DEVELOPMENT OF AN INSTRUMENT TO MEASURE COLLABORATIVE

COMPETENCIES IN INTERPROFESSIONAL HEALTH CARE EDUCATION

A Dissertation
Submitted to the Graduate Faculty
of the
North Dakota State University
of Agriculture and Applied Science

By

Carla Jean Gross

In Partial Fulfillment of the Requirements
for the Degree of
DOCTOR OF PHILOSOPHY

Major Program:
Education

November 2011

Fargo, North Dakota

North Dakota State University
Graduate School

Title

Development of an Instrument to Measure Collaborative

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The Supervisory Committee certifies that this ***disquisition*** complies with North Dakota State University's regulations and meets the accepted standards for the degree of

DOCTOR OF PHILOSOPHY

ABSTRACT

Gross, Carla Jean, Ph.D., Program of Education, College of Human Development and Education, North Dakota State University, November 2011. Development of an Instrument to Measure Collaborative Competencies in Interprofessional Health Care Education. Major Professor: Dr. Nathan Wood.

Despite the widespread endorsement of interprofessional education (IPE), health care education has not implemented the strategy to the extent expected. Decisions to adopt and implement IPE must be based on evidence indicating that the approach is superior in promoting collaboration as compared to the traditional, uniprofessional educational approach. Evidence supports that incorporating IPE into the curricula generally improves students' attitudes, perceptions, and knowledge of teamwork skills on a short-term basis. Whether IPE produces graduates who are prepared to collaborate more effectively on the health care team in practice has not been determined because valid instruments have not been developed to measure the collaborative competencies expected for health care students and professionals.

This dissertation examined the psychometric properties of an instrument designed by the researcher to measure collaborative competencies in health care students. In addition, this study examined the impact of IPE on undergraduate nursing students' ability to collaborate with other members of the health care team. Using an electronic version of the instrument, data were collected during the spring semester of 2011. The convenience sample (n = 293) included baccalaureate nursing students enrolled at two midwest state universities that incorporated IPE into the curriculum and six midwest state universities that did not incorporate IPE into the curriculum.

Factor analysis was conducted using two, four, five, and six factor rotations with varimax and promax rotations. The four- factor model with promax rotation provided the

best defined factor structure, demonstrating a combination of empirical findings and theoretical constructs. Results indicated that patient-centered care, role clarification, interprofessional communication, and teamwork are constructs that can be used to design competencies for collaboration. The construct of conflict resolution did not emerge as a separate factor.

The independent-samples t-test revealed significant differences between the mean scores for interprofessional communication ($p = 0.010$) and health care teamwork ($p = 0.044$) between non-IPE and IPE groups. One-way ANOVA analysis revealed no significant differences for gender, previous experience, or GPA. Students in the older age group (>31) rated themselves significantly higher in the factors of role clarification ($p = 0.002$), interprofessional teamwork ($p < 0.001$), and patient-centered care ($p = 0.003$).

ACKNOWLEDGEMENTS

My doctoral journey has been an intense, challenging, and rewarding process that could not have been accomplished without the support of others. First of all, I would like to acknowledge Dr. Ron Stammen, my initial adviser and teacher, who inspired me to identify my passion early in the doctoral process. This strategy allowed me to continuously develop my work as I progressed through the doctoral program. I was fortunate to have a wonderful dissertation committee to guide me along the way. I thank Dr. Nathan Wood, my trusted adviser and chair, who always provided thoughtful feedback and challenged me to be thorough, methodical, and accurate even at times when I was anxious to move faster. I will always appreciate Dr. Norma Kiser-Larson, my colleague and dear friend, who was continuously available to provide theoretical and emotional wisdom and support. Thank you to Dr. Dan Friesner who offered me guidance through factor analysis and was available at any time to answer questions and provide direction. I am grateful for Dr. Claudette Peterson who was always responsive to my questions or needs and who provided constant reaffirmation of my work and progress. Finally, I thank Dr. Chris Ray who provided further guidance in factor analysis and readily stepped in at the last minute to assume the role of a committee member when a new member was required. His willingness to take the time to analyze and reflect on my work on such short notice made a potentially adverse situation proceed smoothly. For that, I will always be grateful.

Most important, I thank my husband and closest friend, Dean, and my children: Emily, Jacob, and Alyssa. During my emersion in doctoral studies over the past four years, they were always patient, understanding, and encouraging. I could not have succeeded in this journey without their enduring love and support.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE. INTRODUCTION

Statement of the Problem

Today's fast-paced, high acuity health-care system demands health care professionals who can collaborate effectively using an interprofessional team approach in order to provide patient care. Unfortunately, educational programs have not prepared health care professionals for this reality. As a result, higher education has been challenged at the national and international levels to incorporate interprofessional education (IPE) into curriculums (Oandasan & Reeves, 2005), providing students with an opportunity to practice collaboration with other health care professionals during the educational process. In the United States, IPE has been promoted by the Institute of Medicine (IOM) since the 1970s and has been endorsed by government, professional, educational, and philanthropic organizations for over 30 years (Remington, Foulk, & Williams, 2006). However, for health care education to fully embrace and implement IPE, research must substantiate that IPE is more successful in preparing health care students to collaborate effectively than the traditional, uniprofessional format. Unfortunately, research into the implementation and effects of IPE has been hindered by a lack of valid and reliable instruments to measure collaborative abilities in health care students.

