the passive or enhanced feedback conditions, it was deemed more important by program stakeholders to let participants choose the mode of feedback. Participants could elect to receive the enhanced rather than the passive feedback, if desired. Subsequently, the design of the study was changed due to a low N and an imbalance between subjects who opted for the enhanced feedback compared the those who only received the passive feedback only (five-enhanced, two-passive). The final study design involves a qualitative analysis of pre and post total IFPAS results (passive and enhanced feedback combined), and a statistical analysis of how changes pre- to post-feedback is related to the results of the student interaction analysis.

Participants and Organizational Context. Eligible participants included all faculty video recorded participating as facilitators in the Rutgers University SPICE program special needs dentistry case review sessions. Exclusion criteria included any session facilitator that opted not to be recorded or anyone who was an advisor/researcher for this pilot study.

SPICE case sessions involved student IPECP patient case discussions, focused on special needs dentistry patient cases. Study participants were adjunct and full time faculty members with professional backgrounds including nutrition, social work, pharmacy and medicine. These IPECP facilitated sessions took place in a classroom in the dental school with interprofessional student groups from the following professional backgrounds: dentistry, dental hygiene, social work, nutrition, nursing, and medicine. Some students participated in the sessions via video conference.

Sessions were chosen according to their pre-scheduled program dates that ran parallel to the research pilot study schedule (Spring 2018). Participants were recruited via email by the SPICE study principal investigator. Study participants who expressed interest in participating were then contacted by the pilot study researcher as part of the study intervention. The intervention process is described in the section below.

Intervention. The intervention involved the email distribution of a pre-intervention IFPAS assessment results report (passive feedback) to all study participants, which provided an opportunity for faculty facilitators to independently review strengths and weaknesses, and apply this feedback to the self-developmental process. In addition, all participants received an electronic survey designed to capture their feedback concerning the SPICE program sessions, facilitator training and the IFPAS results received via email (details for this and other instruments are in the data collection section below).

The passive feedback email (containing individual IFPAS results) also included an offer for a one-to-one video-conference coaching (enhanced feedback) session with the pilot study researcher, an experienced IPECP facilitator with a background as a clinician and educator. The enhanced feedback provided an opportunity for subjects to discuss their assessment results, and receive IFPAS-guided coaching to inform their self-development and help improve their performance outcomes.

The enhanced feedback coaching sessions were one-hour in length, using both video conferencing and telephone as modes of communication. The coaching approach involved the main components of the assessment framework (learning domains-cognitive, affective, psychomotor; metacognitive; Shingo, IPECP, constructivist student learning/teaching) and was individualized according to the IFPAS pre-assessment findings. The sessions included a free-form, semi-structured discussion where subjects were initially asked if they reviewed the IFPAS report (areas in need of improvement were reviewed during the session). The conversation then focused on capturing their feedback through questions regarding their IFPAS results, SPICE case sessions, and facilitator training. Coaching moments were woven into the conversation in order to link participant concerns, perceptions, and areas in need of improvement with IFPAS-centered facilitation approaches they could apply in subsequent facilitated student sessions. Additionally, a review of the SPICE session objectives were discussed as a way of aligning facilitation practices to the expectations of the SPICE program. SPICE session objectives included the following: 1. To introduce students of different professions to the other professions so as to expand their understanding of the scope of practice and knowledge base of the different professions; 2. To model interprofessional discussion and conversation about a complex case; and 3. Introduce students to the characteristics of special needs dentistry cases.

Prior to the end of the session, a discussion regarding what new approaches could be considered for use in subsequent sessions helped to identify possible program changes, further discussed in the results section of this chapter.

Data Collection. The pre and post-intervention facilitated sessions were recorded by university staff for study purposes and saved in an institution password protected electronic folder. Recorded sessions were then accessed and reviewed in order to collect performance assessment data using the electronic version of the IFPAS instrument created with Qualtrics survey software and saved using a password protected folder in the university Qualtrics database (Qualtrics, 2016).

The passive feedback intervention involved the distribution of a Qualtrics generated IFPAS results report to all study participants (Qualtrics, 2016). The enhanced feedback session consisted of a free-form, semi-structured interview that provided the platform for reviewing the IFPAS results report, allowing for subjects to provide their perspectives on the SPICE program, training and the feedback they received, combined with coaching opportunities.

Two Qualtrics electronic surveys were used by the researcher in order to capture the information gathered during the enhanced coaching session: 1. "IFPAS Enhanced Feedback Implementation Survey" (capturing coaching details); 2. "Baseline Characteristics/Faculty Feedback Survey" (capturing facilitator concerns and perceptions) (Qualtrics, 2016). Study participants that did not receive the enhanced feedback coaching did receive the electronic Baseline Characteristics/Faculty Feedback Survey via email in order to provide them with the opportunity to document their feedback as well. All survey instruments used can be viewed in the appendices of this dissertation.

Table 6.5 lists each study instrument, purpose and associated aim.

Table 6.5

Trial Instruments, summary of purpose and related Aims (Appendix A)

Instruments	Purpose	Measure Type	Aim
Interprofessional Facilitator Performance Assessment Scale (IFPAS)	Facilitator assessment instrument that provides the core theory and evidence for the comprehensive coaching intervention.	5-point Likert scale: strongly disagree, disagree, neither agree/disagree, agree, strongly agree	Aim 1
IFPAS Enhanced Feedback Implementation Survey	Documentation of coaching details and approach	Multiple-choice, free text	Aim 1
Baseline Characteristics/ Faculty Feedback Survey	Documentation of facilitator characteristics and subject perceptions regarding SPICE program activities, facilitator training and IFPAS performance feedback	Multiple-choice, free text	Aim 2

Analysis. The pre- and post-intervention case session recordings were accessed from the password protected server in the university Microsoft-One Drive online account (Microsoft Corporation, 2019). Videos were viewed using a researcher owned, password protected laptop computer and IFPAS performance assessment data were captured during and after viewing the videos using the electronic version of the IFPAS instrument created using the Qualtrics survey software (Qualtrics, 2016). Recorded performances were then coded for student-to-student (STS) session participation and a tally approach using paper and pen was used for the initial gathering of interaction data (described in more detail below). Duration of technical difficulties or long silences were measured via a stopwatch. Data from the STS session participation analysis was then transferred to a Microsoft Excel data file and uploaded to the university password protected Microsoft One Drive online account (Microsoft Corporation, 2010; Microsoft Corporation, 2019).

The pilot analysis utilized a mixed-methods approach that included the use of a case-series empirical analysis (Yin, 2018) of the participant feedback and discussions along with statistical analyses of the IFPAS results and student interaction analysis. The case series analysis was performed by reviewing all qualitative survey data stored in the Qualtrics database, as well as the Microsoft Excel and SPSS data files stored in the Microsoft One Drive online account. Thus, the qualitative feedback received from participants was triangulated with information from the IFPAS evaluated facilitation performances as well as with the student interaction analysis (described below).

Qualitative/Quantitative Analysis. The qualitative analysis of study data is presented in a case series structure, which includes a **within-case synthesis** of the individual subject findings, as well as a **cross-case synthesis** to identify patterns between the cases, as well as any emerging themes regarding their perspectives and recommendations regarding the SPICE program, faculty facilitator training, and the IFPAS instrument/assessments (Aim 2) (Yin, 2018).

The **within-case synthesis** is presented as a narrative of the both the pre- and post- performance sessions and the intervention provided. This synthesis provides additional detail and contextual information not ordinarily captured by statistical analysis alone. For example, session details (facilitator role, number of student participants, individual IFPAS results, session objectives accomplished), feedback details (passive, enhanced), facilitator reported challenges, concerns, and recommendations collectively provide a more in-depth understanding of session conditions present during the assessment of performance, the intervention, and facilitator perceptions.

The **cross-case synthesis** first summarizes patterns and themes found across all cases in terms of the feedback from subjects regarding the SPICE case sessions, training, and the IFPAS feedback, followed by a statistical analysis that examines how all subjects performed individually and as a group, by performing a paired t-test on the overall IFPAS scores pre- to post-feedback, and a Wilcoxon test on each IFPAS item that helps to uncover which performance areas improved the most across all facilitators. A Pearson's correlation test of the proportion of student-to-student interactions (% STS) and IFPAS total change scores provided the ability to examine how changes in facilitator performance were related to changes in student interactions. Both Microsoft Excel and the Statistical Package for Social Sciences (SPSS) software version 25 was used to perform all qualitative statistical testing (IBM, 2017; Microsoft Corporation, 2010).

Analysis of Session Objectives Achieved. SPICE case objectives include the following: 1. To introduce students of different professions to the other professions so as to expand their understanding of the scope of practice and knowledge base of the different professions; 2. To model interprofessional discussion and conversation about a complex case; and 3. Introduce students to the characteristics of special needs dentistry cases.

The analysis of objective one will involve the tracking of the professions participating in the discussions during the core portion of the session. The core portion of the session does not include the student and case introductions, which can be considered preparation procedures for the main collaborative conversation, and the debriefing process would also not be considered a part of the core activity since it is a post-collaboration review of the discussion.

For example, students are directed to introduce themselves and the case (preparation stage). If five professions are present during a session (example: nursing, medicine, dental, pharmacy, social work), and the students representing the nursing profession do not participate in the core portion of the collaborative discussion, prior to the debriefing segment (review of the discussion), then objective one is incomplete. At least one student representative from each profession present needs to participate during session conversations in order to achieve objective one. This analysis will be presented in narrative form in each case synthesis, and a summary of case findings will be presented in a figure in the cross-case synthesis section of this chapter.

The analysis of session objective two involves the tracking of the percent STS interactions observed during the core portion of each session (after student introductions and prior to the debriefing process) pre and post. Although there is no known benchmark for this measure, it is nevertheless important to understand the level of STS occurring during IPECP since students learning with and from each other is a core component of the IPECP student experience. The within-case synthesis will provide individual percent STS interaction measures pre and post, and the cross-case synthesis will summarize the pre-post achievement of session objectives overall.

As mentioned above, additional analysis will involve statistical testing of the correlation between percent STS interaction measures and total IFPAS scores as a way of determining if there is a relationship between performance outcomes and the proportion of STS interactions during the sessions. This quantitative analysis will be described in detail in the section below (Interaction Analysis Methodology).

The analysis of session objective three will involve the review of session recordings in order to detect the presence of special needs dentistry case-centered discussions. Recordings are observed in order to detect the introduction to the case, and case-related conversation throughout the session. The data for this analysis will be presented in narrative form, documenting the presence of case-related discussions during the session as evidence of the completion of objective three.

Interaction Analysis Methodology. An interaction process analysis was performed in order to measure the central intended learning outcome of IPECP experiences: students learning with and from each other (Aim 3) (Bales, 1950; Green, Camilli, & Elmore, 2006). The analysis involved the coding of the recorded sessions, allowing for the replay of interactions to verify the initial coding. (Green et al., 2006). Video recordings were designed to capture 360 degree view of the room, capturing all participant interactions, and the occasional multi-participant conversation combination was able to be captured with a fair degree of ease.

The main focus of the interaction process analysis was the pre-post percent of session STS interactions as a measure of IPECP facilitation performance outcomes and student learning. In order to further understand the STS interaction measurement, Schegloff's definition of a speech turns or "turn constructional unit" (TCU) will be used (Schegloff, 2007). When one student takes a turn-in-speaking, this describes a TCU. Therefore, when one person takes a speech-turn to speak to another person, this is considered one TCU, and when the other person takes a speech-turn to respond, that is a second TCU. Schegloff (2007) describes the two TCU sequence as an "adjacency pair" (Schegloff, 2007). An adjacency pair sequence between two students is what makes up a single STS interaction measurement.

The number of student adjacency pairs (SAPs) was identified during the session assessment process (and served as the numerator for the computation of %STS). All other types of adjacency pairs (e.g., faculty to faculty [FTF], faculty to student [FTS] and student to faculty [STF]), were counted collectively (as non-SAPs) and added to the total number of SAPs for the aggregate count of adjacency pairs present during each session (denominator of the %STS calculation). However, the resulting proportion of SAPs calculated are expressed as percent STS interactions in acknowledgement of the exchange of ideas and knowledge that occurs during IPECP sessions. Therefore:

% STS interactions = (Total SAPs/Total adjacency pairs) x 100

It is important to note that although there is no known benchmark for this process measure, for the purpose of this study, the minimum threshold of 20% will be used to determine the achievement of session objective number two (To model interprofessional discussion and conversation about a complex case). In addition, any % STS interaction measure below 20% will be considered “low”.

The content of each SAP counted (agreement, disagreement, etc.) will not be analyzed. Rather, only the identities of the speaker and target (faculty versus student) in speech turn adjacency pairs served as the unit of analysis. Certainly there can be several combinations of adjacency pairs, and it is important to discuss these in order to understand how the SAPs were identified.

Classroom SAPs may arise from multi-sequence TCUs that may involve adjacency pairs between facilitators and students, or additional students that may join an already in progress SAP (e.g., when a second student enters an existing interaction between a faculty member and a student). There were four types of SAPs identified among the sequence patterns present during session assessments (Figure 2).

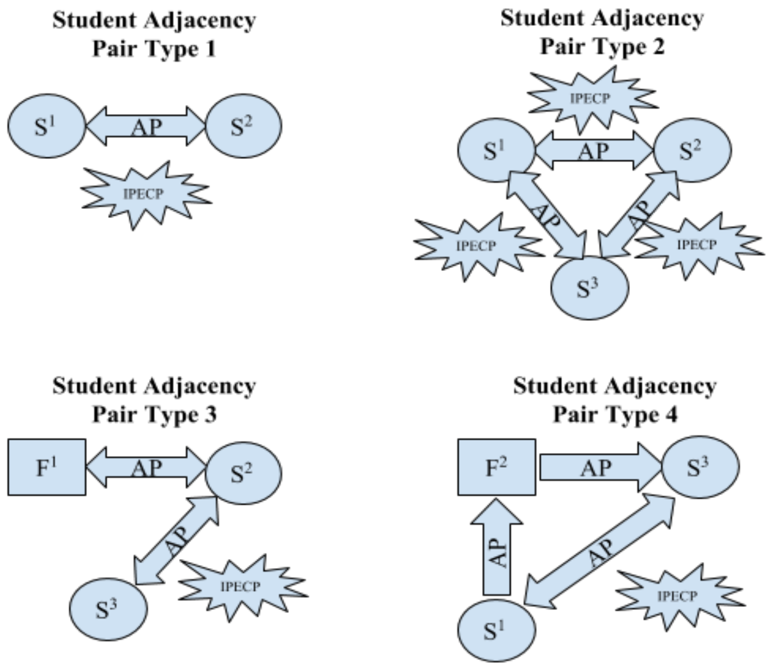

Figure 6.2 Types of student adjacency pairs. AP = Adjacency pair. F^1= first position facilitator. F^2= second position facilitator. S^1= first position student. S^2= second position student. S^3= third position student. IPECP-Interprofessional education and collaborative practice.

The above SAPs range from basic to complex sequences. Schegloff's terminology helps to describe the presence of other types of adjacency pairs that occur before, during, or after a base SAP unit as "pre-sequences", "insert-sequences", and "post-sequences", which add speech turns to the sequence and are considered to be "expansions" of the base SAP unit (Schegloff, 2007). Below are the descriptions of each SAP type.

Student Adjacency Pair Type 1 displays the basic SAP sequence that is the core unit of interest in each type of SAP displayed in the figure above. SAP Type 1 shows a student in the first position (S^1) taking a speech turn that is directed to the student in the second position (S^2), and the double-sided arrow signals a speech turn response by the student in the second position (S^2). The following exchange is an example of how SAP type 1 occurs:

TCU 1: $S^1_{question}$ $\rightarrow S^2$ = "Which medication can be used for pain during the procedure?"

TCU 2: S^2_{answer} $\rightarrow S^1$ = "We would use a local anesthetic such as lidocaine."

TCU 1 and TCU 2 together make up one SAP since each student used one speech turn during this sequence.

Student Adjacency Pair Type 2 shows the basic SAP unit (Type 1), along with a student in the third position (S^3). The student in the third position may comment, ask a question, or help answer a question that was initiated by the student in the first or second position. This form of entering into a two person SAP sequence is an example of a post-sequence SAP. The following exchange is an example of how SAP type 2 occurs:

TCU 1: $S^1_{question}$ $\rightarrow S^2$ = "Which medication can be used for pain during the procedure?"

TCU 2: S^2_{answer} $\rightarrow S^1$ = "We would use a local anesthetic such as lidocaine."

TCU 3: $S^3_{comment}$ $\rightarrow S^2$ = "I think that would be difficult with a special needs patient."

TCU 4: $S^2_{comment}$ $\rightarrow S^3$ = "Well, we could use a blanket wrap to keep the patient calm."

TCU 1 and TCU 2 together make up the first SAP. A second SAP starts with TCU 3 in a third-position S^3 post-sequence directed towards S^2. TCU 4 ends the second SAP as S^2 responds using a follow-up comment to S^3.

Student Adjacency Pair Type 3 shows two kinds of adjacency pairs. The first adjacency pair involves a speech turn sequence between a facilitator and a student (a non-SAP). The facilitator is in the first position (F^1) and is using a speech turn towards the student in the second position (S^2). This facilitator-student speech turn is considered to be a pre-sequence for the SAP adjacency pair. An additional student in the third position (S^3) enters the sequence by directing a speech turn towards the student in the second position (S^2), and a SAP is completed. The following exchange is an example of how SAP type 3 occurs:

TCU 1: F^1_{question} $\rightarrow S^2$ = "How would you check if the patient is growing normally?"