Background

The concept of IPE was formulated by health care professionals in practice, faced with complex patient situations, rather than among faculty members in health education programs (Faresjo, 2006). The health care environment has become more complex for several reasons. Because medical science and technology have advanced at such a rapid rate, health care providers are no longer able to maintain the broad level of expertise that

was once possible (IOM Committee on Quality of Health Care in America, 2001). The country's aging population and advances in disease management have resulted in more chronic health problems that exacerbate acute problems. Consequently, patient care has increased in complexity and acuity, often requiring expertise beyond the scope of a single physician or health care profession (Interprofessional Education Collaborative [IPEC] Conference Proceedings, 2011; Sargeant, 2009). In fact, greater emphasis has been placed on health promotion and prevention. Subsequently, health care has been moving from acute care centers to community settings, further contributing to the system's complexity (Faresjo, 2006).

The health care industry has responded to the increasing demands of patient care by creating health care teams and simply expecting professionals to collaborate. These teams are composed of many disciplines, each contributing their expertise to provide optimal patient-centered care (Headrick et al., 1996). According to Hall and Weaver (2001), there is no evidence to support the belief that health care professionals can learn interprofessional skills without education. Furthermore, the disciplines lack understanding of each other's knowledge base, scope of practice, and daily work challenges (Cronenwett, 2001). When health care professionals are called to practice in teams without training, a range of tensions is created. Conflicts arise concerning role boundaries, professional status, and autonomy, which can be attributed to a lack of knowledge and unrealistic expectations about the roles of other professions. The resulting frustrations, augmented by staff shortages, may be manifested in defensiveness or hostility when the situation becomes demanding (Ladden, Bednash, Stevens, & Moore, 2006). Interprofessional teamwork does

not just happen; collaboration such as this demands another set of skills that must be learned.

Integrating IPE into health care curricula has been difficult because the traditional education of health care professionals has been known to take place in silos (Barnsteiner, Disch, Hall, Mayer, & Moore, 2007; Hall, 2005). Each discipline struggles to maintain its own professional identity, scope of practice, theory, and role in health care by controlling its own boundaries. Every health care profession has its own culture, which students learn through a socialization process. As a result, the traditional education model has created specialized disciplines, each with their own theory, language, and expertise, that often do not know much about each other or how to collaborate (Carlisle, Cooper, & Watkins, 2004; Hall, 2005; Headrick et al., 1996).

A number of other barriers have impeded the integration of IPE into the health profession curriculums. Some of these challenges center on the academic organization, including course scheduling, matching course content, varied curriculums, discrepancies in the number of students in each discipline, institutional policies for sharing course credits, a lack of space for small group activities, and resources (Barnsteiner et al., 2007; Horsburgh, Lamdin, & Williamson, 2001). Faculty members must value the shared learning concept of IPE, have an excellent knowledge base of their own and other disciplines, and develop the skills required to facilitate small group activities. Support is also needed at the administrative level to invest in and reward faculty members who participate in IPE (Gilbert, 2005; Hall & Weaver, 2001). Perhaps the most difficult obstacles to overcome are students who exhibit negative attitudes towards interprofessional learning and stereotypical views of other professions (Hind et al., 2003; Horsburgh et al., 2001).

In 2001, the IOM Committee on Quality Health Care in America published a report titled *Crossing the Quality Chasm* which challenged health care systems to aim for six areas of improvement: safety, effectiveness, patient-centeredness, efficiency, timeliness, and equity. Educators of health care professionals met in a follow-up summit and concluded that to achieve the proposed vision of health care, all health care professionals should be educated to function on a health care team (IOM Committee on the Health Profession Education Summit, 2003).

According to the IOM Committee on the Health Profession Education Summit (2003), a lack of communication, coordination, and collaboration by health care disciplines impacts patient safety, patient outcomes, and the quality of patient care. Poor communication between disciplines has been attributed to many of the unsafe patient situations that have arisen in the current health care system; the Joint Commission reports that the lack of collaboration and communication between providers accounts for 70% of adverse patient events in the current health care system (Fewster-Thuente & Velsor-Friedrich, 2008). The ultimate result is less efficient and lower quality care accompanied with higher health care costs (Headrick et al., 1996). Improving teamwork and communication has been identified as essential components in promoting a culture of safety in today's health care facilities (Sammer, Lykens, Singh, Mains, & Lackan, 2010). If IPE becomes a successful educational strategy to improve collaboration on the health care team, it will be a critical factor in improving patient outcomes and providing accessible, high quality, safe, and efficient health care (IPEC Expert Panel, 2011).