TCU 2: S^2_{answer} $\rightarrow F^1$ = "I would use a standardized infant growth chart."

TCU 3: S^3_{comment} $\rightarrow S^2$ = "I think there are special needs-specific growth charts. "

TCU 4: S^2_{comment} $\rightarrow S^3$ = "Oh, I didn't know there were special needs growth charts."

TCU 1 and TCU 2 together make up a non-SAP sequence, and is considered to be a pre-SAP sequence adjacency pair. TCU 3 is a third-position speech turn, which enters the sequence and marks the start of a SAP. When S^2 takes another speech turn to respond to S^3, this completes the SAP.

Student Adjacency Pair Type 4 shows a non-SAP sequence that starts with a student in the first position S^1 directing a speech turn towards a facilitator who is in the second position F^2. Instead of the F^2 responding to S^1, F^2 directs the speech turn towards a student in the third position S^3, which leads to a speech turn in the third position (S^3) directed towards the student in the first position (S^1), starting an SAP sequence. When S^1 responds using a speech turn directed towards S^3, then the SAP has been completed. The following exchange is an example of how SAP type 4 occurs:

TCU 1: $S^1{}_{question}$ →F^2 = "Can social workers help to get a patient health insurance?"

TCU 2: $F^2{}_{question}$ →S^1 = "Just a moment."

TCU 3: $F^2{}_{question}$ →S^3 = "Can one of our social work colleagues answer her question?"

TCU 4: $S^3{}_{answer}$ →S^1 = "Yes, social workers can help patients get health coverage."

TCU 5: $S^1{}_{comment}$ →S^3 = "Oh, okay, thank you."

TCU 1 and TCU 2 make up a non-SAP sequence, and can be considered a pre-sequence expansion, where the facilitator in the second position F^2 takes a speech turn towards S^1. This is followed up with an insert-sequence expansion where F^2 directs a speech turn towards the student in the third position S^3 (TCU 3), another non-SAP sequence. When S^3 directs a speech turn towards S^1 then this starts an SAP (TCU 4), and the speech turn response from S^1 (TCU 5) completes the SAP in this sequence.

The receiver student need not respond verbally, since non-verbal communication is sometimes used to acknowledge the interaction. For example, a simple nodding action after hearing an answer to a question posed, or a comment. In addition, the majority of STS interactions took place one at a time (largely polite conversations), with very few instances of several students speaking at once.

Results

A total of ten subjects received the passive IFPAS feedback intervention via email following the analysis of a case review session recorded in Spring 2018. Three subjects did not perform a post-intervention case review session (two received passive feedback, one received the enhanced-feedback) since their availability changed and they were no longer available to participate in the SPICE case sessions in Fall 2018. Out of the three subjects who no longer participated in the program, two were no longer available due to a change in employment position and the third subject dropped out due to a change in work schedule and subsequent unavailability. A total of seven subjects completed both pre and post-intervention facilitation student sessions, among which five requested the enhanced feedback session, and only two subjects received the passive feedback.

Subject characteristics are listed in table 6.6 below. Subject professional backgrounds and sex are not identified in light of the small sample size and the need to protect subject identity. Subject professional backgrounds include nutrition, social work, pharmacy and medicine.

Table 6.6

Subject characteristics (N = 7)

Subject	**Teaching experience (yrs.)**	**Faculty position**
N-1	11-15	Full-time
N-2	20+	Adjunct
N-3	1-5	Full-time
N-4	6-10	Full-time
N-5	*na	Adjunct
N-6	11-15	Full-time
N-7	6-10	Full-time

*na - not available

The individual IFPAS findings and survey data are analyzed using a within-case and cross-case synthesis format below.

Within-case synthesis. We begin with a rich description of each case. The cross-case synthesis will follow, helping to identify any patterns across all individual cases that can expand upon what has been learned by the statistical analysis and help to inform the SPICE program and future IFPAS research. Case session and individual performance assessment details are presented in table 6.7 below.

Table 6.7

Within-case session details

Case ID	Pre-Post Presence of Lead or Co-Facilitator	Type of Feedback Received	# Students in Session Pre/Post	#Technical Difficulties (minutes of duration)	% Overall Session STS interactions	Pre/Post Total IFPAS Score (Mean itemscore)
N-1	Pre-1 Co-Facilitator Post-None	Enhanced	Pre-16 Post-11	Pre- 1 (12 min.) Post- 2 (9 min.)	Pre-16% Post-25%	Pre-51 (4.3) Post-57 (4.75)
N-2	Pre-None Post-1 Co-Facilitator	Enhanced	Pre-9 Post-11	Pre- 6 (15 min.) Post- 2*	Pre-13% Post-24%	Pre-50 (4.2) Post-60 (5.0)
N-3	Pre-1 Co-Facilitator Post-1 Co-Facilitator	Passive	Pre-18 Post-11	Pre- 2* (9 min.) Post - 1*	Pre-5.5% Post- 24%	Pre-46 (4.8) Post-58 (3.8)
N-4	Pre-2 Co-Facilitators Post-2 Co-Facilitators	Enhanced	Pre-20 Post-10	Pre- 3 (30 min.) Post - 3* (60 min.)	Pre-10% Post-8.8%	Pre-42 (3.5) Post-51 (4.3)
N-5	Pre-2 Co-Facilitators Post-1 Co-facilitator	Passive	Pre-10 Post-14	Pre* Post-1 (48min.)	Pre-0.5% Post-6.3%	Pre-47 (3.9) Post-56 (4.7)
N-6	Pre-2 Co-Facilitators Post-2 Co-Facilitators	Enhanced	Pre-10 Post-17	Pre* Post- None	Pre-0.5% Post-9.8%	Pre-46 (3.8) Post-58 (4.8)
N-7	Pre-None Post-Co-Facilitator	Enhanced	Pre-12 Post-9	Pre- None Post- None	Pre-3.1% Post-5.6%	Pre-53 (4.4) Post-60 (5.0)

*Case-related handouts were not able to be shared with students on video conference

Subject N-1. This subject facilitated the **pre-intervention session** in-person and was accompanied by a co-facilitator. The student group contained 16 participants including the use of video conference for two of those participants. There were four professions represented among the students including: social work, dentistry, medicine, and nursing. There was a technical interruption at the start of the session, involving a lack of the video conference connection, with partial audio connection that lasted for 12 minutes before resolving. The facilitator stopped the session for one-minute to provide a short summary to the 2 video conference participants who were finally able to join. Both issues interrupted the flow of the conversation.

The session was started with an introduction of all participants, followed by an introduction of the special needs case. During the session, the facilitator consistently spoke clearly, asking questions that were respectful, thought provoking and provided knowledge regarding the special needs dentistry case. The students were responsive with a good level of participation but only when prompted by the facilitator. This facilitator worked collaboratively with the co-facilitator, and listened attentively to all students as students provided their professional comments and recommendations, consistently providing positive feedback without imposing her own perspectives on the consensus of the group or individuals. The special needs case was discussed in detail throughout the session. A debriefing was provided and included a review the purpose, benefits and practical application of IPECP, and allowed students to share what they learned.

In review of this pre-intervention performance, it is important to note that there were five periods of silence throughout the session ranging from 19 to 60 seconds in length (using an electronic timer), which may have had an impact on the momentum of the conversation and motivation of the student group. Although there were many interactions during the session (n=57), there was limited stimulation/provoking of discussion/conversation between students, resulting in only nine STS interactions during the session, a minimal proportion of overall session interactions (15.8%), not meeting this study's threshold of 20%.

In addition, there were four professions in attendance (medicine, dentistry, social work, and nursing), and no student participation was observed for nursing during the core collaborative discussion portion of the session. Subject N-1 did not prompt the input of each profession present, decreasing the ability of students to learn about the roles and responsibilities of all students present. As a result, two session objectives were left incomplete (1. To introduce students of different professions to the other professions so as to expand their understanding of the scope of practice and knowledge base of the different professions. 2. To model interprofessional discussion and conversation about a complex case). This subject successfully completed the third objective focused on sharing information about special needs dentistry.

Since the core IPECP element of students learning with and from each other was lacking, the IFPAS assessment scoring for several items was affected (items 2, 5, 6, 7, 10, 12), making this subject's overall IFPAS score 51 and the overall item average score *M*= 4.3, *SD*= .79.

The **Subject N-1 pre-intervention IFPAS assessment of performance** included a results report (passive feedback) that was provided via email, and this subject opted to participate in an enhanced feedback coaching session via video conference. Overall, the feedback coaching session focused on strategies to increase STS interactions during sessions. More specifically, in order to improve the scoring in the above mentioned items, the following IFPAS-specific components were discussed:

1. Affective skills - for example, monitoring group dynamics in order to detect a decrease in participation and collaboration among students (targeting items 5, 6 and 7.
2. Metacognitive skills - for example, self-assessing implemented facilitation approach outcomes and changing strategies in order to ensure collaborative interactions (targeting items 2, 5, 7, and 10).
3. IPECP skills - for example, the use of role play in order to have students practice sharing their professional roles and responsibilities, all in fulfillment of two out of three SPICE case session objectives (targeting items 5, 7, 10, and 12).
4. Constructivist learning/teaching theory - for example, create IPECP opportunities by asking each student to share their professional approach to the case and then coach students to answer questions posed by other students (targeting items 5 and 12).

The subject agreed with the suggested facilitation approaches for use in future sessions. Facilitation goals for subsequent sessions included stimulating more STS participation/discussion, and ensuring that each profession present has had an opportunity to introduce the group to their role and responsibilities regarding the case being discussed.

Subject N-1 facilitator comments and recommendations concerning the SPICE case session, facilitator training and their performance assessment results included the following:

SPICE case activity concerns and recommendations:

1. There are too many students participating in individual SPICE case session, making it difficult to have all participants contribute to the conversation, especially the groups of students that participate via video conference.
2. More facilitators need to be added in order to share the amount of cases that get scheduled.
3. It seems that some co-facilitators are not clear on what their role is during the cases.
4. General case activity instructions need to be provided to all facilitators in order to provide guidance and standardization. This would be especially helpful for the sessions that have co-facilitators.
5. Many times the co-facilitator wants to take a different approach and it makes the session more challenging to complete.

SPICE facilitator training concerns and recommendations:

1. Feedback regarding performance is needed and helpful.
2. Co-facilitation experience is important to the development of new facilitators, however, they need more training in order to be transitioned to perform independently.

3. New facilitators need more training than the current one-time training provided.
4. As a facilitator, there is not enough time between patient care, teaching and facilitating the SPICE cases in order to go back to edit session "write ups" after the session.

IFPAS assessment results concerns and feedback:

1. Some of the items regarding the collaborative communication (STS) may not be appropriate considering that, at times, there is a wide range of student experience and stages of education in the session making it difficult for all students to contribute at the same level.
2. This subject chose to neither agree nor disagree with the IFPAS findings, because the items marked low are difficult or impossible to achieve because of the disproportionate levels of student knowledge and experience.
3. Overall, the subject appreciated the opportunity to receive feedback, discuss her experience as a facilitator, as well as her concerns and recommendations.

The **subject N-1 post-intervention session performance** occurred 32 days after the enhanced feedback coaching session. There were no co-facilitators present at this session and there were 11 students present. Two technical difficulty events occurred involving a malfunction of the video conference connection (1- One student joined and did not have a video connection for 8 minutes, 2- one student loss of sound, 15 seconds).

During this performance, the facilitator again guided students in participant and case introductions. She spoke clearly and made sure to emphasize the purpose and benefit of the IPE special needs case and gave cues to students to answer questions or elaborate on discussion points so that others may better understand that profession's perspective, *resulting in an increase in STS conversations*. The facilitator provided consistent guidance and was supportive of student contributions, while also providing knowledge concerning special needs cases and emphasizing the important of collaboration between the various professions in order to provide the best approach for patient management. There were only two moments of prolonged silence where no one spoke that were 16 and 27 seconds in length, a decrease from the pre-session. The facilitator debriefed the group and all students expressed the important IPECP-focused lessons from having participated in the session. The session had a strong focus on the special needs case, therefore completing session objective number three.

The number of STS interactions remained the same (9), however the total number of session interactions decreased (from 57 to 36), causing an increase in the percent of STS interactions over all from 16% in the pre-session, to 25%, meeting the study threshold. This session had a decrease in the total number of STS interactions since some of the student interactions included lengthy discussion points by individual participants that were not structured by the facilitator, resulting in a decrease in the number of interaction opportunities for the overall group.

However, since the percent STS interactions met the 20% threshold, case discussions were strongly focused on the patient case, and all professions participated during the session, all three session objectives were accomplished in the post-session.

The post-intervention performance assessment results showed an improvement in all 6 items identified in the pre-intervention assessment (items 2, 5, 6, 7, 10, and 12), with a 6-point increase from an overall pre-score of 51 (item *M*= 4.25, *SD*= .87) to a post-score of 57 (item *M*= 4.75, *SD*= .45).

Subject N-2. This subject facilitated the **pre-intervention session** in-person, without the assistance of a co-facilitator, and there were nine students in attendance, with two of those students on video conference. There were six video conference-related interruptions which had a negative impact on the flow of the conversation: 1-An unexpected second person joined the video conference; 2-One person's computer continued to make a ringtone sound on and off for about minutes; 3-One person's sound was lost for one minute while participating in a conversation with the facilitator; 4-A pop up window came up three times during the session letting everyone know that the free video conference session would end in 10 minutes, and each time the connection was lost. There was a two-minute delay in reconnecting the first time due to the technical assistant leaving the room during the session. After reconnecting the first disconnection, the technical assistant did not remain in the room, and the next two disconnections were resolved with the assistance one of the students.

The facilitator began the session with an introduction of the participants present, and of the special needs case. Throughout the session, the facilitator spoke clearly, asking thought-provoking case-based questions to the group and providing information regarding the management of special needs dentistry patients as well as their primary diagnosis, allowing for many opportunities for the students to answer and contribute to the conversation. This facilitator was attentive and consistently provided positive feedback that was enthusiastic and respectful of student contributions.

Students were engaged and answered facilitator questions when prompted. However, the facilitator provided minimal stimulation of STS collaborative communication, resulting in few STS collaborative conversations in comparison to FTS interactions. A debriefing segment was provided in which each student was directed to share lessons learned.

In review of this pre-intervention performance, it was found that the facilitator led a rich discussion about the diagnosis and general management of the patient in the case, with the majority of students participating in the conversation including all professions present (medicine, dental, social work, nursing, dental hygiene, and pharmacy). As a result, objectives one and three were completed.

The few number of STS interactions (10 in total) resulted in a minimal proportion of overall session interactions of 12.7%, a low level of % STS interactions (threshold not met). This finding shows an incomplete fulfillment of objective two (2. To model interprofessional discussion and conversation about a complex case). This finding affected several pre-intervention performance assessment item scores (2, 5, 6, 7, 9, 10, 12), with an overall IFPAS score of 50 and an average item score of $M = 4.17$, $SD = .83$.

The **subject N-2 facilitator comments and recommendations** included both the passive and enhanced feedback. The enhanced feedback session included a discussion about session content, and session objectives. The main focus of the session was the need to increase the STS interactions during future sessions since this session was performed in the traditional higher education model (Csomay, 2006) of an educator lecturing and a student-to-educator question/answer format during the session.

Coaching focused on the following areas:

1. The three SPICE special needs case session objectives (1. To introduce students of different professions to the other professions so as to expand their understanding of the scope of practice and knowledge base of the different professions; 2. To model interprofessional discussion and conversation about a complex case; 3. Introduce students to the characteristics of special needs dentistry cases) (targeting items 2 and 12)
2. Ensure the detailed discussion of the roles and responsibilities of each profession present in the session (targeting items 5, 9, and 10)
3. Create IPECP opportunities as needed during the session (targeting items 6 and 7)

Subject N-2 provided feedback regarding the SPICE sessions, training and the IFPAS pre-intervention results:

SPICE case activity concerns and recommendations:

1. More facilitators are needed in order to better support the SPICE case program and it may be because of the low comfort level and little

experience concerning special needs patient cases. This may cause a distraction among those who may want to participate as facilitators, however they may feel they do not have enough knowledge in this subject area. They need to know that they are not the experts in the room.

2. There is not enough additional support for the facilitators (additional facilitators to lead sessions).
3. The groups grow to be very large as the semester continues and it is very difficult to have students participate via video conference.
4. Video conference technical issues have also been a problem and have interrupted the flow and quality of the experience for students and facilitators.
5. A limit of 4 people on Skype may be helpful.
6. It is also difficult to have co-facilitators participate via Skype and it may be best to have them facilitate in person.
7. There is not always a good cross section of students/professions in the room that allows for a well-rounded, comprehensive discussion about the case (for example, when social work is not present to discuss certain portions of the case, the group is left having to guess what would need to be done).

SPICE facilitator training concerns and recommendations:

1. New facilitators need to understand that they do not need to be experts in all portions of the case (disease process, etc.), however, they should just be ensuring that students participate in the discussion.
2. Facilitators may need support materials in preparation for the sessions. These materials would help them to understand the case better so that they are not intimidated by the case and feel more comfortable during the session.