Despite numerous endorsements from governmental, philanthropic, and professional organizations, as well as accrediting bodies, the implementation of IPE has

been insufficient and sporadic in our country's health education curriculums (Newhouse & Spring, 2010; Remington et al., 2006). The lack of implementation is not only due to the barriers described above, but also because IPE has not been fully embraced and valued by faculty and students. Because the support and resources demanded for IPE are significant, decisions to adopt and implement IPE must be based on evidence indicating that the approach is superior in promoting collaboration as compared to the traditional, uniprofessional educational approach (Reeves et al., 2009).

Research related to IPE is extensive and some general, consistent findings that provide direction for further investigations are emerging. Systematic research reviews have indicated that, although IPE is likely to improve learners' short-term attitudes and perceptions toward other disciplines as well as teamwork knowledge and skills, there is little evidence for persistent improvement or behavioral change that carries over into professional practice (Barr, Hammick, Koppel, & Reeves,1999; Cooper, Carlisle, Gibbs, & Watkins, 2001; Davidson, Smith, Dodd, Smith, & O'Loughlan, 2008; Freeth, Hammick, Koppel, Reeves, & Barr, 2002; Reeves & Freeth, 2006; Reeves et al., 2009; Remington et al., 2006; Zwarentstein et al., 2003). Likewise, evidence is needed to demonstrating that IPE does improve collaboration by the health care team in the practice setting. Research into the effects and outcomes of IPE have been hindered due to a lack of valid and reliable tools to measure collaboration for health care students and new graduates (Thannhauser, Russel-Mayhew, & Scott, 2010). Once such tools are developed, longitudinal studies must be conducted to determine if the attitudes, knowledge, and skills learned in IPE transfer to more effective collaborative practice in the health care team.

Purpose of Study

The purpose of this study was to develop and examine the psychometric properties of an instrument designed to measure collaborative competencies obtained during health care students' IPE. Focusing on baccalaureate nursing students, this study serves to build a foundation for future research that measures collaborative competencies in other health care disciplines. In addition, this study examined the impact of IPE on undergraduate nursing students' ability to collaborate with other members of the health care team. The primary research questions underlying this study were as follows:

1. Can the constructs identified to define collaborative competencies learned by health care students be measured in the development of a new psychometric instrument?

2. Do the collaborative competencies of baccalaureate nursing students who have IPE incorporated into the curriculum differ from nursing students who do not have IPE incorporated into the curriculum?

Definition of Terms and Acronyms

According to the literature, developing a common language for IPE has been an evolving process. There has been much debate concerning a preferred prefix: "multi" often refers to partners working independently, side by side, or towards a common purpose; "inter" often refers to a partnership in which members of different disciplines work collaboratively towards a common purpose (Oandasan & Reeves, 2005; Page & Meerabeau, 2004); and "trans" has been criticized by some authorities for characterizing role blurring (Oandasan & Reeves, 2005). The current, most acceptable prefix used is "inter," making the preferred terminology interprofessional education. For the purposes of this study, the following definitions and acronyms will be used:

Interprofessional education: "when students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes" (Centre for the Advancement of Interprofessional Education, 2010).

Interprofessional competencies: "the complex integration of knowledge, skills, attitudes, values, and judgments that allow a health provider to apply these components into all collaborative situations. Competencies should guide growth and development throughout one's life and enable one to effectively perform the activities required in a given occupation or function and in various contexts" (Canadian Interprofessional Health Care Collaborative [CIHC], 2010, p. 7).

Collaboration (in health care teams): "an interprofessional process of communication and decision making that enables the separate and shared knowledge and skills of health care providers to synergistically influence the client/patient care provided" (Way et al., 2001, as cited in CIHC, 2007, p. 7).

CAIPE: Centre for the Advancement of Interprofessional Education

CIHC: Canadian Interprofessional Health Collaborative

IOM: Institute of Medicine

IPEC: Interprofessional Education Collaborative

WHO: World Health Organization

CHAPTER TWO. LITERATURE REVIEW

History of IPE Initiatives

The Institute of Medicine (IOM) has supported the concept of IPE for the health care disciplines since 1972 when it convened its first conference on "Interrelationships of Educational Programs for Health Professionals" and published the related report "Education for the Health Team" (Baldwin, Jr., 2007; IPEC Expert Panel, 2011). At that time, the IOM cited that health care education had an obligation to conduct interdisciplinary education as a method to link education with the health care practice requirements. Isolated programs across the nations, such as the University of Miami, University of Minnesota, University of British Columbia, Nevada Health Sciences, and the University of Kentucky, developed innovative interdisciplinary strategies, but the movement was not widespread. When the Office of Interdisciplinary Programs was established in 1974, federal funding was created to support interdisciplinary training in the United States. This support set the stage for additional funding opportunities to become available under the Health Manpower Education Initiative Awards (HMEIA). A wide range of IPE approaches were funded, ranging from imbedding IPE throughout the curriculum to including selected extra-curricular activities that incorporated IPE. Such programs remained primarily elective and targeted a small number of students (IPEC Expert Panel, 2011). Unfortunately, most of the funding support for these programs ceased by 1980, resulting in a significant decline in the promotion of IPE (Baldwin, Jr., 2007).

There were, however, some IPE funding sources that continued beyond the 1980s. One source was the Veteran's Administration (VA), which funded the Interdisciplinary

Team Training in Geriatrics (ITTG) in 1979 in an effort to improve comprehensive care for aging veterans (Baldwin, Jr., 2007). The program was renamed (Interdisciplinary Team Training Program) in 1980 and was funded in 1995 to train 535 students from various disciplines. Private philanthropic foundations, primarily the Robert Wood Johnson and W. K. Kellogg Foundations, have also been significant sources of IPE funding since the early 1970s. These foundations, along with the Pew Commission, have recently provided major new funding initiatives aimed at promoting IPE in health care education (Baldwin, Jr., 2007).

On the international level, IPE has been promoted by the World Health Organization (WHO) since the 1970s when it reported that introducing IPE into medical education would complement traditional educational strategies. Following this support, other national organizations such as the Organization for Economic Co-operation and Development (OECD) and the World Federation of Medical Education (WFME) have promoted IPE strategies (Oandasan & Reeves, 2005). The literature is saturated with examples of IPE initiatives taking place in European countries (such as Finland, Sweden, Norway), Australia, the United Kingdom, Canada, and developing countries (e.g., South Africa, The Sudan, and Thailand) (Oandasan & Reeves, 2005).

During the past decade, interest in IPE and interprofessional practice has resurged due to acute awareness of inadequacies in the current health care system. Like other businesses, health care has been driven by pressures to improve revenue, quality, and efficiency; interdisciplinary teamwork is seen as a mechanism for improvement (Baldwin, Jr., 2007). As mentioned previously, the IOM Committee on Quality of Health Care in America, in its report *Crossing the Quality Chasm* (2001), called for a radical change in

the health care system to improve quality, safety, efficiency, and patient-centered care. Following the initial report, a summit of health profession educators (IOM Committee on the Health Profession Education Summit, 2003) convened, concluding that all health care professionals should be educated to function on interprofessional teams.

With the recent implementation of the Patient Protection and Affordable Care Act, designed to provide health care coverage to an estimated 32 million Americans who were previously uninsured (IPEC Conference Proceedings, 2011), a national sense of urgency for a drastic change in health care education has been created. Providers and policy makers created the act based on the realization that the health care workforce shortage necessitates increased collaboration and teamwork across the health care disciplines in order to provide care for an aging population with multiple chronic health problems. Innovative team-based models, such as the transitional care, accountable care organization, and medical care homes, have been designed and proposed to improve quality, safety, efficiency, and access for health care. A more informed public is also demanding this type of health care. The health care delivery systems cannot adjust to meet these demands unless education trains professionals to practice collaboratively (IPEC Conference Proceedings, 2011). Together, these current factors have created a renewed momentum for change, indicating that the time is ripe to move forward with IPE.

Professional organizations and accrediting bodies across disciplines are strongly recommending interdisciplinary education in the preparation of health care professionals, integrating the expectations into criteria and outcomes for accreditation. These organizations include the American Society of Health-System Pharmacists, the American Association of Colleges of Pharmacy, the American Association of Medical Colleges, the

Accreditation Committee for Graduate Medical Education (Larson, 1995; Remington et al., 2006), the Bureau of Health Professions, the American Association of Colleges of Nursing, and the National League for Nursing (Larson, 1995).

Furthermore, IPE was identified as a key strategy to reach the Healthy People 2010 objective of increasing the number of health professional training programs that integrate health promotion and disease prevention into core competencies (Evans, Cashman, Page, & Garr, 2011). In order to help reach this goal, the Association for Prevention Teaching and Research sponsored the Institute for Interprofessional Prevention Education in 2007-2008; the institute provided instruction to improve interprofessional education. Evidently, IPE will play a key role in the implementation of the Healthy People 2020 framework for Education for Health. Authorities argue that in order to prepare students for collaborative practice, IPE should occur at the phase in the education continuum in which attitudes, skills, and knowledge for effective teamwork and prevention are incorporated into the "DNA" of future health professionals.

International IPE Progress

Two countries, Canada and the United Kingdom, are leading the way in IPE development. The Centre for the Advancement of Interprofessional Education (CAIPE) was established in 1987 in the United Kingdom to promote and develop IPE (2011). The organization provides information and consultation through websites, bulletins, and papers and is associated with the Journal of Interprofessional Care. Documents published by CAIPE have provided valuable, current information on IPE as well as direction for curriculum development and research related to IPE.

The Canadian government has identified IPE as a key strategy that will contribute to sustainable change in the country's health care system. In 2003, the Canadian Interprofessional Health Care Collaborative (CIHC) was developed as a mechanism for health organizations, educators, researchers, professionals, and students across Canada to strengthen IPE and collaborative patient-centered practice in a widespread effort to improve teamwork and patient outcomes (Buring et al., 2009). The government has funded approximately $21 million to support 20 IPE research grants with the goal of promoting and demonstrating the benefits of IPE in providing collaborative patient care (CIHC, 2008). Among other essential documents produced by this organization, the *National Interprofessional Competency Framework*, published in February 2010, provided valuable direction in developing the instrument designed by this researcher.