IFPAS assessment results concerns and feedback:

1. This facilitator felt it was good to receive feedback regarding performance. However, it is difficult to critique a facilitator considering that the level of group participation/motivation may vary and therefore the facilitator's performance may vary accordingly.
2. Subject N-2 chose to neither agree nor disagree regarding the results of the IFPAS assessment since she felt that the student group participation level is a core factor in the performance of facilitators.
3. Overall, subject N-2 seemed satisfied with the opportunity to discuss her experience and concerns as a SPICE facilitator, and she, and she expressed wanting to focus on STS participation as a facilitation goal for future sessions.

The **subject N-2 post-intervention session performance** occurred 44 days after the enhanced feedback coaching session. There were 16 students (2 attending via video conference), and one co-facilitator in attendance. There were two challenges regarding the use of the video conference for this session. The facilitator shared case-related learning materials (lab results and a picture) for the case discussion. These materials were not previously shared with the students on video conference and the facilitator was able to share the documents with these students during the session and was left having to briefly explain their content.

The session started with an introduction of all participants and case details. Throughout this session, the facilitator explained the purpose and benefits of the session and encouraged the students to share their professional perspective on the care of the special needs patient case. The facilitator was very supportive of the STS conversation and ensured participation. The case content was thoroughly reviewed and students were allowed to share their knowledge and their recommendations for the case being discussed. The facilitator was consistently enthusiastic about the session and monitored team dynamics carefully and consistently provided support as needed. The facilitator provided a thorough debriefing for the team, asking them to share any new knowledge learned during the session.

The assessment of the above session showed that all professions present during the session were represented during student discussions (medicine, dental, nutrition, dental hygiene and pharmacy). There was an increase in the number of STS interactions from 10 in the pre-session (13%), to 24 interactions in the post-session (24%), meeting the threshold. The post-intervention IFPAS performance assessment results showed an improvement in all 7 items identified in the pre-intervention assessment (items 2, 5, 6, 7, 9, 10, and 12), with a 10-point increase from an overall pre-score of 50 (item M= 4.17, *SD*= .83) to a post-score of 60 (item *M*= 5.00, *SD*= .00). Noticeably, there was a two-point increase in scoring for items 5, 6, and 7, reflecting a strong performance regarding the facilitator's ability to monitor team dynamics and use strategic skills in order to provoke STS interactions, ensuring that the discussion focused on the roles and responsibilities of the professions present. The above results demonstrate the achievement of all session objectives.

Subject N-3. This subject facilitated the pre-intervention session in person with the assistance of a co-facilitator. There were 16 students in attendance, with 1 student on participating via video conference. There was a challenge in using the video conference involving the inability to share a case-related document that was shared with the students present in the classroom. The content of the document was explained, however, the student was not able to fully participate in the discussion regarding the contents of this document (photograph of patient equipment). In addition, this facilitator left the session twice in order to answer a phone call for a total of 9 minutes, interrupting the flow of this subject's facilitation process.

Subject N-3 introduced herself and informed the group that this was her first time facilitating an interprofessional student group. Although the facilitator did briefly mention the benefit of the IPE experience, there was no clear discussion of the purpose of the session or the importance of practicing interprofessional education and collaborative practices within the scope of patient care. Knowledge regarding the management of special needs patients was contributed, along with asking case-related probing questions. All session interactions were respectful and collaborative, however, there was limited

STS interprofessional conversation, and although there were very few specific discussions regarding roles and responsibilities, all professions present were represented during the session (medicine, dental, social work, nutrition, nursing, dental hygiene, and pharmacy).

Overall, the subject N-3 played a limited role in facilitating the session, in comparison to the co-facilitator. The facilitator did not provide much assistance in the debriefing of the session and seemed to rely on the co-facilitator to lead most discussions, as well as the debriefing portion of the session.

There were only 5 STS interactions out of a total of 91 overall interactions during the pre-intervention session, a minimal proportion of overall session interactions (5.5%) (not meeting threshold). As a result, IFPAS scores were also affected with 10 items (2, 4, 5, 6, 7, 9, 10, 11, 12), with a total score of 46 and an average item score of M = 3.83, SD= .72. Session objective three was the only objective achieved in this session, since the discussions were case-centered and there was a strong exchange of information regarding the management of the special needs patient.

Subject N-3 performance feedback was provided by via a passive feedback IFPAS results report sent via email. This subject did not opt to receive the enhanced feedback coaching. In addition, the electronic Baseline Characteristics/Faculty Feedback Survey link was sent via email to this subject, however, no response was received. Therefore, feedback regarding the SPICE case sessions, facilitator training, or the IFPAS results was unable to be captured for this subject. However, the facilitator still had the opportunity to independently review the findings and apply this feedback towards self-development of skills and competencies.

The **subject N-3 post-intervention session performance** occurred 90 days after receiving the passive feedback IFPAS report. The session was performed in-person, with a co-facilitator and 16 students in attendance. There were two technology-related issues during the session that involved the sharing of a case-related document with the group and two students on video conference were not able to view the picture at the time of the session and the second issue was that the two students on video conference informed the facilitator that the sound quality of the session was poor and inconsistent throughout the session.

This session showed an overall great improvement in performance in comparison to the pre-intervention session. Subject N-3 encouraged all students to provide their expertise to the group discussion, and was actively guiding the session, being careful to allow students to answer case questions and providing assistance only when necessary. This facilitator provided learning aids to enhance the learning experience, encouraging participation across the group and in conjunction with the co-facilitator. There was consistent encouragement provided to students and she provided case-related questions, that guided students towards having collaborative communication throughout the session. The debriefing session also showed an increase in participation from this subject in comparison to the pre-intervention session, and all professions were represented during the session.

This post-intervention session showed a marked increase in the number and percent of STS interactions from 5 total interactions (5.5 %), to a total of 24 interactions (24%) in the post-intervention session interactions. Additionally, the post-intervention assessment results showed an improvement in all 9 items identified as in need of improvement (items 2, 4, 5, 6, 7, 9, 10, 11, and 12), with a 12-point increase from an overall pre-score of 46 (item *M*= 3.83, *SD*= .72) to a post-score of 58 (item *M*= 4.83, *SD*= .39). All session objectives were met for this session.

Noticeably, there was a two-point increase in scoring for items 2, 5, and 10, reflecting a strong performance regarding the facilitator's ability to guide the IPECP activity, encourage STS interactions and ensure the discussion of the roles and responsibilities of the professions present in the session, successfully completing session objectives. The facilitator stated in this post-session that she had assisted other groups using the same case, which confirms that Subject N-3 experienced additional practice opportunities between the first session (where she stated that it was her first facilitation session) to this post-intervention session.

Lastly, item one scoring did not improve, reflecting the need to emphasize the purpose and benefits of IPECP to the student group, and although item 11 scoring did improve, it reflected the need to improve performance in the debriefing portion of the session to include a review of session discussion points, knowledge presented, and the practical application of IPECP to the clinical setting.

Subject N-4. The pre-intervention session was performed in-person, along with 2 co-facilitators and 20 students in the group, two of which participated through video conference. There were three technical difficulties during the session that included the following: 1. The initial connection was delayed two minutes, and although both students eventually connected, the audio was inconsistent throughout the session; 2. A picture was shown during the session and it was not able to be viewed by the students on the video conference system.

Throughout the session, the facilitator played a supportive role in encouraging students to learn about each other's roles and responsibilities, providing knowledge and answering questions for the different professions present. This facilitator provided positive interactions, valued student participation and acknowledged the contributions of all professions present. Although the facilitator's actions and contributions to the discussion brought some value to the experience, the participation of this facilitator was minimal, limiting the impact on the IPECP student experience.

This facilitator was not involved in managing team dynamics during the session, however, she provided encouraging feedback regarding team dynamics and insight as to the importance of IPECP. There was some participation from this subject during the debriefing portion of the session, and she provided some additional encouragement at the end of the session.

As a result, the percentage of STS interactions were limited to a total of 9 for the session (10% of total interactions). The pre-intervention assessment results showed a need for improvement in 11 items (items 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, and 12), and a resulting total score of 42 with mean item score of $M = 3.5$, $SD = .67$.

Overall, there was limited discussion regarding the roles and responsibilities of the specific professions present during the session, resulting in one out of the five professions present not being represented in the session activity (nursing). This facilitator provided little support in during the session, therefore, two out of the three objectives were not achieved (1. To introduce students of different professions to the other professions so as to expand their understanding of the scope of practice and knowledge base of the different professions; 2. To model interprofessional discussion and conversation about a complex case).

Subject N-4 performance feedback included both the passive and the enhanced IFPAS-guided feedback. Overall the feedback coaching session was centered on IPECP skills and competencies, as well as tips that can be used to motivate students to speak to each other. The enhanced feedback coaching session included a review of the findings, session objective, IFPAS-related facilitation tips, such as the following:

1. Session objectives were reviewed (1. To introduce students of different professions to the other professions so as to expand their understanding of the scope of practice and knowledge base of the different professions; 2. To model interprofessional discussion and conversation about a complex case; 3. Introduce students to the characteristics of special needs dentistry cases) (targeting items 2, 4, and 12)
2. Monitor team discussions in order to ensure that each profession present in the session has been represented during the session (targeting items 5 and 9)

3. Monitor team dynamics and provide IPECP opportunities such as using role play to motivate students to share their professional knowledge and recommendations about the case with facilitator assistance as needed (6, 7 and 8).

Subject N-4 provided feedback regarding the SPICE case sessions, facilitator training and the IFPAS pre-intervention results:

SPICE case activity concerns and recommendations:

1. Smaller scale groups would work better in terms of facilitation of IPE.
2. It would be helpful if facilitators would be provided with guided IPE related questions for the specific case in order to provide guidance to facilitators in asking students questions that are specific to their profession.
3. It is a challenge to facilitate the sessions using video conference, however with a limit of 2 people on their own separate video window, it seems to work better.
4. As a facilitator, it can be a challenge to ensure the participation of those students on video conference.

SPICE facilitator training concerns and recommendations:

1. The video is good. However, it would be helpful to provide more structure for those facilitators who are new to facilitation, have not worked with special needs patients, are not dentists, and have not facilitated IPE specifically. Guided questions help so that a facilitator has limited

knowledge about the other professions can use these questions to at least guide the conversation.

IFPAS assessment results concerns and feedback:

1. It is good to get feedback on facilitation performance in order to develop skills.
2. This facilitator agreed with the IFPAS findings.
3. The feedback was well received and the subject set goals for future sessions that included: remembering to review the purpose of the SPICE session with the students so that they can share what they learned about another profession by the end of the session during the debrief. And to help guide more STS interactions/discussions during the session.

The **subject N-4 post-intervention session performance** took place 81 days after receiving the enhanced feedback IFPAS-guided coaching. The session was performed in person, with two co-facilitators and 10 students in attendance. There were four technology-related challenges that lasted a total of 30 minutes including the following items: 1. It took three minutes for two students to connect; 2. One student didn't connect until 27 minutes into the session; 3. That connection was not consistent for the rest of the recording; 4. Towards the end, two students lost connection for one minute.

This facilitator increased her level of participation in comparison to the pre-intervention session. The facilitator ensured that students had the opportunity to contribute to the conversation and was more supportive of the IPECP process throughout the session. Although this performance was improved in comparison with the pre-intervention session, this facilitator was the lowest scoring performer out of all subjects. There were two co-facilitators in attendance that dominated the facilitation process, similarly to the pre-intervention session, which may still have had an impact on finding opportunities to contribute to the facilitation of the session.

In addition, the post-intervention video recording was cut-off just prior to the debriefing session, limiting the ability to assess any additional contributions for this facilitator. As a result, the pre-intervention assessment score related to the facilitation of the debrief was also used as the post-intervention performance assessment score for statistical purposes.

The post-session participation of this facilitator did support the inclusion of all professions present during the session. However, the number of STS interactions remained the same as the pre-session, and since there were many more FTS interactions during this post-session, the percent of STS interactions actually decreased from 10% to 8.8% not meeting the threshold. The overall IFPAS score did improve from 42 (item M=3.50, SD= .67) to 52 (item M=4.33, SD= .49), an overall 10-point increase. Additionally, the post-intervention assessment results showed an improvement in only 9 out of the 11 items identified as in need of improvement (items 2, 4, 5, 6, 7, 9, 10, and 12).

Although nine items showed an increase in scoring, when reviewing all post-session scores, there were eight items that still reflect the need to continue to improve on the following performance areas: Emphasizing the purpose and benefits of IPECP; provide more guidance with team dynamics, communication and debriefing; bring more of a focus on the roles and responsibilities of the professions present; assurance of session objectives.

This facilitator participated in the facilitation of the special needs case throughout the session, and all professions present during the session were represented by student participation, however, the percent STS was still very low, resulting in the completion of session objectives one and three only.

Subject N-5. This facilitator participated in the pre-intervention SPICE session in-person, along with two co-facilitators (one on video conference), and a total of 14 students in attendance (including two students on video conference). There were no technical difficulties for during the session.

This facilitator's participation in guiding students to share their knowledge and experience with the group, and managing team dynamics was limited. However, during moments of participation, this facilitator spoke clearly and in a positive manner, offering knowledge in managing the patient in the case, and answering questions for the different professions present. This facilitator was respectful of all student comments and recommendations and valued their perspectives, being careful to not impose upon the consensus of the group or individuals.

This facilitator did not assist in stimulating STS collaborative interactions during the session. Question and answer portions of the session were primarily between the facilitators and the students. Furthermore, there was limited profession-specific conversation of the professions that were present during the session, impacting what was learned regarding the roles and responsibilities of the professions present and this was reflected in the debriefing portion of the session as students expressed what was learned during the session. Although this facilitator briefly discussed the purpose and benefits of IPE at the end of the session, he did not participate in leading the debriefing portion of the session.

The limited participation from this facilitator did not sufficiently support session objectives. The percent of STS interactions during this session were extremely low with only one STS interaction occurring, compared to 185 FTS interactions, making the percentage of STS interactions only 0.5% (threshold not met). The individual item scores showed a need of improvement in the following eight items: 1, 2, 5, 6, 7, 10, 11, and 12. The overall IFPAS score for this facilitator was 47 with a mean item score of M=3.92, SD= .90.

Overall, much information was shared about the case (diagnosis and aspects of patient management) during this session, however, there was little to no stimulation of STS interactions and one out of the five professions present did not participate during the session (nursing), affecting the quality of the IPE experience and leaving session objectives incomplete (objectives not met: 1. To introduce students of different professions to the other professions so as to expand their understanding of the scope of practice and knowledge base of the different professions. 2. To model interprofessional discussion and conversation about a complex case).

Subject N-5 performance feedback was provided by passive feedback using the IFPAS results report provided via email. This facilitator did not opt to receive the enhanced form of feedback, however the IFPAS report did provide an opportunity to independently review the findings and this in the self-developmental process. This facilitator was also provided with the Baseline Characteristics/Faculty Feedback Survey as an opportunity to submit comments and concerns regarding the SPICE case sessions, facilitator training, and the IFPAS feedback findings, however, no response was received.

The **subject N-5 post-intervention session performance** was completed 81 days after receiving the passive feedback IFPAS report. The session was performed in person, with two co-facilitators and 14 students in attendance (three students on video conference). There were two technology-related challenges during the session that included the following: 1. A case-related picture was shared as part of the discussion, and students on video conference were not able to view the picture at the time of the session; 2. A student that joined in late was not able to connect into the session at all (no video, no audio, the screen showed “someone” was there). These two challenges affected the quality of the IPECP experience for the students affected, limiting the opportunities to learn with and from these students.

During the post-intervention session, this facilitator was more involved in the discussion by broadening the conversation towards other professional aspects about the management of the patient in the case. The increase in facilitation participation from this subject included asking IPECP related questions, and helping students to make connections between the discussion points and the collaborative aspects of patient healthcare. This facilitator encouraged students to think about how other professions assist in the care for the patient in the case presented, and asked many questions about interprofessional-related topics. This facilitator also participated in the debriefing portion of the session, helping to emphasize the importance of the considering the patient as a whole and not just as a set of diagnoses.

Interestingly, there was only a marginal increase in the number of STS and overall interactions, from 1 STS interaction (0.5%), to a total of 7 (6.3%) STS interactions in the post-session (threshold not met). Considering that the rise in percentage in the post-session is due to both a slight increase in STS interactions and a decrease in the total amount of overall interactions, it is clear that both sessions showed extremely low outcomes and a poor IPECP experience for the student participants in both sessions. Subject N-5 did improve in overall performance, and the overall IFPAS score increased from 47 (M=3.92, SD=.90) to 56 (M=4.67, SD= .49), with improvement in six out of the eight items identified as areas in need of improvement, with four items having a two-point increases (items 5, 6, 7, 10, 11, 12).

The overall analysis of the post-session showed that all professions present during the post-session did participate in the case discussion, and the focus of the session was the special needs case, therefore, this facilitator did achieve session objectives one and three.

It is important to note that the increase in facilitation performance was inconsistently effective and may have negatively impacted the number of STS opportunities since many of the questions posed by this subject were not presented clearly (may have caused confusion at times), having an apparent incongruous effect on the flow of the conversation, resulting in a decrease in scoring for item number four (effective performance) from the pre-session. Overall, a total of 4 items showed that this subject needs to improve in the following item focus areas: Emphasizing the purpose of IPECP, guiding students in the activity, formulating questions *to spark STS interactions* (and not merely elicit student answers to the question), and providing more facilitation of the debriefing process including a review of the session and application of discussed approaches in the clinical setting.

Subject N-6. This facilitator participated in the pre-intervention session via video conferencing, along with two co-facilitators participating in-person. There were a total of 14 students in attendance, with two of those students on video conference). There were no technical difficulties for this session.