In contrast to the United Kingdom and Canada, the pace of advancing IPE in the United States has been slower. Funded by the Stuart Foundation, the Interprofessional Education Consortium (IPEC) was developed to bring groups of educators, administrators, and evaluators together to define, promote, and sustain IPE and interprofessional practice in educational settings and practice agencies. IPEC currently consists of six national associations of health profession schools: American Association of Colleges of Nursing, American Association of Colleges of Osteopathic Medicine, American Association of Colleges of Pharmacy, American Dental Education Association, Association of American Medical Colleges, and Association of Schools of Public Health (IPEC Conference Proceedings, 2011). This consortium was charged with the task of defining core competencies in interprofessional education and practice (IPEC, 2001). The proposed

IPEC framework was published during the data collection for this study (May 2011), and the competencies proposed by IPEC will be discussed in Chapter Five.

Impact of Nurse-Physician Collaboration

Because the disciplines of nursing and medicine have always worked closely together in the provision of patient care, literature regarding the relationship between the two is abundant. Some authorities emphasize that there are aspects in the socialization process of physician education that counteract the principles of collaboration and interprofessional teamwork. According to Vazirani, Hays, Shapiro, and Cowan (2005), "the traditional physician-nurse relationship was not created on a collaborative platform. Traditional patterns of behavior have been that of 'physician dominance and nurse deference' " (p. 74). Indeed, an acute power gradient exists between physicians and nurses, and it creates obstacles for shared learning and decision making. Many problems have arisen with collaborative practice and "the issue of professional (medical) dominance is thought to be at the root of many of these problems" (Page & Meerabeau, p. 121).

Because physicians are educated to take charge and assume leadership in making patient-care decisions, sharing the leadership role creates not only a challenge, but also a conflict (Hall, 2005; Whitehead, 2007). Physician training focuses on action and outcomes which aim at curing and saving lives rather than developing and maintaining relationships. In relationships with patients, physicians traditionally take an authoritative role as compared to other health care professionals who place more value on patient self-determination and partnerships (Hall, 2005). In order to transcend the pressures of life and death situations in health care, physicians are expected to adopt a "cloak of competence" and act with certainty and decisiveness in a cool, competent manner, distancing themselves

from the patient. Furthermore, Whitehead (2007) emphasizes that physicians are distinguished from other health care professions by their claim to exclusive authority over specific knowledge and skills as well as a high degree of status granted them by society.

In addition to the power gradient, conflicts between physicians and nurses arise due to different values, beliefs, and philosophies of care. These conflicts can result in poor or dysfunctional communication, which negatively impacts patient care (Arford, 2005; Page & Meerabeau, 2004). Recent reports by the IOM Committee on Quality of Health Care in America (2001) and the IOM Committee on the Health Profession Education Summit (2003) indicate that poor communication between physicians and nurses accounts for adverse patient events. Furthermore, there is evidence that nurse-physician relationships have a significant impact on nurses' morale and satisfaction as well as the recruitment and retention of nurses in health care systems (Rosenstein, 2002). This finding has important implications when addressing the national nursing shortage, a critical issue challenging the nursing profession and health care system today.

Rudland and Mires (2005) studied medical students' perceptions about the characteristics and background of nurses and physicians as well as their attitude toward shared learning as the students entered medical school. The medical students had a positive attitude about shared learning and considered nurses to have comparable life experience, but lower academic ability, competence, and status. The fact that nurses are viewed by medical students as inferior may impact shared learning as well as collaboration in the practice setting. These findings provide support for introducing medical students to the roles and responsibilities of nurses and other professions early in the educational process in

an effort to modify or limit the development of inappropriate stereotypical views and behaviors.

Another barrier to collaboration occurs due to the fact that a growing number of studies have indicated that nurses and physicians do not define collaboration similarly. In a recent survey of operating-room personnel measuring the quality of collaboration and communication of colleagues (surgeons, anesthesiologists, nurse anesthetists, and nurses), results indicated that there were considerable discrepancies in the perceptions of teamwork. Although physicians rated teamwork as "good," nurses perceived it to be "poor." Nurses in the study described collaboration as having input into decision-making while physicians defined it as having their needs anticipated and directions followed. An alarming finding in the study revealed that, due to the power differential between physicians and nurses, nurses did not feel empowered to speak up to physicians regarding safety issues or situations indicating early signs of adverse patient events (Makary et al., 2006).

Another interventional study compared the effect of a multidisciplinary intervention on communication and collaboration among health care professionals. On one wing of a large unit, interdisciplinary rounds were introduced, utilizing the services of a nurse practitioner and a hospitalist medical director. Another wing, serving as the control group, did not receive the interdisciplinary rounding intervention. The results indicated that, after the intervention, physicians reported improved collaboration with nurses and nurse practitioners. However, nurses reported that collaboration and communication were improved with nurse practitioners but not with physicians (Vazirani et al., 2005).

In a longitudinal study by Leipzig et al. (2002), 591 students in medicine (MD), nurse practitioner (NP), and social work (MSW) in an interdisciplinary geriatric team

training program were investigated over a 2.5 year period. Attitudes and perceptions were studied using The Attitudes Toward Health Care Team Scale, a 21 item scale composed of three sub-scales: Attitude Toward Team Values, Attitudes Toward Team Efficiency, and Attitudes About the Physicians' Shared Role on the Team. Results indicated that, although all disciplines expressed a positive attitude toward the quality of patient care provided by the interdisciplinary team, the MD students' scores were significantly lower ($p = 0.05$). Regarding the sub-scale measuring attitudes toward team efficiency, MD students' attitudes were rated significantly lower than NP and MSW students, and NP students' attitudes were significantly lower than MSW students at the $p = 0.05$ confidence level. The most marked differences in attitudes between the professions regarded beliefs about the physician's role. Compared to 77% of MD students, 44 % of MSW students and 47% of NP students thought the team's primary purpose was to assist physicians in achieving treatment goals for patients. Eighty-nine percent of MSW students and 91% of NP students did not think that physicians should have the final word regarding decision-making; 60% of MD students thought physicians should have the final word. The majority of MD students (80%) agreed physicians that have the right to alter the plan of care developed by the team as compared to only 35% of NP and 40% of MSW students.

The results raised concern about the lack of interprofessional training and role modeling in health care programs as well as the impact of professional culture on attitudes regarding the health care team process. The researchers stated that the differences in attitudes could be a barrier in moving forward with the concept of shared team decision-making, which is fundamental to interdisciplinary work.

Rosenstein (2002) surveyed nurses, physicians, and executives in a large hospital to study how they viewed the relationship between nurses and physicians, disruptive physician behavior, and the institutional response to such behavior. In addition, the effect of such behaviors on nurse satisfaction, morale, and retention was investigated. All respondents saw a direct link between physician behavior, and nurse satisfaction and retention. This study emphasized that in order for facilities to recruit and retain nurses, the nurse-physician relationship must be addressed and ameliorated.

The need to improve collaboration between physicians and nurses has been promoted by authorities for years, and IPE has been identified as an effective strategy. Moving forward with IPE will demand attention to the complex nature of role socialization during education and the culture of the health care environment. Both must be congruent with the concept of collaboration. On the other hand, for IPE to be successful, the goals of improving the quality of care, communication, and collaboration must not pose an intrinsic threat to physicians (Whitehead, 2007). Advocating that physicians' authority must be reduced for shared learning and collaborative practice to happen will diminish the likelihood that physicians will embrace the collaboration proposed by IPE. For this reason, the initial objective of IPE may be improving collaboration and communication within the given hierarchal structure of the health care system.

Theoretical and Conceptual Frameworks

IECPCP Framework.

A well-established conceptual framework developed by D'Amour and Oandasan (2005), which has provided a foundation for planning, implementing, and evaluating IPE internationally, was used as a guide in designing the current study. This comprehensive

framework, called Interprofessional Education for Collaborative Patient-Centred Practice (IECPCP), is based on the assumption that education and practice are interdependent in enhancing patient-centered care. The complex framework, presented in Figure 1, depicts the determinants and processes that influence both interprofessional education and interprofessional practice. The learner is at the core of the interprofessional education component of the framework, whereas the collaborative practice component centers on the patient.
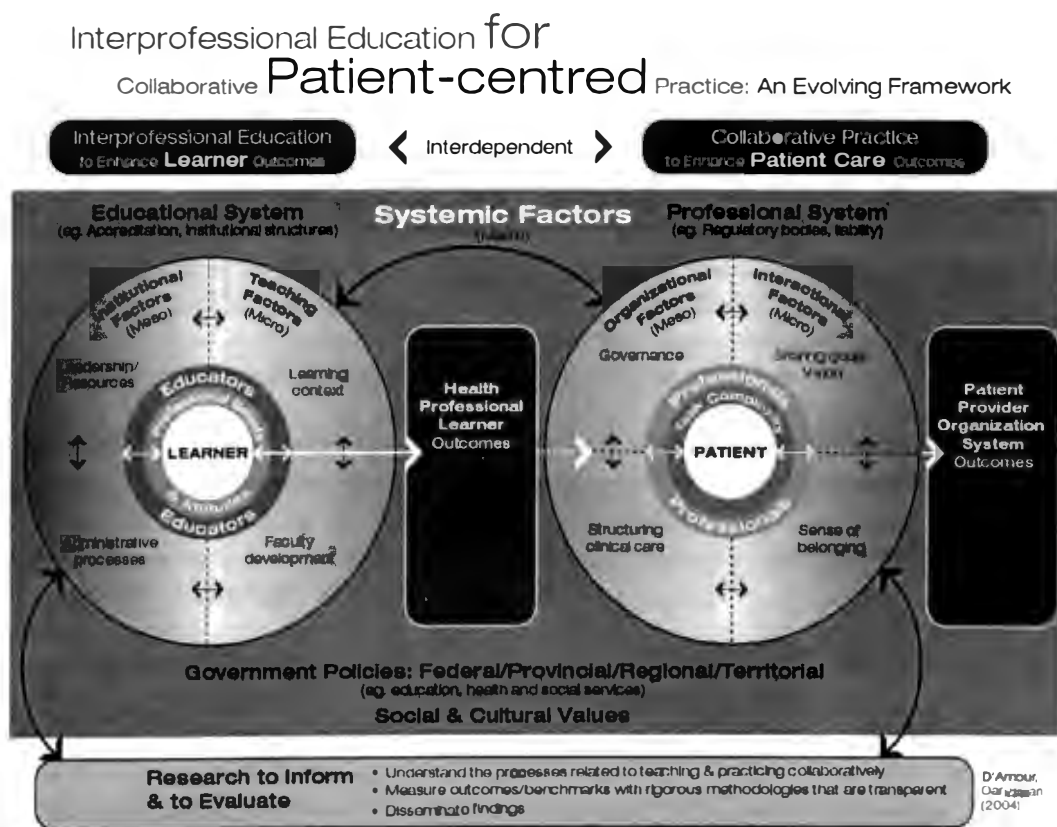
Figure 1. Interprofessional Education for Patient-Centred Practice: An Evolving Framwork (IEPCCP)
Printed with pemission from D'Amour, D., and Oandasan, I. (2005). "Interprofessionality as the Field of Interprofessional Practice and Interprofessional Education: An Emerging Concept," *Journal of Interprofessional Care, Supplement 1,* p. 20.