This facilitator provided knowledge regarding the management of the patient case and assisted in answering questions for the different professions present. He was very supportive of all student contributions and was respectful of their point of view regarding the case. This facilitator spoke clearly and provided clear, well-structured answers to student questions. However, this facilitator was not involved in managing team dynamics nor guiding students to share their roles and responsibilities, and although the participation during the debriefing portion of the session was also limited, this facilitator offered encouragement regarding the benefits of IPECP. Overall this facilitator was very limited in his contribution to the activity, and the level of student participation was low, resulting in one out of the five professions not participating during the session (nursing), affecting the quality of the IPECP activity.

In addition, the number of STS interactions for this pre-session was extremely low at only 1 interaction (0.5%), and did not meet the threshold. The pre-intervention assessment showed that eight items were in need of improvement (2, 5, 6, 7, 9, 10, 11, 12). The overall IFPAS total score was 46 with a mean item score of *M*= 3.83, *SD*= .94. Subject N-6 did not support the achievement of session objectives one and two.

Subject N-6 performance feedback was provided via passive and enhanced feedback methods. The enhanced feedback coaching session was focused on the need to increase STS interactions, and including the following IFPAS-centered coaching areas:

Coaching focused on the following areas:

1. The three SPICE special needs case session objectives (1. To introduce students of different professions to the other professions so as to expand their understanding of the scope of practice and knowledge base of the different professions; 2. To model interprofessional discussion and conversation about a complex case; 3. Introduce students to the characteristics of special needs dentistry cases) (targeting items 2 and 12)
2. Ensure that the discussion includes the role of each profession present in the session as it relates to the patient case (targeting items 5, 9 and 10)
3. Monitor team dynamics to look for IPECP opportunities during the session (targeting items 6 and 7)

Subject N-2 provided some feedback regarding the SPICE special needs sessions, facilitator training and the IFPAS pre-intervention results:

SPICE case activity concerns and recommendations:

1. The large groups greater than 10 - 12 are more difficult to facilitate in terms of ensuring participation among students present.

2. Past experiences have shown that groups of 10 - 12 students have a higher level of STS participation.
3. It is difficult for students on video conferencing to know when they can enter into the conversation, and when there are 5-6 or more students on video conference it becomes even more challenging.
4. Facilitators should be provided with guided questions from which to choose from during the session. These questions can also be profession specific in order to ensure the participation among the students. This would help to guide new facilitators.
5. It may also be helpful to define or structure the sessions so that both facilitators present can direct the session. For example, splitting the questions into two groups for each facilitator to lead.
6. In addition, smaller IPE groups that are given direction to discuss a case, not focused on learning new knowledge, but that is focused on the interaction and discussion among the students regarding their professional approach to the case, has been a better model.
7. Facilitators provide assistance as needed, however, the facilitator does not heavily control the flow of the conversation. At the end of such sessions, students discuss/present any questions that may have come up during the session and the facilitator(s) present provide an opportunity to discuss the answers across all groups present.

SPICE facilitator training concerns and recommendations:

1. Facilitators in training should be aware that each session may be different depending on the group level of participation.
2. It may be challenging to answer questions that are not in your scope of practice or in a profession that is not your own.

IFPAS assessment results concerns and feedback:

1. Subject N-6 agreed with the IFPAS results and found them to be accurate.
2. The coaching was well received.
3. The subject set goals for future sessions that included finding more opportunities for students to learn with and from each other.

The **subject N-6 post-intervention session performance** was performed 77 days after the enhanced IPFAS feedback coaching session. The facilitator participated in-person, along with two co-facilitators, and 17 students in attendance (3 students on video conference). There were no technical difficulties during this session.

Throughout this session, the facilitator assisted in guiding the IPECP student experience. He provided support to the student conversation, discussing the purpose of IPE and its application to clinical practice, actively listening, asking questions to spark interactions and clarifying concepts for students to understand the management of the special needs dentistry case. All interactions with students and co-facilitators were respectful, allowing students to devise their own approach to the case, and serving as a role model for interprofessional communication for all students to follow. This subject did not lead the debrief portion of the session, however he did contribute final thoughts and offered some encouragement regarding the application of IPECP.

The number of STS interactions for this session increased from one (0.5%) interaction in the pre-session, to 13 interactions in the post-session (10%) (not meeting threshold). There was improvement in 7 out of the eight items identified as areas in need of improvement items 2, 5, 6, 7, 9, 10, 12, out of which six items increased by two-points (items 2, 5, 6, 7, 10, 12). The total score for this subject increased from 46 (item M=3.83, SD= .94) to 58 (M=4.83, SD= .39). This reflects a strong improvement in the facilitator's ability to guide the activity, increase the opportunities for IPECP, and contribute to meeting session objectives. Although performance markedly improved, the facilitation of STS was still limited.

Overall, this post-session performance resulted in the successful achievement of session objective one, since all professions present participated during the session activity, as well as objective two, since the session activity was strongly focused on the special needs case.

Subject N-7. The pre-intervention session was performed via video conference, with two co-facilitators present in the classroom, along with a total of 9 students, one of which participated via video conference. There were no technical issues involving the video conference system, however, the video recording did not capture the debrief portion of the session.

The participation of Subject N-7 during this session was somewhat limited. When she did participate, she spoke clearly, respectfully, and was supportive and courteous. She provided encouragement for students to share information about their roles and responsibilities regarding the patient case, and purposely took the time to emphasize the importance and benefits of the IPECP process in the clinical setting. This facilitator did assist in guiding the activity, and provided case-focused instruction, however she had a limited role in managing team dynamics and assuring STS interactions. This co-facilitator participated regularly throughout the session and clearly acted as a role-model by engaging with those students from her profession, as well as the students from other professions. Unfortunately, the video does not include the conclusion of the session, therefore a debrief session was not able to be viewed and assessed.

Although Subject N-7 performed well during moments of participation, and all professions present participated in the session activity, however, there was little if any direct facilitation of STS interactions during the session. There were a total of only two STS interactions out of a total of 65 interactions during this session, making the total percentage of STS participation 3% (not meeting threshold). Three items showed a need to improve (1, 7, and 12), and the total IFPAS score for this subject is 55 with a mean item score of M=4.58, SD= .79. Two out of the three session objectives were achieved for this session: 1. To introduce students of different professions to the other professions so as to expand their understanding of the scope of practice and knowledge base of the different professions; 3. Introduce students to the characteristics of special needs dentistry cases. The missing objective involves the process of students learning with and from each other. This was a core element that was missing from this session. This subject's participation over video conference may have had an impact on her ability to fully facilitate this session.

Subject N-7 performance feedback was provided by passive and enhanced methods. The focus of the enhanced feedback coaching session was to increase STS interactions, and included the following IFPAS-centered coaching areas:

1. Discussing and demonstrating the benefits of IPECP by highlighting specific moments during the session when students are learning from each other and how it benefits the patient. (Targeting item 1)
2. Direct students or structure the activity to have collaborative discussions where students ask and answer each other's questions as an idea for ensuring IPECP during these sessions. (Targeting item 7)
3. Ensure that there is a majority of STS interactions throughout the session in order to meet all session objectives. (Targeting item 12).

Subject N-7 also provided feedback regarding the SPICE case sessions, facilitator training and the IFPAS pre-intervention results:

SPICE case activity concerns and recommendations:

1. This subject suggested that the SPICE sessions utilize a structure for the case which involves discussing the different stages of a patient presentation in a healthcare setting, in order for all professions present to provide a summary of their specific roles and responsibilities as it pertains to the case.

SPICE facilitator training concerns and recommendations:

1. This subject felt that facilitators could use an evaluation of their performance as part of their development, rather than simply providing the training with no follow-up evaluation/debriefing on performance.
2. She also mentioned the training she received for the simulation/role play CVA cases she facilitated, in which she also received training that involved watching videos of what good facilitation looks like as compared to what poor facilitation looks like. This type of training is provided prior to participating in each of these types of simulation/role play facilitation sessions (therefore a facilitator may receive several training sessions over the course of time). She found this to be helpful and recommends this approach as well.

IFPAS assessment results concerns and feedback:

1. This subject agreed with the IFPAS findings and verbally appreciated the feedback.
2. She felt that the IFPAS was a great idea since as an educator, the more opportunities to be evaluated and self - reflect, the more opportunities there are to improve.
3. This subject felt that she should improve upon the management of STS dynamics (communication/interactions).

The **subject N-7 post-intervention session performance** occurred 77 days after the enhanced feedback coaching session. There were 17 students, of which only 1 attended via video conference, and there were no co-facilitators in attendance. There were no technical difficulties for this session. The facilitator shared case-related learning materials (lab results) for the case discussion and she had shared this with the student on video conference prior to the session.

Subject N-7 was the only facilitator for this session. As a result, she was able to structure and guide the session without having to share time with another facilitator. She started the session by setting expectations for the session and informing the students that the session was for them to learn from each other by speaking with one another. She let them know it was okay for them to ask each other questions. Support was provided throughout the session by cuing students to speak to each other, and even incorporated role play at one point during the session.

The facilitator clearly explained the purpose and benefit of the IPECP, and showed enthusiasm when discussing the case and guiding the class. The facilitator monitored team dynamics and provided guidance as needed in order to keep the IPE conversation going. She also strategically took time to provide additional knowledge about patient management from her own knowledge base and expertise and was very good at sparking conversation and encouraging students to share even though their experience and knowledge base may be limited. The debriefing reflected the IPE lessons learned by the students and their new found appreciation for connecting with other professions in order to provide the best care.

Although subject N-7 strongly improved on her performance during this session, and all professions present did participate during the post-session, the number of STS interactions marginally increased from 2 interactions in the pre-session (3%), to 6 total

STS interactions in the post-session, which is considered as extremely low at 6% (threshold not met). This facilitator improved in all three areas identified as needing improvement during the pre-session (1, 7, and 12) and the total IFPAS score reached the maximum score of 60 with a maximum item average of M=5.0, SD= .00, from the previous total score of 55 (item M=4.58, SD= .79).

There seemed to be no structure to the activity in this session that would direct students to speak with one another. Although the facilitator provided some direction at the beginning of the session, there was not enough stimulation of STS interactions in order to achieve session objective two. This facilitator did, however, provide strong support of session objectives one and three by ensuring that all professions participated, and by strongly contributing to the conversations focused on the management of the patient. It is also important to note that the facilitator spoke three times at length regarding the management of the patient, which may have impacted the number of STS opportunities. This could be considered an example of the need to balance the efforts made towards achieving session objectives.

Cross-case synthesis. The cases reviewed above helped to uncover details regarding the intervention and performance characteristics and IFPAS scoring of each subject. It is important to note that only 5 out of the 7 subjects opted to provide the feedback that is presented below.

Summary of Facilitator Feedback. This section of the cross-case synthesis will help to inform SPICE program stakeholders regarding facilitator challenges, needs, and concerns. Facilitators provided feedback regarding several aspects of the SPICE case experience that help to uncover the many factors involved in the SPICE case facilitation process and additional details regarding the performance assessment. Facilitator feedback was examined for any patterns or themes that could provide insight into their experience, and help to provide additional insight into the statistical analysis of the facilitator performance assessment results.

The presentation of faculty feedback concerning the SPICE case facilitation experience does provide some repeated themes of that feedback, as well as some individual concerns and recommendations that can contribute to the development of the SPICE program and improvement of the facilitator experience.

Figure 6.3 below provides a summary of the feedback concerning the SPICE case facilitation experience.

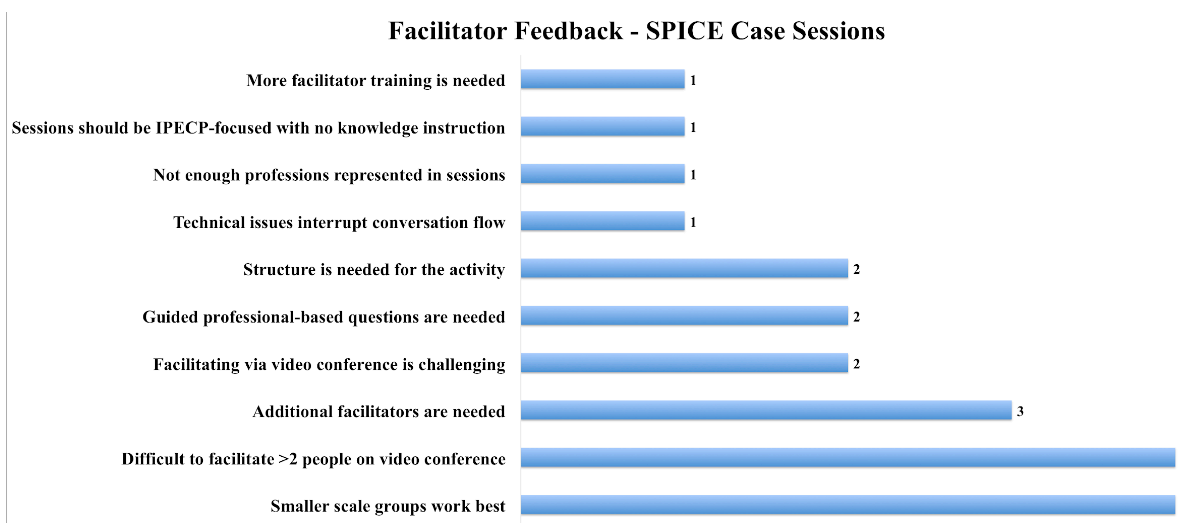

Figure 6.3 Facilitator Feedback - SPICE case sessions.

There were several themes captured regarding the sessions, however, among the most mentioned are three themes: 1. Additional facilitators are needed; 2. Difficult to facilitate with more than 2 people on video conference; 3. Smaller scale groups work best. The first theme was discussed in terms of having more co-facilitators function as lead facilitators so that more of the sessions can be distributed among faculty. This topic was linked with the topic of providing more training for new facilitators in order to support independent facilitation and assumption of lead facilitator roles. More details regarding this issue is provided in the summary of facilitator feedback concerning training. Although only one facilitator mentioned having technical difficulties which interrupted the flow of the session, there were actually several interruptions observed among the 14 videos reviewed (figure 6.4 below). It is important to understand just how many challenges were present in this study in order to comprehend the impact that these issues may have on the student IPECP experience. Figure 6.4 below displays all the technical difficulties experienced in the observed sessions.

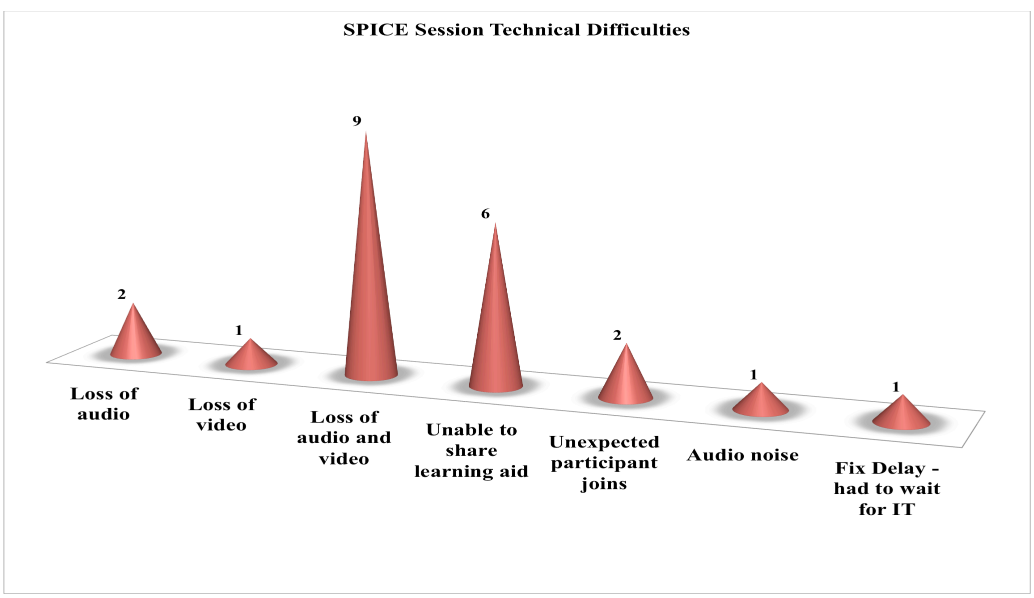

Figure 6.4 SPICE Session Technical Difficulties.

The loss of audio and video during the sessions caused a disruption in the flow of the conversation and a distraction for the students and faculty. Some of the sessions experienced more than one loss of connectivity, impacting the amount of time available for the core portion of the activity. The inability to share documents in a timely fashion before the session had an impact on the students participating via video conference. Although materials could have been shared with these students prior to the session, there were students that joined the meeting unexpectedly. This type of technical challenge may not be avoidable.

Aside from assessing performance, it is important to allow facilitators to provide feedback concerning their training experience, the need for additional training, or if they have any recommendations for that additional training. Several themes were uncovered when examining facilitator feedback about training, as well as some individual recommendations that also contributes towards improving the training process.

Feedback concerning facilitator training is summarized in figure 6.5 below.