Providing structure for the current study is the educational component of the framework, presented in Figure 2, which explains the relationship of the determinants and processes involved in IPE at the micro-, meso-, and macro-levels (D'Amour & Oandasan, 2005). At the micro-level of planning for IPE initiatives, the learner, educator, and learning context issues are addressed. This process emphasizes the importance of socializing students into the spirit of collaboration during the development of their professional identity. Early socialization is believed to foster mutual respect among disciplines and to diminish stereotypes (Hall, 2005; Horder, 2004; Oandasan & Reeves, 2005). The framework depicts learners in the center, surrounded by the educators; both groups come to the educational process with professional beliefs and attitudes that must be recognized and considered during IPE planning. The focus of IPE lies equally on the learning process and the content presented. The content must include the knowledge, skills, and attitudes important to interprofessional practice. The learning process must incorporate strategies to build awareness of and respect for the perspectives and roles of other disciplines. In addition, students must develop the interpersonal skills required for effective collaboration and communication (Sargeant, 2009).

At the meso- or institutional level, leadership and administration must be considered in the development of IPE initiatives (D'Amour & Oandasan, 2005). Administrative support is necessary to overcome barriers to IPE, factor in faculty workloads, and provide resources. Finally, the macro-, or systemic, level addresses accreditation and licensure bodies as well as governmental policies, which play a crucial role in providing incentive supporting IPE initiatives. The micro-, meso-, and macro-factors influence each other in the development of IPE initiatives. Ultimately, learner
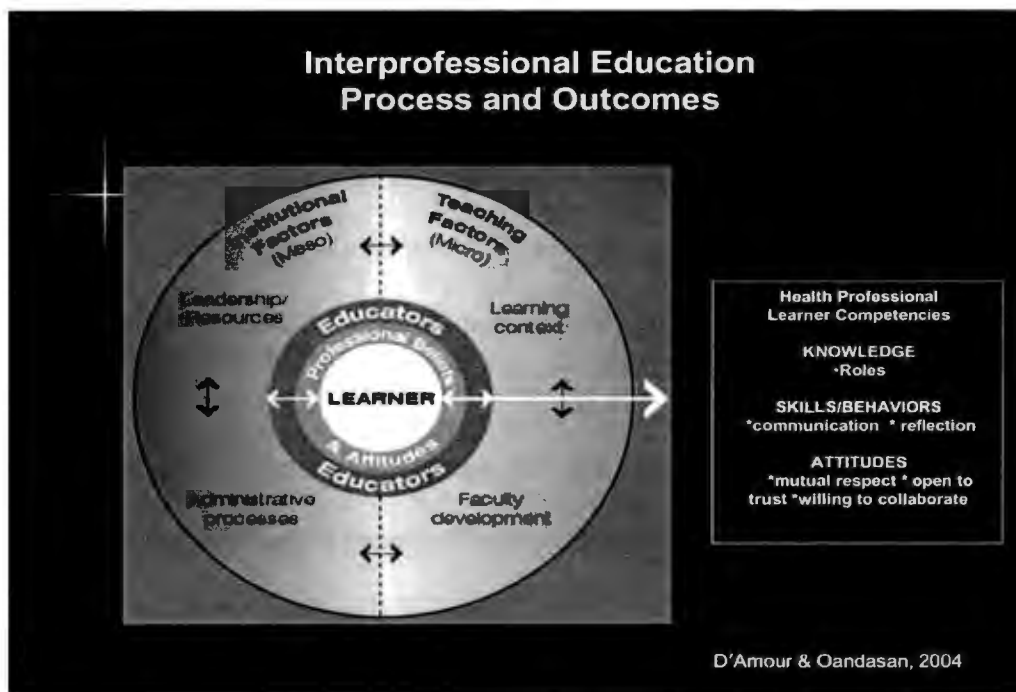
Figure 2. Interprofessional Education Process and Outcomes
Printed with permission from D'Amour, D., and Oandasan, I. (2005).
"Interprofessionality as the Field of Interprofessional Practice and Interprofessional
Education: An Emerging Concept," *Journal of Interprofessional Care, Supplement
1,* p. 20.

outcomes focus on developing competency in the knowledge, skills, and attitudes needed

for effective, collaborative practice in health care. By focusing on the measurement of

collaborative competencies for health care students, this study primarily centers on the

learner outcome aspect of the framework's educational component.