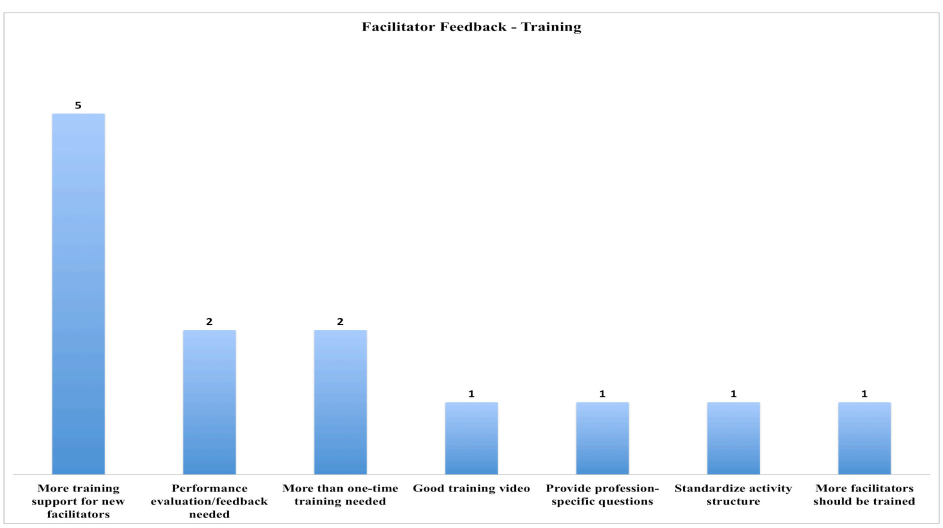

Figure 6.5 Facilitator Feedback – Training.

It is evident from this chart that there is consensus regarding the need to provide more training support to new facilitators. This feedback is similar to the feedback received regarding the SPICE sessions previously discussed. There is a general concern from new facilitators that they do not have enough structure to be able to lead a session independently. This may be related to needing more training in order to function at such a capacity. Other feedback focused on the need for performance evaluation and expanding training to more than one session.

This study involved providing performance feedback as an opportunity for facilitators to examine the results and inform the self-developmental process. The performance evaluation provided was generally well received and feedback regarding IFPAS results are displayed in Figure 6.6 below.

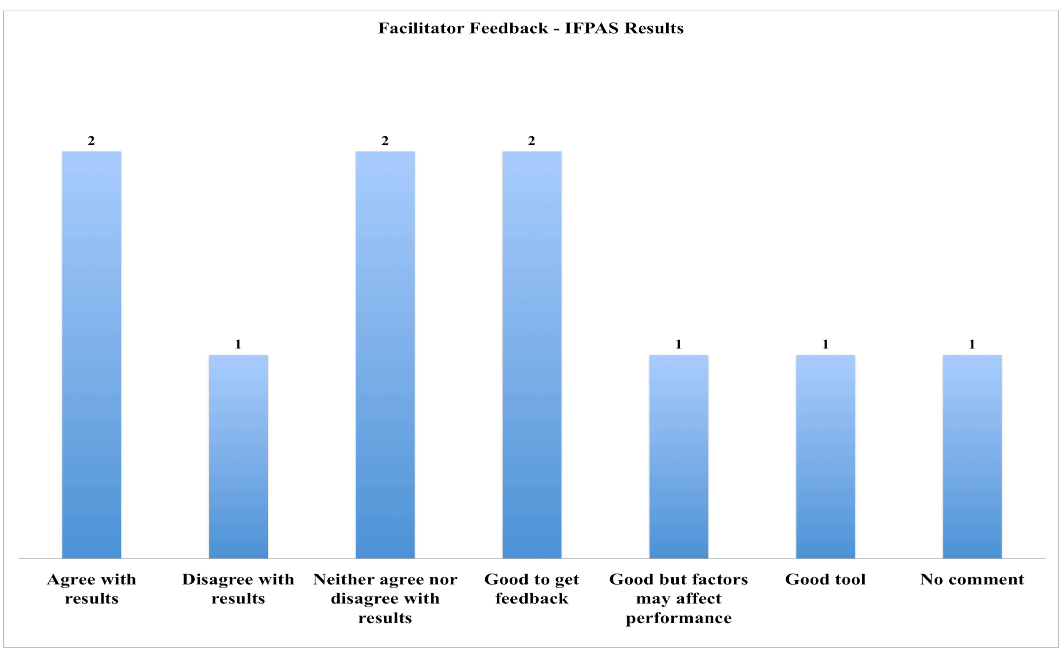

Figure 6.6 Facilitator Feedback - IFPAS results.

Two out of the five subjects that provided feedback for this study agreed with the IFPAS results. They felt that the results were accurate and that it was good to get some feedback regarding performance in order to improve future performance. Two subjects did not agree with certain items which focused on STS interactions since it they felt that the participation level of students was not in their control and also felt that the questions related to student participation do not take into account the varying levels of student clinical experience, which may limit their ability to participate with each other (though, this observation was at odds with the analysis of STS speech patterns below). The subjects that chose to neither agree nor disagree did not elaborate on why they were indecisive about the results. The rest of the feedback themes in this chart provide additional details from the subjects who provided agreement feedback. In general 4 out of the 5 subjects felt that the IFPAS was a good tool for the purpose of receiving feedback. This feedback will help to inform the development and future testing of the IFPAS.

The enhanced feedback coaching sessions resulted in specific action plans (focus areas for future practice). Three main themes for the action plans are displayed in figure 6.7 below.

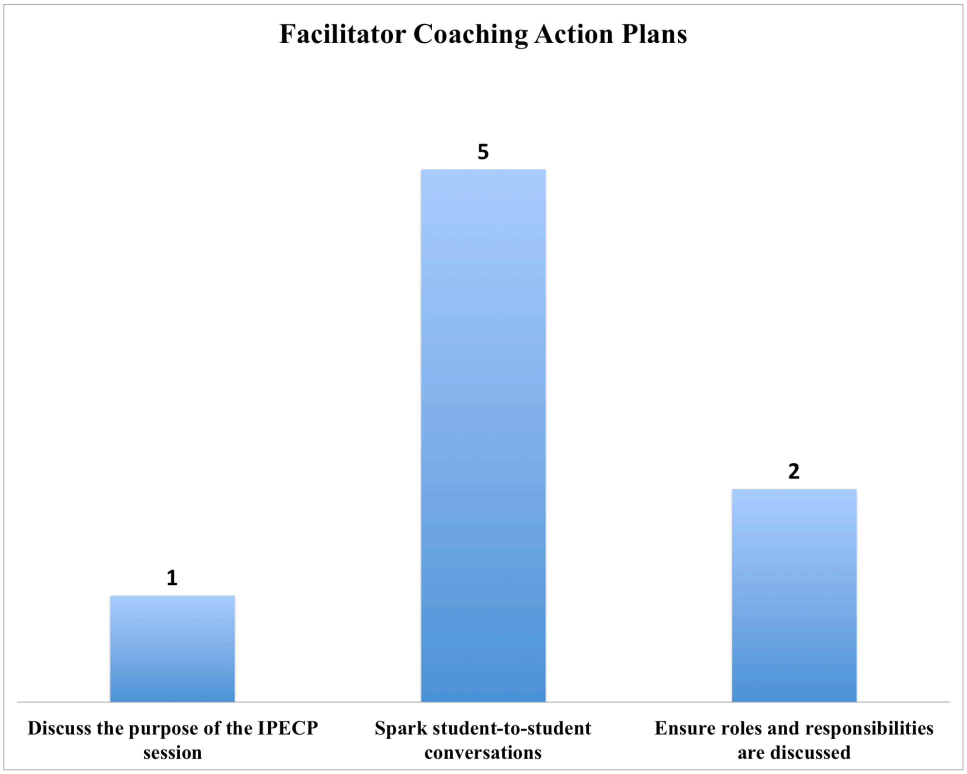

Figure 6.7 Facilitator training action plan themes.

This chart reflects the concentration of IPECP-related focus areas that were discussed across all cases who received the enhanced feedback coaching. The "Spark student-to-student conversations" focus area was the major trend in the enhanced coaching session. Facilitators recognized the importance of guiding students to interact and learn from each other during the session (a constructivist teaching and learning approach). The constructivist approach (discussed in detail in chapter 3) is the core component to the IPECP experience, and therefore it is important to explore the facilitator outcomes for evidence supporting this approach. Student-to-student conversations is a major point of interest in the analysis of the outcomes of the facilitation process. More specifically, the % of STS interactions in each pre and post session will be measured as a reflection of the facilitation outcomes of each case. The next section contains statistical analysis of group outcomes in an attempt to further uncover details about facilitator performance.

Statistical Analysis of Facilitator Performance

The statistical analysis of facilitator performance will be presented with a focus on group pre-post performance results regarding session objectives, overall performance, IFPAS assessment items that will help to summarize case findings, as well as an analysis of student participation outcomes in relation to facilitator performance.

The analysis begins with a review of the pre-post achievement of session objectives. The within-case synthesis provided individual pre-post results regarding the achievement of session objectives. The cross-case synthesis of the session objective findings provides a measure of the pre-post program outcome measures. Below is a summary of facilitator group pre-post results regarding the achievement of SPICE session objective number one ("To introduce students of different professions to the other professions so as to expand their understanding of the scope of practice and knowledge base of the different professions"; see figure 6.8 below).

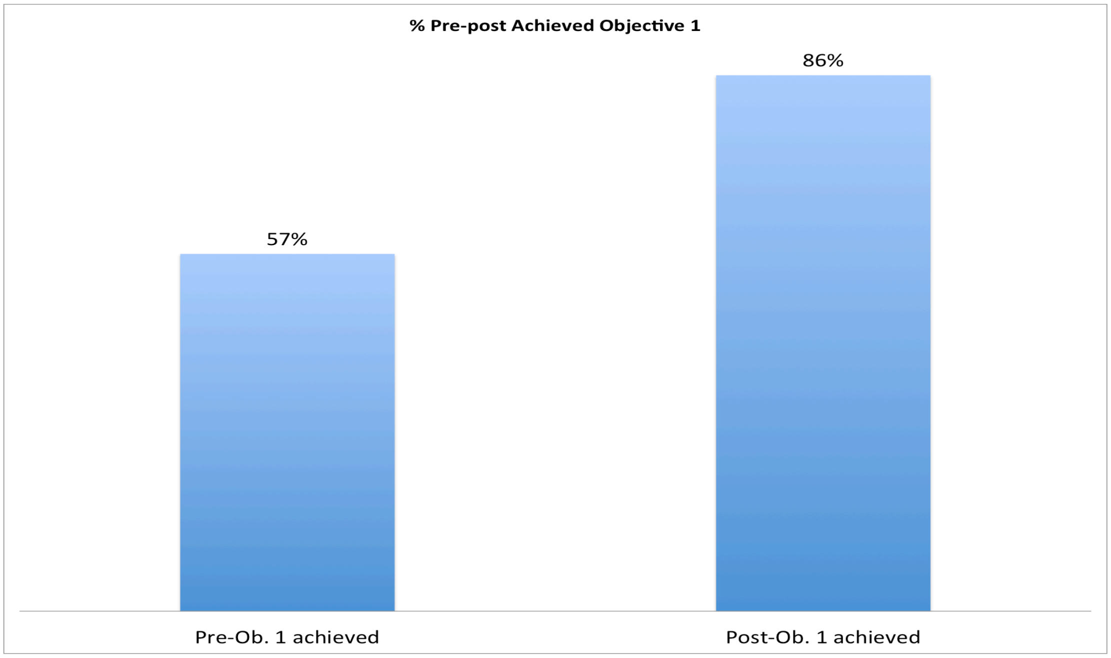

Figure 6.8 Overall SPICE pre-post session objective 1 achieved.
Pre-ob. 1 achieved - the percent of objective 1 achieved in the pre-session
Post-ob. 1 achieved - the percent of objective 1 achieved in the post-session
Objective 1 - To introduce students of different professions to the other professions so as to expand their understanding of the scope of practice and knowledge base of the different professions.

Objective one was measured by tracking the participation of at least one member of each profession represented during the session. This measure is reflective of the efforts put forth by all SPICE facilitators to ensure that by the conclusion of each session, participants have been provided the opportunity to gain an understanding of the roles and responsibilities and knowledge base of the professions present during the session. Overall, there was a 29% increase in the achievement of objective one from the pre-session (pre-57%) to the post-session (86%). This is suggestive of the benefits of providing facilitator training in order to best reach IPECP program objectives.

Objective two ("To model interprofessional discussion and conversation about a complex case") is very similar to objective one, in that it is focused on a type of student participation (student-to-student interactions). Figure 6.9 below shows the overall percent mean of STS for all sessions.

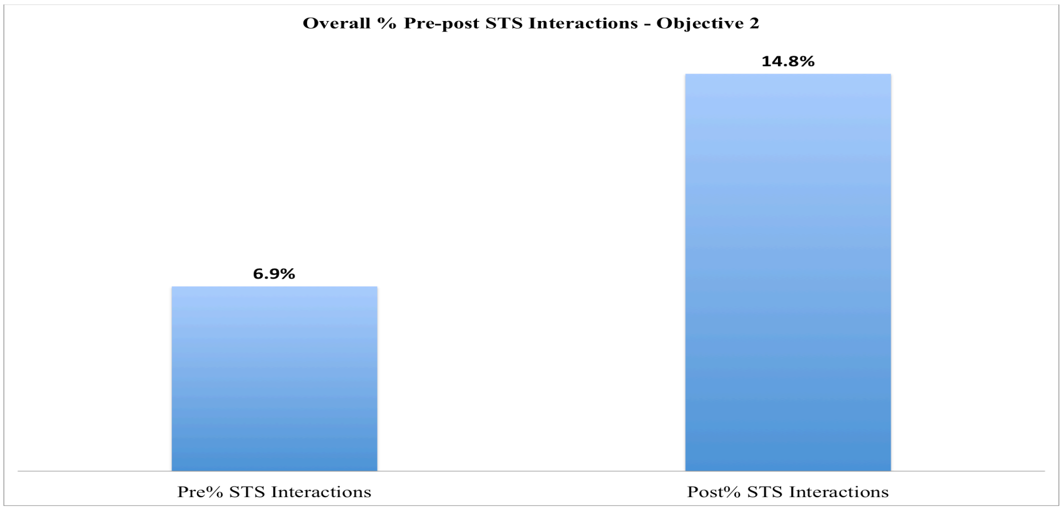

Figure 6.9 Overall SPICE session percent pre-post student-to-student interactions – Objective 2.
Objective 2 - To model interprofessional discussion and conversation about a complex case.

Objective two was measured by observing session student-to-student interactions (student adjacency pairs - SAPs) and calculating the overall pre-post group mean as a measure of the opportunities provided for students to learn with and from each other during the sessions. As previously discussed, there is no benchmark for this measurement, however, it is important to understand the level of STS in considering the intended outcomes of objective 2.

The results show a 7.9% increase in STS interactions from a pre-session % mean STS interaction of 6.9%, to a post-session mean % STS interaction of 14.8%. The post-session measurement of 14.8% can be considered low since according to the literature, STS interactions are at the center of the IPECP student experience (Reeves et al., 2016). A recommended benchmark for this measurement is 40% since STS interactions can be considered a process measure that can help to support intended IPECP program outcomes.

The third objective is focused on sharing information regarding the management of special needs patient cases. Figure 10 below reflects the overall findings regarding this objective.

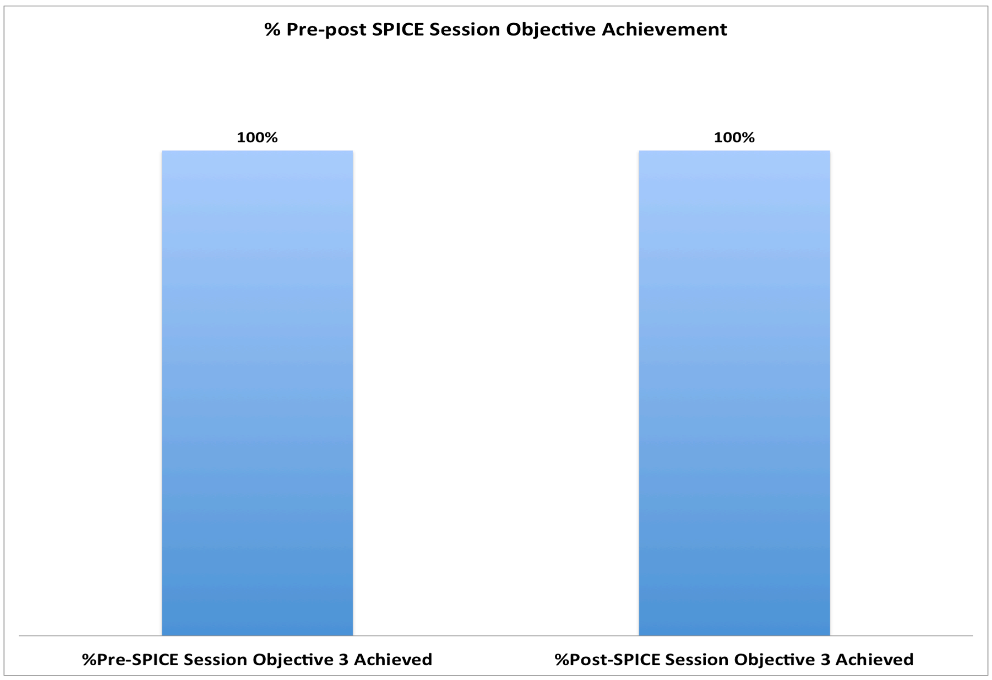

Figure 6.10 Overall Pre-post SPICE session objective 3 achieved.
Objective 3 - Introduce students to the characteristics of special needs dentistry cases.

All pre and post sessions completed the objective of discussing the special needs case, as a collaborative effort between facilitators and students. Each session started with an introduction to the case and session discussions were case-centered. Both students and facilitators contributed knowledge regarding the management of special needs dentistry patients. This objective was strongly supported by all facilitators.

The above results provided some insight regarding program outcomes. The following analysis focuses on facilitator performance measures as a way of understanding overall and detailed pre-post performance outcomes.

When taking a look at group performance assessment outcomes based on total IFPAS scores, all subjects improved their performance scores from pre-to-post ($p<0.035$). The t-test calculation confirms this in table 6.8.

Table 6.8

Paired T-test - pre and post mean comparison

	M	*SD*	*SE*	*t*	*df*	*p*
Post-IFPAS overall score	57.14	3.07834	1.16350	-10.73	6	.035
Pre-IFPAS overall score	47.85	3.71612	1.40456			

N=7

On average, facilitators significantly improved their IFPAS assessment scores after the IFPAS feedback intervention (M = 57.14, SE = 1.16) compared to the performance assessment scores before the intervention (M = 47.86, SE = 3.72), $t(6) = -10.73$, $p < .035$, $r = .81$. There was an average change of 9.29 points, which represents 19% of the IFPAS range of 12-60. In order to understand which items improved the most overall, a Wilcoxon test was performed on all IFPAS items. The results are in table 6.9 below.

Table 6.9

IFPAS Wilcoxon Z-scores, Descriptive Statistics

IFPAS items	*Z*-scores	p value
1. Facilitator is able to clearly explain the purpose and benefits of IPECP	-.447	.655
2. Facilitator is able to instruct and guide participants through IPECP activities	-2.070	**.038**
3. Facilitator displays a positive attitude during IPECP session(s). (e.g., willingness to listen, participate, value contributions, advocate)	--	--
4. Facilitator is able to effectively perform oral presentations (lectures, demonstrations)	-.577	.564
5. Facilitator encourages team members to learn collaboratively about each other's roles and responsibilities during the session(s)	-2.271	**.023**
6. Facilitator observes team behavior and provides feedback to manage team dynamics as needed	-2.251	**.024**
7. Facilitator stimulates and encourages respectful interprofessional collaborative communication	-2.428	**.015**
8. Facilitator does not control group consensus or outcomes	-1.000	.317
9. Facilitator acts as a role-model when practicing IPECP skills and competencies	-1.890	.059
10. Facilitator ensures consistent alignment in all IPECP activities in order to meet organization-wide strategic goals and objectives	-2.251	**.024**

11. Facilitator provides debriefing at the conclusion of all activities, explaining purpose and practical application	-1.134	.257
12. Facilitator accomplishes all IPECP instructional objectives as scheduled	-2.460	**.014**

-- Not calculated - no change in performance pre/post
IFPAS - Interprofessional Facilitator Performance Assessment Scale

Overall, greater than 70% of subjects positively improved in 6 out of 12 IFPAS points of assessment (items 2, 5, 6, 7, 10, and 12). We can conclude that when provided with targeted performance feedback, there is a significant improvement in performance as measured by the IFPAS instrument (Item 2 - Z=2.070, p<.038; Item 5 - Z=2.271, p<.023; Item 6 - Z=2.251, p<.024; Item 7 - Z=2.428, p<.015; Item 10 - Z=2.251, p<.024; Item 12 - Z=2.460, p<.014).

The above findings reflect what is already known about the benefits of assessment-based training (Garfield, 1994; Sennhenn-Kirchner et al., 2016), however, considering the research limitations of this study, more expansive research is needed to test the effects of an IFPAS-based coaching strategy on performance.

It is important to understand the relationship between performance assessment results and session outcomes, such as STS interactions. In order to understand how facilitator performance is related to STS interaction, this section describes the analysis of the % STS interactions in each session. As noted in Figure 7, STS interactions was the main trend in the discussion of the individual IFPAS results and coaching focus across all cases. When examining the relationship between the IFPAS total change scores pre and post, and the pre/post % STS difference, there is a visual pattern that shows a correlation between the scores and the resulting change in % STS. See figure 6.11 below.

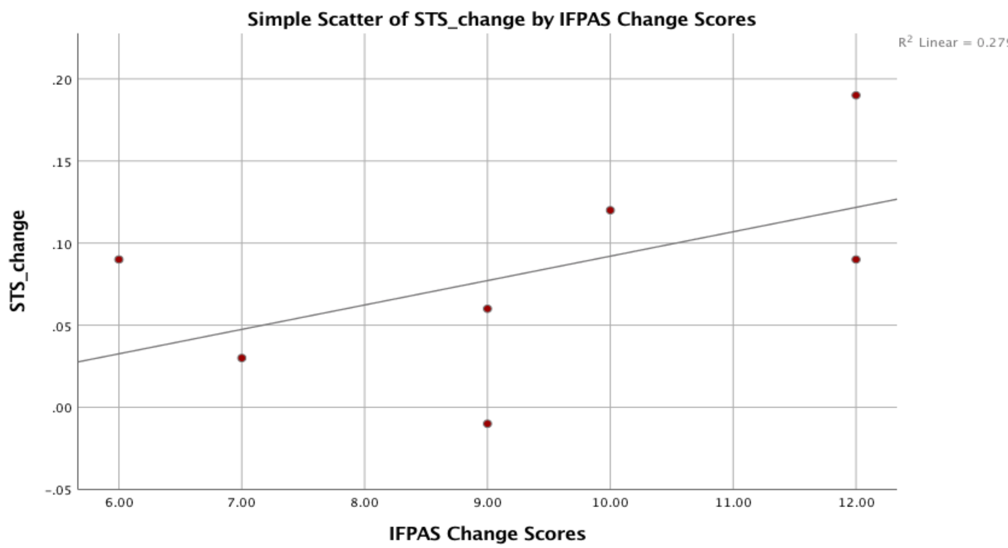

Figure 6.11 Correlation of IFPAS total scores and change in percent STS.

Overall, there is a strong positive relationship between the change in IFPAS total scores and change in % STS (*r*=.528, *p*=.223). In other words, as facilitator performance improved, STS interactions increased as well (for every one unit increase in IFPAS score, there was a 1.5 percent increase in the proportion of STS interaction). While this finding was not statistically significant (due to the small sample size N=7), this represents a strong relationship and is suggestive of that reproducing a feedback enhanced training may also lead to increased student interaction. Interestingly, this finding runs contrary to the perspectives of some of the participants that the level of STS interaction was not a direct result of their facilitator skills.

Discussion

This chapter described the development, face and content validity of the IFPAS instrument, a theory-based facilitator performance assessment instrument designed for the classroom setting, which was derived from a similar instrument designed for the clinical setting (Bravo-Sanchez, Parrott, Dorazio, Denmark, & Heuer, 2017). The Taxonomy Table analysis demonstrated that the IFPAS assessment framework contains a high proportion of high level knowledge and cognitive targeting items, and the modified Kirkpatrick's model of outcomes provided an insight as to the various levels of intended learning outcomes which ranged from individual to the level of supporting patient-centered care. Aside from having a strong theoretical foundation, the framework analysis demonstrates the comprehensiveness of the IFPAS instrument. The pilot testing of the utility of the IFPAS as a training instrument helped to demonstrate its ability to assess facilitator performance in the classroom setting.

Faculty facilitators were assessed using the IFPAS instrument, and provided with the results as part of a feedback intervention designed to contribute to the self-development process **Aim 1**). This was important since these facilitators had received a previous one-time training that did not include assessment of performance or any feedback at the time of this study. Results showed that the IFPAS was able to detect changes in performance pre and post, and qualitative data provided some additional insight regarding performance results, which also informed the targeted coaching intervention.

Not all participants received the enhanced coaching intervention (5-enhanced feedback coaching session, 2-passive feedback IFPAS report only), however those who did receive the enhanced intervention were provided with an IFPAS assessment-based, targeted coaching which focused on specific areas in need of improvement. This type of session can be considered as exclusive and uncommon since not many programs have the resources to provide such feedback and few programs have documented this type of intervention in the literature.

The coaching session also provided an opportunity for facilitators to share their concerns and recommendations for the SPICE program, the training process, and the IFPAS-centered feedback (**Aim 2**). This qualitative data, along with additional session observational data was presented in the within-case format, and summarized in the cross-case synthesis. The results of the case series provided many contextual and performance details including environmental conditions, challenges (both human and technical), as well as insight into facilitator perceptions, individual performance scores and achievement of session objectives.

The environmental factors (number of students, number of facilitators participating, video conference participants, and number of technical issues) placed additional stressors to the already challenging dual classroom platform (virtual and classroom settings). Thus, it is important to understand the impact of these environmental factors when reviewing facilitator performance results.

The number of students participating in the session ranged from 9 to 20, making it more challenging for facilitators to ensure the participation of all students (a point emphasized by several study participants). The number of facilitators participating in the session ranged from one to three, making the management of group dynamics and the flow of the activity even more challenging since there was not standardized approach used for the activity.

Additionally, facilitators had to navigate both a traditional and virtual classroom settings during individual sessions. This dual mode classroom environment posed additional challenges for the facilitator, even if no technical issues arose since the facilitator's comfort level and experience could have an impact on outcomes. The variable dynamics of the virtual classroom has been documented in the literature, however the details of this mode of classroom interaction are not explored in this study (Fahy, 2005).

Compounding the issue of the dual mode classroom are the sessions containing anywhere up to four participants on the video conferencing system, including facilitators and students. The two facilitators that used this system to participate seemed to struggle with being able to monitor group dynamics and helping to guide the session. This may have had an impact on performance scores. And students who participated via video conference had some struggles participating during the session due to some impromptu sharing of visual learning aids that were not readily able to be shared at the time of the session. The impact of the video conferencing system during the session was strongly affected by the numerous technical issues that arise during a session. Although only one facilitator reported experiencing technical challenges, many were observed in the direct observation of the evaluated sessions.

Eleven out of the fourteen (21%) sessions observed experienced technical difficulties that created challenges for both facilitators and students, and certainly interrupted the flow of the activity. Although technical support was available to assist with many of the issues which arose, interruptions of any length of time caused a distraction for all session participants.

The above environmental factors were observed in the analyses of the sessions, and echoed by the facilitators who shared their concerns regarding their experiences. Facilitator feedback concerning their experience as SPICE facilitators provided much insight as to the needs of the faculty. There was a strong emphasis on the need to increase the number of facilitators participating in the program, provide additional training support, as well as reduce the number of in-class and video conference participants in order to improve the quality of the session. Additional recommendations included the need to standardize the case sessions in order improve facilitation and student participation outcomes. Overall, study participants appreciated the opportunity to express their concerns and provide recommendations, which also contribute to program improvement efforts.

Subject feedback concerning the IFPAS will help to inform future development and testing of the IFPAS. Although 60% of the responses regarding their perception of the performance results were positive (**Aim 2**), there were some concerns regarding the content of the assessment questions that focused on facilitation approaches that linked to student participation levels. Although group work can involve both student and facilitator factors that affect the learning environment, studies show that the best learner interaction outcomes depend on the ability of the facilitator to create a safe learning environment and timely support that helps support STS interactions during group activities--a core aspect of the IPECP experience (Fanning & Gaba, 2007; Green et al., 2006; Oxley, Dzindolet, & Paulus, 1996).

Considering the IPECP core intended outcome, it is very important that a larger proportion of STS interactions should occur in comparison to FTS interactions, and it is the responsibility of the facilitator to create those STS opportunities. Studies show that in order to increase STS interactions, facilitators need to create opportunities for these interactions, while at the same time minimizing their interactions with students in order to not interrupt (block) or suppress their opportunities to interact (Oxley, Dzindolet, & Paulus, 1996).

The concerns expressed by the facilitators are similar to the concerns that have been documented in IPECP literature (Sunguya, Hinthong, Jimba, & Yasuoka, 2014). An interprofessional education systematic review by Suguya et. al. (2014) provides detailed insight regarding the concerns and challenges faced by IPECP programs world-wide. Among these concerns are the following: lack of leadership support for IPECP programs (financial, promotional, career development, recognizing staff involvement, need for mentorship, lack of research opportunities), student groups are too large, difficulties in facilitating students of differing experience levels, the style of sessions are not helpful, feeling of unpreparedness, academia demands versus practice demands, poor perceived value, and negative attitudes).

In response to many of these issues listed above, additional leadership support (champions, deans, associate deans and directors), training (competency-based), and providing more structure for student activities (standardized activities, smaller groups, problem-based learning) were among the solutions implemented to address the challenges faced by program stakeholders (Sunguya et al., 2014). It is important for stakeholders to consider the concerns and recommendations of front line facilitators and work collaboratively to formulate the best solutions that incorporate best practices.

Although it is important for stakeholders to consider the implications presented, it is also important to acknowledge the difficulties in developing a facilitator training program that requires the dedication of time and resources. During the time of this study, 30% of study participants left the program for other opportunities that did not allow for continuing participation. One of the main challenges is the recruitment and retention of dedicated facilitators that make up the framework of a program. Therefore, aside from dedicating resources to faculty training, it may also important to include meaningful incentives for faculty to participate for the long term.

This pilot study provides strong support for the implementation of competency-based training and targeted feedback in order improve the quality of the IPECP student experience. The quantitative analysis performed in this study not only showed that there was a significant improvement in performance pre to post, but the analysis also showed that when you provide training to facilitators, there is a concomitant improvement in STS interactions--a core component of IPECP (**Aim 3**). The improvement of STS interactions improves the quality of the IPECP student experience. Additional analysis of each session also showed that session objectives targeting the participation of students greatly improved overall in the post-session, further supporting the need for training as an approach to accomplishing the intended learning outcomes. Overall study findings overwhelmingly support the further training and development of facilitators involved in delivering IPECP.

Limitations. There are many limitations which may have had an impact on this study. This pilot study involved the use of a single researcher to develop and test all study instruments, evaluate all case sessions and facilitator performances, and implement the feedback intervention, increasing the likelihood of investigator/observer bias. Although the IFPAS instrument was derived from a similar instrument that was previously tested and validated, the IFPAS and all other study instruments were not validated prior to the study. The IFPAS instrument was not reviewed by content experts, and study participants were the only source of validity testing.

This pilot study can be considered a feasibility study that can help to determine whether a larger study would be possible. The sample size is small and it is unclear if the study population will increase in the future in order to allow for a larger study to be conducted. Sample limitations restricted generalizability of study results.

In addition, there are many unknown factors that may or may not have contributed to the final results such as the following:

1. Additional facilitator training (on top of the one-session prior training) or practice that may have been received in addition to the IFPAS feedback. In order to differentiate the effect of the enhanced feedback from a possible secular trend to improve with practice, a control group receiving no feedback would need to be used. It is unclear whether this would be ethically acceptable to the program stakeholders.

2. Facilitators who received the passive feedback report and may or may not have reviewed the results prior to the post-session assessment.
3. The impact of co-facilitators on the target facilitator's ability to perform.
4. The effect of co-facilitators on total session STS interactions.

Future testing of the IFPAS and IFPAS-centered intervention should include a larger sample size, along with additional researchers to improve reliability of the coding process and assessment of facilitation performance.

Conclusion

At the center of all IPECP programs are the collaborative learning experiences of student groups, and the core intended outcome of these programs is to ensure that students are learning with, about and from each other, in order to gain an understand each other's roles and responsibilities, and to develop a mutual respect for the members of the healthcare team in preparation for future clinical practice. In order for institutions of higher learning to accomplish this outcome, it is vitally important provide comprehensive training and support structures for program facilitators.

References

Ascione, F. J., Sick, B., Karpa, K., McAuley, J., Nickol, D. R., Weber, Z. A., & Pfeifle, A. L. (2019). The big ten IPE academic alliance: A regional approach to developing interprofessional education and practice. *Journal of Interprofessional Education & Practice,* doi:10.1016/j.xjep.2019.01.001

Bales, R. F. (1950). A set of categories for the analysis of small group interaction. *American Sociological Review, 15*(2), 257-263. doi:10.2307/2086790

Banfield, V., & Lackie, K. (2009). Performance-based competencies for culturally responsive interprofessional collaborative practice. *Journal of Interprofessional Care, 23*(6), 611-620. doi:10.3109/13561820902921654

Black, H., Soto, L., & Spurlin, S. (2016). Thinking about thinking about leadership: Metacognitive ability and leader developmental readiness. *New Directions for Student Leadership, 2016*(149), 85-95. doi:10.1002/yd.20164

Brandt, B., Lutfiyya, M. N., King, J. A., & Chioreso, C. (2014). A scoping review of interprofessional collaborative practice and education using the lens of the triple aim. *Journal of Interprofessional Care, 28*(5), 393-399. doi:10.3109/13561820.2014.906391

Bravo-Sanchez, C., Parrott, J. S., Dorazio, V., Denmark, R., & Heuer, A. J. (2017). Development of an interprofessional collaborative practice Lean facilitator assessment scale (ILFAS). *Journal of Interprofessional Care,* (December)

Bylund, C. L., Brown, R. F., di Ciccone, B. L., Diamond, C., Eddington, J., & Kissane, D. W. (2009). Assessing facilitator competence in a comprehensive communication skills training programme. *Medical Education, 43*(4), 349 8p. doi:10.1111/j.1365-2923.2009.03302.x

Csomay, E. (2006). Academic talk in american university classrooms: Crossing the boundaries of oral□literate discourse? *Journal of English for Academic Purposes, 5*(2), 117-135. doi:10.1016/j.jeap.2006.02.001

El-Awaisi, A., Joseph, S., El Hajj, M. S., & Diack, L. (2018). A comprehensive systematic review of pharmacy perspectives on interprofessional education and collaborative practice. *Research in Social & Administrative Pharmacy : RSAP, 14*(10),

863. doi:10.1016/j.sapharm.2017.11.001

Evans, S. M., Ward, C., & Reeves, S. (2018). Online interprofessional education facilitation: A scoping review. *Medical Teacher,* , 1-8. doi:10.1080/0142159X.2018.1460656

Fahy, P. J. (2005). Online and face-to-face group interaction processes compared using bales' interaction process analysis (IPA). *European Journal of Open, Distance and E-Learning,* Retrieved from http://www.eurodl.org/materials/contrib/2006/Patrick_J_Fahy.pdf

Freeth, D., & Reeves, S. (2004). Learning to work together: Using the presage, process, product (3P) model to highlight decisions and possibilities. *Journal of Interprofessional Care, 18*(1), 43-56. doi:10.1080/13561820310001608221

Green, J. L., Camilli, G., & Elmore, P. B. (2006). *Handbook of complementary methods in education research*. Mahwah, N.J: Lawrence Erlbaum Associates.

Hall, P., Weaver, L., & Grassau, P. A. (2013). Theories, relationships and interprofessionalism: Learning to weave. *Journal of Interprofessional Care, 27*(1), 73-80. doi:10.3109/13561820.2012.736889

IBM. (2017). IBM SPSS - IBM analytics. Retrieved from http://www.ibm.com/analytics/us/en/technology/spss/

Institute of Medicine. (2015). *Measuring the impact of interprofessional education on collaborative practice and patient outcomes* National Academies Press. Retrieved from http://nationalacademies.org/hmd/reports/2015/impact-of-ipe.aspx

IPEC. (2011). *Core competencies for interprofessional collaborative practice.* ().

Retrieved from https://www.aacom.org/docs/default-source/insideome/ccrpt05-10-11.pdf?sfvrsn=77937f97_2

IPEC. (2016). *Core competencies for interprofessional collaborative practice: 2016 update*. Washington DC: Interprofessional Education Collaborative.

Krathwohl, D. R. (2002). *A revision of bloom's taxonomy: An overview* College of Education, The Ohio State University.

Krathwohl, D. R., Bloom, B. S., & Masia, B. B. (1965). *Taxonomy of educational objectives, handbook II: Affective domain (the classification of educational goals)*. New York: David McKay Company. Retrieved from http://catalog.hathitrust.org/Record/008307011

Magno, C. (2010). The role of metacognitive skills in developing critical thinking. *Metacognition and Learning, 5*(2), 137-156. doi:10.1007/s11409-010-9054-4

Microsoft Corporation. (2010). *Microsoft excel for mac 2011*

Microsoft Corporation. (2019). *Microsoft office 365 - one drive for business*. Redmond, WA: Retrieved from https://onedrive.live.com/about/en-us/business/

Pintrich, P. R. (2002). *The role of metacognitive knowledge in learning, teaching and assessing*

Qualtrics, L. (2016). *Qualtrics survey software* Qualtrics.com.

Reeves, S., Boet, S., Zierler, B., & Kitto, S. (2015). Interprofessional education and practice guide no. 3: Evaluating interprofessional education. *Journal of Interprofessional Care, 2015, Vol.29; 29*(4; 4), 312; 312.

doi:10.3109/13561820.2014.1003637

Reeves, S., Fletcher, S., Barr, H., Birch, I., Boet, S., Davies, N., McFayden, A., Rivera, J., Kitto, S. (2016). A BEME systematic review of the effects of interprofessional education: BEME guide no. 39. *Medical Teacher, 38*(7), 656-668. doi:10.3109/0142159X.2016.1173663

Schegloff, E. A. (2007). *Sequence organization in interaction: A primer in conversation analysis I*. Cambridge, UK: Cambridge University Press.

Sennhenn-Kirchner, S., Kirchner, B., Goerlich, Y., Schiekirka, S., Simmenroth, A., Notbohm, M., & Raupach, T. (2016). The effect of repeated testing vs repeated practice on skills learning in undergraduate dental education. *European Journal of Dental Education,* doi:10.1111/eje.12254

Simpson. (1966). *The classification of educational objectives, psychomotor domain*. United States: University of Illinois, Urbana.

Sindelar, N. W. (2011). *Assessment-powered teaching*. Thousand Oaks, Calif: Corwin Publishing. Retrieved from https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com.proxy.libraries.rutgers.edu/login.aspx?direct=true&db=nlebk&AN=690919&site=eds-live

Sunguya, B. F., Hinthong, W., Jimba, M., & Yasuoka, J. (2014). *Interprofessional education for whom? --challenges and lessons learned from its implementation in developed countries and their application to developing countries: A systematic review* doi:10.1371/journal.pone.0096724

The Shingo Model. (2011). Shingo model handbook for operational excellence. Retrieved from http://lean.nh.gov/documents/Shingo%20Model%20Handbook.pdf

Yin, R. K. (2018). *Case study research and applications : Design and methods*. Thousand Oaks, California: SAGE Publications, Inc.

Chapter VII: Conclusion

Healthcare organizations and institutions of higher learning have been charged with improving the quality of patient care by implementing and supporting IPECP efforts. Stakeholders turn to the literature for guidance in designing and implementing IPECP processes and programs. However, there is a research gap regarding facilitation best practices, and considering the implications of poor facilitation, it is very important to expand upon this area of research.

This dissertation research expands upon this area of study and provides important guidance and recommendations to stakeholders for improving their IPECP facilitator training efforts and performance outcomes. The key contributions and recommendations are presented below.

However, we should first review for our readers the history of what, at first, may appear to be a rather unconventional sequence of analyses. The impetus for the project was practical--a large hospital system in New York City needed a tool with which to assess the facilitators of interprofessional practice teams. At the time, no facilitator assessment existing tool existed that was both firmly grounded in theory and research as well as designed to be part of an organizational process improvement initiative. This lead to a deep dive into the literatures relating to interprofessional practice, organizational improvement, meta-cognitive research and learning theory (Chapter 3) to identify the key components of a robust IPCP facilitator assessment instrument. Based on the analysis of these literatures, we developed and pilot tested the ILFAS tool for use in the clinical setting (Chapter 5). Then, responding to a practical need within our own university setting, we adapted the ILFAS tool to be used in an educational context, focusing specifically on how the adapted tool (IFPAS) could be used as part of an interprofessional facilitation training effort (Chapter 6). Having now developed two context-specific IPCP facilitator assessment tools, we also recognized the need to differentiate those tools from the handful of existing IPCP facilitator assessment tools (Chapter 4).

Context-specific Facilitator Assessment Framework

The research presented in this dissertation is unique in its context-specific approach to the assessment framework, which provides a comprehensive assessment instrument that is designed for the clinical setting and another that is designed for the classroom setting, in recognition of the need to utilize facilitator performance assessment instruments that most closely match the conditions in which facilitation is taking place.

This is important since the use of generic IPECP facilitator assessment instruments may lead to gaps in the assessment of context-specific skills that may be required for successful facilitation outcomes. For example, using a generic assessment instrument to assess a clinical process improvement facilitator would likely fall short of assessing the technical skills needed for successful outcomes. In order to avoid such an assessment gap, this dissertation research provides IPECP stakeholders with the opportunity to apply the assessment methodology that is most appropriate for their needs, as well as the ability to comprehensively target performance training/coaching that can improve the efficiency of the skills development process.

Facilitator Assessment and the Emphasis on Higher Order Cognitive Processes: Comparison of Assessment Tools

IPECP literature has shown that few programs use theory to develop assessment frameworks and instrumentation (Reeves et al., 2016). Considering the implications of poor facilitation, it is critical that facilitation assessment instruments contain theory that provides targeted guidance for facilitation training and development.

Facilitation practices involve a wide range of skills and competencies that require low to high level of cognitive and knowledge processing. If an assessment instrument is not designed to measure a wide range of facilitator skills and competencies, results may not be accurate and training may be misguided. In addition, if instrument items are not structured clearly in order to target the exact skill that is being assessed, there may be confusion regarding the evaluation process and the resulting skills development plan.

The facilitator performance assessment instrument comparison in chapter four demonstrated that the proposed instruments (ILFAS and IFPAS) contain a high proportion of higher-level cognitive and knowledge components within their framework (Taxonomy Table). Therefore, both instruments are able to assess facilitator skills of varying competency levels and each item was designed using Bloom's Taxonomy, helping to target the specific skills and competencies during the assessment process. This is important to the accuracy of performance assessment results, and assists with the development of training action plans.

In addition, when reviewing and comparing the range of learning outcomes (using the modified Kirkpatrick's model), the proposed instruments target more levels of learning outcomes than other instruments. This wide span of learning outcomes can assist stakeholders in assessing the ability of the facilitator to support a wide range of learning outcomes. This is important since the success of IPECP experiences rely on the facilitator's ability to explain and demonstrate the benefits of the experience and how it is applicable to clinical practice for the purposes of improving patient care quality.

A recommendation for IPECP program planners is to ensure that the chosen assessment instrument is aligned with program objectives and activities in terms of the level of cognitive and knowledge dimensions, intended learning outcomes, as well as the required skills and competencies. Facilitator trainees should be clear on the level of expectations and training they will be required to accept and practice. Alignment of all portions of a program also assists educators/facilitators in delivering this non-traditional form of education.

Facilitator Assessment in a Clinical Context for Organizational Improvement: ILFAS

The ILFAS instrument was specifically designed for the clinical setting since facilitation practices often require these technical skills to support process/quality improvement teamwork. Although process improvement has been included in graduate medical education, and has been acknowledged as beneficial by some health profession schools, it has not been widely implemented into healthcare higher education (Armstrong, Lauder, & Shepherd, 2015; Jenson et al., 2009; Ogrinc et al., 2015).

Lean methodology is one of the main assessment components that uniquely sets this instrument apart from other instruments used for the assessment of IPECP facilitator performance in the clinical setting. Through its uniqueness in targeting Lean skills and competencies, assessment results can provide details regarding the ability to align organizational goals with session goals, implement technical skills such as building charts and summarizing data in order to assist with the improvement process. Facilitator assessment instruments used in the clinical setting that do not contain process improvement skills and competencies, and only contain IPECP-related skills and competencies (collaborative communication, sharing of roles and responsibilities, etc.), would fail to capture the competency levels of these critically important skills. In this case, a facilitator that has poor process improvement skills, would not be evaluated correctly and follow-up training may not target the appropriate areas of weakness, which could lead to team outcomes that fall short of expectations.

The ILFAS was tested in the clinical setting, and the results showed a high level of inter-rater reliability, which argues for the usability of the tool across assessors (Bravo-Sanchez, Parrott, Dorazio, Denmark, & Heuer, 2017). This is important since aside from using an instrument that includes a comprehensive set of competencies to assess performance, it is also important for stakeholders to be able to use an instrument that has been previously tested for usability, increasing the confidence in the use of the tool for the purposes of assessing facilitator performance.

A recommendation for healthcare organization stakeholders who are not using a formal assessment instrument to evaluate both hard (technical) and soft skills, would be to incorporate the ILFAS instrument in order to comprehensively assess facilitator skills and competencies, making sure that project objectives and tasks are similarly aligned with the framework of the assessment instrument. In this manner, stakeholders will be able to target specific areas of weakness in the training and development process, helping to improve facilitator performance and team outcomes, best supporting organization-wide quality improvement strategic goals and objectives.

Facilitator Assessment and Training in the Educational Context: IFPAS

This dissertation research helps to inform IPECP facilitator training programs by recommending and demonstrating the use of assessment-based training as part of the skills developmental process. There is so much variability in the way in which training is provided, and although it would be difficult to create a standard approach for all organizations, the recommendation from the literature emphasizes the need for the practice of skills coupled with the assessment of performance and providing detailed feedback and training that targets the specific areas of improvement (Garfield, 1994). IPECP programs can utilize the instruments provided by this research in order to implement assessment-based training programs that comprehensively target context-specific skills and competencies as a best practice approach.

Facilitator Performance Outcome Measures

The IFPAS pilot study not only demonstrated the use of assessment-based training in an IPE setting, we demonstrated that how the use of the IFPAS-directed training can be empirically linked to important program-specific outcome measures. By linking facilitator assessment to facilitator training and event objectives we demonstrated a way of enhancing not only facilitator performance, but student outcomes as well. The literature emphasizes that the core principle of the IPECP higher education experience is centered on students learning with, about and from each other and the responsibility of the facilitator in fostering an environment, which maximizes the student-to-student collaborative experience during IPECP activities (Fanning & Gaba, 2007; Green, Camilli, & Elmore, 2006; IPEC, 2016; Oxley, Dzindolet, & Paulus, 1996). Therefore, by tracking student-to-student interactions and the representation of each profession present during

IPECP discussion activities, stakeholders can gain an understanding of the impact of the facilitation, which takes place during an activity.

Collectively, these facilitation outcome measures help to inform both facilitator skills training and overall program development as a way of tracking the progress of predetermined objectives. A recommendation would be to collect these measures during each skills practice opportunity in order to provide additional feedback to facilitators, and periodic random tracking of these measures can be used to monitor program outcomes and objectives.

The recommended benchmark used in this study for percent student-to-student STS interactions was 40% during a session. This is not an absolute benchmark for STS interactions. Rather, for the purposes of the IFPAS study which included IPECP student session objectives that had both a student communication focus and a focus on *learning new knowledge*, it was assumed that a substantial proportion of time would need to be devoted to communicating new content knowledge about special needs dentistry. However, this benchmark may not be appropriate for programs, which do not include a new knowledge objective for their students, therefore placing a stronger focus on the STS interactions. The recommended benchmark for % STS interactions during a session in this case might be 70% since there will still be a need for facilitators to interact with students in order to guide them through student activities. More research is needed to explore if this recommended benchmark can be applied to other higher education settings.

Facilitator-derived Recommendations

An important contribution of this dissertation is the presentation of facilitator feedback, which reflected the concerns regarding their specific program. However, the feedback of the facilitator participants in this study echoed many of the same struggles that impact IPECP programs worldwide (Sunguya, Hinthong, Jimba, & Yasuoka, 2014). Subject recommendations and concerns provide vital feedback to program planners that help to inform program improvement efforts. Recommendations included the need for: smaller group sizes, less video conference participants during any given session, standardizing session activities (with guided profession-based questions), more training and development of new facilitators, and an additional number of facilitators to help cover scheduled sessions.

Stakeholders can use these recommendations to help improve the facilitator and student experience. It may also beneficial to periodically use an anonymous survey to capture additional recommendations, concerns and overall satisfaction for facilitator retention purpose, and overall program improvement efforts.

Although not captured by the facilitator feedback, an additional and very important factor has been identified by the literature. Faculty incentives to participate in the facilitation of IPECP are recognized as an important factor in growing and maintaining programs (Sunguya et al., 2014). Incentives can be provided in a variety of ways such as financial, recognition of participation that can be applied towards promotions, and research opportunities. It is important for program leaders to consider providing incentives as a way of providing resources to the program and ensuring long-term sustainability.

Research Recommendations in Support of Program Outcomes

This dissertation has provided many recommendations regarding facilitator training and assessment approaches. In reviewing the facilitator/program outcomes related to the percent of STS interactions during a session, there was measurable improvement after the feedback intervention provided. In order to provide further guidance to stakeholders regarding specific training approaches that can be used to best ensure this kind of participation, the following four theories are offered by Oxley et al., (1996):

1. **Evaluation apprehension theory** - this concerns lack of student participation for fear of being judged. Facilitators need to continue to reassure students that their contributions will not be evaluated, making sure to remind all students that all contributions need to be respected. In moments where students are not contributing, the facilitator can repeat the last question, remind the group of the context of the case, or discuss topics related to the case which have not been covered at that point in time. (Oxley et al., 1996).
2. **Free-riding theory** - concerns group participants who are not participating during the session because they don't feel their input will have an impact on the discussion. Facilitators need to strategically encourage students who are not participating, and remind them of the importance of their contributions to the success of the overall experience (Oxley et al., 1996).
3. **Production blocking theory** - concerns the need to allow students to express their ideas freely without interruptions. Facilitators should minimize the amount

of time used to keep the student group interacting with each other, interrupting when students veer off topic, while keeping in mind that even one quick interruption in the flow of student conversation may reduce (block) the amount of STS interaction time (Oxley et al., 1996).

4. **Social influence theory** - this theory states that even when using the above facilitation practices to support STS, results may still fall short if the facilitator does not set a high standard of performance for the group prior to and during the session, therefore the recommendation is for facilitators to set the “ground rules” for participating in the IPECP activity as a way of ensuring a high quality learning experience (Oxley et al., 1996). This along with using structuring the activity so that STS is built into the session can assist in maximizing results.

Additional training recommendations for new facilitators include the use of role play during the training process using a facilitator group setting, where all participants have the opportunity to play the facilitator, in order to receive critical feedback prior to the facilitation of a student group (Oxley et al., 1996). In addition, as an approach to providing a higher level of training, the review of recorded facilitation performance is an opportunity for facilitators to self-reflect and improve upon skills.

The overall recommendation from the literature is that in order to have improved STS interactions during IPECP activities, facilitator need to have extensive training (Oxley et al., 1996).

Future Research

This dissertation provided additional resources for IPECP program planners. More research is needed to further develop the ILFAS and IFPAS instruments in order to strengthen their capacity to provide vital facilitator feedback. It is important to continue to learn how to improve facilitator practices in order to support the mission of providing students with experiences that will best prepare them for clinical practice.

References

Armstrong, L., Lauder, W., & Shepherd, A. (2015). *An evaluation of methods used to teach quality improvement to undergraduate healthcare students to inform curriculum development within preregistration nurse education: A protocol for systematic review and narrative synthesis* doi:10.1186/2046-4053-4-8

Bravo-Sanchez, C., Parrott, J. S., Dorazio, V., Denmark, R., & Heuer, A. J. (2017). Development of an interprofessional collaborative practice Lean facilitator assessment scale (ILFAS). *Journal of Interprofessional Care,* (December)

Fanning, M., R., & Gaba, M., D. (2007). The role of debriefing in simulation-based learning. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare, 2*(2), 115-125. doi:10.1097/SIH.0b013e3180315539

Garfield, J. B. (1994). Beyond testing and grading: Using assessment to improve student learning *Journal of Statistics Education, 2*(1)

Green, J. L., Camilli, G., & Elmore, P. B. (2006). *Handbook of complementary methods in education research*. Mahwah, N.J: Lawrence Erlbaum Associates.

IPEC. (2016). *Core competencies for interprofessional collaborative practice: 2016 update.* Washington DC: Interprofessional Education Collaborative.

Jenson, B., H., Dorner, B., D., Hinchey, B., K., Ankel, B., F., Goldman, B., S., & Patow, B., C. (2009). Integrating quality improvement and residency education: Insights from the AIAMC national initiative about the roles of the designated institutional official and program director. *Academic Medicine, 84*(12), 1749-1756. doi:10.1097/ACM.0b013e3181bf686f

Ogrinc, G., Davies, L., Goodman, D., Batalden, P., Davidoff, F., Stevens, D., . . . Wollersheim, H. (2015). *SQUIRE 2.0 (standards for Quality improvement reporting excellence) : Revised publication guidelines from a detailed consensus process* BMJ Publishing Group Ltd. doi:10.1136/bmjqs-2015-004411

Oxley, N., Dzindolet, M., & Paulus, P. (1996). The effects of facilitators on the performance of brainstorming groups. *Journal of Social Behavior and Personality, 11*(4), 633.

Reeves, S., Fletcher, S., Barr, H., Birch, I., Boet, S., Davies, N., McFayden, A., Rivera, J., Kitto, S. (2016). A BEME systematic review of the effects of interprofessional education: BEME guide no. 39. *Medical Teacher, 38*(7), 656-668. doi:10.3109/0142159X.2016.1173663

Sunguya, B. F., Hinthong, W., Jimba, M., & Yasuoka, J. (2014). *Interprofessional education for whom? --challenges and lessons learned from its implementation in developed countries and their application to developing countries: A systematic review* doi:10.1371/journal.pone.0096724

Appendix A: Study Instruments

Interprofessional Lean Facilitator Assessment Scale items
(Bravo-Sanchez et al. 2016)

Enabling
1. Facilitator acts as a role-model when applying principles of continuous process improvement.[5, 2, 7]
2. Facilitator is NOT ABLE TO explain the Lean/Breakthrough Pillars and Principles: Respect for people, Continuous Improvement, Customer defines value, deliver value on demand, standardize and solve to improve, transformational learning requires deep personal experience, mutual respect and shared responsibility enables higher performance.[6, 1]
3. Facilitator provokes and stimulates teamwork interactions.[6, 7, 4, *]
4. Facilitator encourages team members to learn with, from and about each other's roles and responsibilities during the process improvement session(s).[2, 6, 7, 4, *]
5. Facilitator displays a positive attitude during process improvement session(s). (e.g., willingness to listen, participate, value contributions, advocate).[2, 5, 7, 4, *]
6. Facilitator is able to effectively perform oral presentations (lectures and demonstrations).[3]

Improving

7. Facilitator is able to accurately explain and translate Lean methodology/process improvement steps and instructions to the team.[1, 6]

8. Facilitator is NOT ABLE TO build and explain visual aids/management (maps, charts, boards, constructs value stream, etc.) during the instructional process.[1, 6 3]

9. Facilitators engage and guide all team members in the development of the process improvement plan.[2, 5, 4, 7, *]

10. Facilitator implemented all Lean/Breakthrough methods, events and tools. appropriately.[1, 6]

Aligning

11. Facilitator ensures consistent alignment in all stages of process improvement in order to meet organization-wide strategic goals and objectives.[1, 5, 4, 7]

12. Facilitator continuously assesses progression of teamwork, changing the facilitation approach as necessary.[1, 4, *]

Results

13. Facilitator explains the purpose and benefits of Lean/Breakthrough methodology.[5, 1]

14. Facilitator accomplished all instructional and procedural daily/weekly objectives.[1, 6, 3]

Note: [1]Cognitive item; [2]Affective item; [3]Psychomotor item; [4]Metacognition item; [5]Shingo item; [6]Lean/HHC Breakthrough item; [7]Interprofessional education and collaborative practice item (IPECP); * Constructivist learning/teaching theory; 5-point Likert scale: strongly disagree, disagree, neither agree/disagree, agree, strongly agree

Interprofessional Facilitator Performance Assessment Scale (IFPAS)

Enabling

1. Facilitator is able to clearly explain the purpose and benefits of IPECP [1, 6]

2. Facilitator is able to instruct and guide participants through IPECP activities [1, 3, 4, *]

3. Facilitator displays a positive attitude during IPECP session(s). (e.g., willingness to listen, participate, value contributions, advocate) [2, 4, 5]

4. Facilitator is able to effectively perform oral presentations (lectures, demonstrations)[3]

Improving

5. Facilitator encourages team members to learn collaboratively about each other's roles and responsibilities during the session(s) [2, 6, 4, *]

6. Facilitator observes team behavior and provides feedback to manage team dynamics as needed [3, 5, 6, *]

7. Facilitator stimulates and encourages respectful interprofessional collaborative communication [2, 4, 6]

8. Facilitator does not control group consensus or outcomes [2, 4, 6, *]

Aligning

9. Facilitator acts as a role-model when practicing IPECP skills and competencies [2, 5, 6]

10. Facilitator ensures consistent alignment in all IPECP activities in order to meet organization-wide strategic goals and objectives [1, 4, 5, 6]

11. Facilitator provides debriefing at the conclusion of all activities, explaining purpose and practical application [4, 6]

12. Facilitator accomplishes all IPECP instructional objectives as scheduled [1, 3]

Note: [1]Cognitive item; [2]Affective item; [3]Psychomotor item; [4]Metacognition item; [5]Shingo item; [6]Interprofessional education and collaborative practice item (IPECP); * Constructivist learning/teaching theory; 5-point Likert scale: strongly disagree, disagree, neither agree/disagree, agree, strongly agree

Baseline Characteristics/Faculty Feedback Survey

1. ID code:
    a. Lead facilitator role (Le); date of pre-assessment facilitation session
    b. Co-facilitator role (Co); date of pre-assessment facilitation session
    c. Second co-facilitator role (Coo); date of pre-assessment facilitation session
2. Gender:
    a. Male

   b. Female

3. Teaching experience (years, months, days):

   a. ____________Years

   b. ____________Months

   c. ____________Days

4. Area of expertise:

   a. Dentist

   b. Dental Hygienist

   c. Nutritionist

   d. Social worker

   e. Pharmacist

   f. Medical doctor

   g. Nurse

   h. Other:____________________________

5. Current position at Rutgers University:

   a. Full – time faculty

   b. Faculty adjunct

   c. Administrator/faculty

   d. Other:______________

6. Do you have any recommendations about the design of the SPICE cases or sessions?

7. How do you feel about the performance feedback report you received?

8. Do you agree or disagree with the results of the feedback report you received?

9. Do you have any questions about the feedback report you received?

10. Which facilitation skills/approaches would you like to improve upon?

11. Do you have any recommendations for the SPICE facilitator training process?

IFPAS Enhanced Feedback Implementation Survey

1. Feedback Approach Implemented:
    a. Passive (IFPAS report delivered – on demand questions answered)
    b. Enhanced (IFPAS report delivered – coaching one-to-one session)
2. Reviewed instruction content, directions, discussions and expectations:
    a. Yes
    b. No
    c. Partial:____
3. IFPAS – focused feedback topics covered:
    a. Bloom's taxonomy
    b. Metacognition
    c. Shingo
    d. IPECP
4. Questions asked by subjects:
    a. ____
    b. ____
    c. ____
    d. ____
    e. ____

f. ____

g. ____

5. Role play discussions:

____

____

6. Facilitation goals and action-planning:

a. Goal(s):____

b. Action plan:_____________________________________

Appendix B: Literature Review Referenced Tables

Revised Taxonomy (Krathwohl, 2002)

Structure of the Cognitive Process Dimension of the Revised Taxonomy (Krathwohl, 2002)	**Structure of the Knowledge Dimension of the Revised Taxonomy (Krathwohl, 2002)**
1.0 Remember – Retrieving relevant knowledge from long-term memory. 1.1 Recognizing 1.2 Recalling **2.0 Understand** – Determining the meaning of instructional messages, including oral, written, and graphic communication. 2.1 Interpreting 2.2 Exemplifying 2.3 Classifying 2.4 Summarizing 2.5 Inferring 2.6 Comparing 2.7 Explaining **3.0 Apply** – Carrying out or using a procedure in a given situation. 3.1 Executing 3.2 Implementing	**A. Factual Knowledge** – The basic elements that students must know to be acquainted with a discipline or solve problems in it. Aa. Knowledge of terminology Ab. Knowledge of specific details and elements **B. Conceptual Knowledge** – The interrelationships among the basic elements within a larger structure that enable them to function together. Ba. Knowledge of classifications and categories Bb. Knowledge of principles and generalizations Bc. Knowledge of theories, models, and structures

4.0 Analyze – Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose. 4.1 Differentiating 4.2 Organizing 4.3 Attributing **5.0 Evaluate** – Making judgments based on criteria and standards. 5.1 Checking 5.2 Critiquing **6.0 Create** – Putting elements together to form a novel, coherent whole or make an original product. 6.1 Generating 6.2 Planning 6.3 Producing	**C. Procedural Knowledge** – How to do something; methods of inquiry, and criteria for using skills, algorithms, techniques, and methods. Ca. Knowledge of subject-specific skills and algorithms Cb. Knowledge of subject-specific techniques and Methods Cc. Knowledge of criteria for determining when to use appropriate procedures **D. Metacognitive Knowledge** – Knowledge of cognition in general as well as awareness and knowledge of one's own cognition. Da. Strategic knowledge Db. Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge Dc. Self-knowledge

Cognitive keywords for item development (Kasilingam et al., 2014)

Domain	Description	Keywords
Remember Recalling important information	Retrieve relevant knowledge from long-term memory	Define, repeat, record, list, recall, name, relate, underline
Understand Explaining important information	Understand, translate, explain facts, concepts, principles, laws and theories or comprehension	Translate, restate, discuss, describe, recognize, explain, express, identify,

		locate, report and review
Apply Solving closed-ended problems	Use facts, concepts, laws, theories, principles, knowledge and skills to solve related problems	Interpret, apply, employ, use, demonstrate, dramatize, practice, illustrate, operate, schedule and sketch
Analyze Solving open-ended problems	Compare and elaborate the similarities, difference and relationship between one and the other	Distinguish, analyze, solve, differentiate, appraise, debate, calculate, experiment, text, compare, contrast, criticize, diagram, inspect, question, relate examine and categorize
Synthesis Creating "unique" answers to problems	Merge, combine and integrate facts and ideas	Compose, plan, propose, design, formulate, arrange,

		assemble, collect, construct, create, set up, organize, manage, and prepare
Evaluation Making critical judgements based on a sound knowledge base	Prove, evaluate, verify, criticize, conclude or to give opinion on a statemen, invention, principles, theories, etc.	Judge, appraise, evaluate, rate, compare, revise, assess and estimate

Affective domain keywords for item development (Kasilingam, et al., 2014)

Domain	Description	Keywords
Receiving Willing to listen	Awareness, willingness to hear, selected attention	Ask, choose, describe, follow, identify, locate, name, select, reply, use
Willing to participate	Participation, interaction or response to new information or experiences	Compile, conform, discuss, help, label, perform, practice, present, read, recite,

		report, select, tell, write
Valuing Willing to be involved	Value or worth a person attaches to particular object, phenomenon or behavior. This ranges from simple to complex state of commitment	Complete, demonstrate, differentiate, explain, follow, form, initiate, join, justify, propose, read, share, study, work
Organization Willing to be an advocate	Incorporating new information or experiences to existing system	Adhere, alter, arrange, combine, compare, complete, defend, formulate, generalize, identify, integrate, modify, order, organize, prepare, relate, synthesize
Characterization Willing to change one's behavior, lifestyle, or way	Value system that controls their behavior. The behavior is pervasive,	Act, discriminate, display, influence, listen, modify,

of life	consistent, predictable and most importantly, characteristic of the learner	perform, practice, propose, qualify, question, revise, serve, solve, verify, use

Psychomotor keywords for item development (Kasilingam et al., 2014)

Domain	Description	Keywords
Perception Senses, cues that guided motor activity	Uses senses, organs to obtain cues to guide action: tanges from awareness of stimulus to translating cue perception into action	Choose, describe, detect, differentiate, distinguish, identify, isolate, relate, select, separate
Set Is mentally, emotionally and physically ready to act	Readiness to take action: includes mental, physical and emotional set	Begin, display, explain, move, proceed, react, respond, show, start, volunteer
Guided response Imitates and practices skills, often in discrete	Knowledge of the steps required to perform a task: includes imitation and trial	Copies, traces, follows, react, reproduce, responds

steps	and error	
Mechanism Performs, acts with increasing efficiency, confidence and proficiency	Perform tasks in a habitual manner: with a degree of confidence and proficiency	Assembles, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes organizes, sketches
Complex overt response Performs automatically	Skill performance of motor acts involving complex patterns of movement	Assembles, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes organizes, sketches
Adaptation Adapts skill to meet a problem situation	Modifies movement patterns to account for problematic or new situations	Adapt, alter, chance, rearrange, reorganize, revise, vary
Origination	Creating new movement	Arranges, builds,

Creates new patterns for specific situations	patterns to account for problematic or new situations; creates new tasks that incorporate learned ones	combines, composes, constructs, creates, designs, intitiate, makes, originates

Krathwohl's Taxonomy Table with example of keywords (Anderson et al., 2001; Krathwohl, 2002; Oregon State University)

	The Cognitive Process Dimension					
The Knowledge Dimension	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual Knowledge	List	Summarize	Classify	Order	Rank	Combine
Conceptual Knowledge	Describe	Interpret	Experiment	Explain	Assess	Plan
Procedural Knowledge	Tabulate	Predict	Calculate	Differentiate	Conclude	Compose
Meta-Cognitive Knowledge	Appropriate Use	Execute	Construct	Achieve	Action	Actualize

Modified Kirkpatrick's classic educational outcomes model (Barr et al., 2005)

Level 1 – Reaction: these cover learners' general views and perspectives on the learning experience, its organization, presentation, content, teaching methods, and aspects of the institutional organization, e.g. timetabling, materials, quality of teaching.

Level 2a – Modification of attitudes/perceptions: these outcomes relate to changes in reciprocal interprofessional attitudes or perceptions between participant groups, toward patients/clients and their conditions, circumstances, care, and treatment.

Level 2b – Acquisition of knowledge/skills: for knowledge,this relates to the acquisition of concepts, procedures, and principles of interprofessional collaboration. For skills, this relates to the acquisition of thinking/problem-solving, psychomotor, and social skills linked to collaboration.

Level 3 – Behavioral change: this measurement documents transfer of interprofessional skills and learning to workplace, such as support for change of behavior in the workplace or willingness of learners to apply new knowledge and skills about collaborative work to their practice style.

Level 4a – Change in organizational practice: this relates to wider changes in the organization/delivery of care, attributable to an education program, such as, changes in organizational policies or clinical pathways that promote interprofessional collaboration, communication, teamwork, and cooperative practice.

Level 4b – Benefits to patients/clients: this level covers any improvements in the health and wellbeing of patients/clients as a direct result of an IPE program. Where possible, such as, health status measures, disease incidence, duration or cure rates, mortality, complication rates, readmission rates, adherence rates, patient or family satisfaction, continuity of care, and costs to carer or patient/client.

Lean A3 Problem-Solving Process (CDOT)

1. Reason for	4. Gap Analysis	7. Complete

Improvement		Implementation
Succint statement of what you want to improve, and why (with background about issue or opportunity)	Analysis of why there is a difference (gap) between boxes 2 (Initial State) and 3 (Target State) (Use flowcharts, root cause analysis charts, etc. to display visually)	What is left to do to implement the Solution (s), after learning from your Rapid Experiments?
2. Initial State	5. Possible Solution(s)	8. Evaluate Implementation
What does the initial state look like (including measurement of the current situation)? (use graphs, charts, picture, etc. to display visually)	Ways for closing that gap (including an action plan for impelementation and assignment of responsibility and accountability).	Current status of implementation. And measuring and evaluating the results of what you implemented: did you close the gap (Initial State vs. Target State)?
3. Target State	6. Rapid Experiments/Pilots	9. Insight and Next Steps

Where do you want/need to be, including a clear, measureable target (use graphs, charts, picture etc. to display visually)	Small-scale testing of Possible Solutions (if applicable) to close the gap	Lessons learned and future opportunities