Modified Kirkpatrick Evaluation Framework.

To determine the value and effectiveness of IPE, learner outcomes must be

carefully designed, measured, and analyzed. Education is planned and implemented to

achieve the specific outcomes that are desired, as depicted in Kirkpatrick's four level

model of educational evaluation (Kirkpatrick, 1998). The well known model, designed by

Donald Kirkpatrick in 1959, has been used for training programs across the country. Level

one focuses on the learner's reaction to the educational experience, essentially determining how relevant the information is to the learner. The interest, attention, and motivation of participants are critical to the success of an educational program and should motivate learners to desire more learning. Level two indicates the extent to which learners change attitudes, gain knowledge, and develop or improve skills as a result of the learning process. Measures focus on the aspects of knowledge, attitudes, and skills. Level three, behavior, indicates how learners transfer the knowledge, attitudes, and skills they have learned to the practice setting. Outcomes can be measured in formal testing and informal observation. The key question asked at this level is "can the learner now perform and produce expected behaviors in the work environment?". Finally, level four refers to changes and measures at the organizational level, investigating the impact training or education has on organizational outcomes, including measures of monetary value, efficiency, morale, and teamwork. Although measures at the organizational level are more difficult to achieve, they are more valuable and make the most impact (Kirkpatrick, 1998).

Freeth et al. (2002) proposed the use of a modified version of Kirkpatrick's framework of educational evaluation during the planning, implementation, and evaluation of IPE. The authors outlined three guiding principles of Kirkpatrick's original framework that highlighted the revised model: outcomes are not hierarchical; as the levels progress, gathering trustworthy data to measure the educational intervention becomes more time-consuming and difficult; and the goal of the model is to promote more holistic and comprehensive evaluations that provide better information for future policy and educational development. The proposed model, displayed in Table 1, has been frequently cited and used by IPE scholars.

Table 1. Model of Interprofessional Education Outcomes

1. Reaction	Learner's views on the learning experience and its interprofessional nature.
2 a. Modification of attitudes/ perceptions	Changes in reciprocal attitudes or perceptions between participant groups. Changes in the perception or attitude towards value and/or use of team approaches to caring for a specific client group.
2 b. Acquisition of knowledge/ skills	Including knowledge and skills linked to interprofessional collaboration.
2. Behavioral change	Identifies individuals' transfer of interprofessional leaning to their practice setting and changed professional practice.
4 a. Change in organizational practice	Wider changes in the organization and delivery of care.
4 b. Benefits to patients/ clients	Improvements in health or well-being of patients/ clients.

Printed with permission from Freeth, D., Hammick, M., Koppel, I., Reeves, S., and Barr, H. (2002). *Occasional Paper No. 2: A Critical Review of Evaluations of Interprofessional Education*. London, England: Higher Education Academy Health Sciences and Practice Network. Retrieved from www.health.heacademy.ac.uk/publications/occasionalpaper02

Conceptual Model Designed for Study

The current research study focuses on one aspect of the complex: the

"Interprofessional Education for Collaborative Patient-Centered Practice" framework that

addresses health professional learner outcomes. For this reason, the author created a model

to depict the relationship among the constructs related to collaboration identified in the

literature, the learner outcomes addressed in the framework, and the evaluation using the

modified Kirkpatrick framework. The conceptual model designed for this study is depicted

in Figure 3 and described in the paragraphs below.

In order for health care professionals to be prepared to collaborate on the health

care team once they enter professional practice, students must be introduced to evidenced-

base collaboration and be willing to learn the skills needed to collaborate during the role

Collaboration embraced during role socialization		

Graduate outcomes related to competencies to collaborate with other disciplines:

- Attitudes
- Knowledge
- Skills/Behaviors

Collaborative theory and application incorporated in IPE:

- Patient-Centered Care
- Role Clarification
- Communication
- Conflict Resolution
- Teamwork

Improved health-care team collaboration resulting in

- Positive attitudes towards collaboration
- Effective collaborative behaviors
- Improved safety, quality, and effectiveness of patient care in the organization
- Improved patient outcomes.

Figure 3. Conceptual Model for Current Study

socialization and educational process. IPE provides an effective strategy to achieve this goal. Authorities have identified the following areas or constructs as important for collaboration: patient-centered care, role clarification, communication, conflict resolution, and teamwork. If graduates can demonstrate attitudes that reflect appreciation of the importance of collaboration along with the knowledge and skills to collaborate, they will be better prepared to practice as part of a health care team.

In order to determine the effectiveness of IPE, outcomes must be evaluated. The modified Kirkpatrick framework of evaluation provides guidance in measuring different levels of learner outcomes. Graduates should demonstrate both a positive attitude towards collaboration (level 2.a) and knowledge (level 2.b) about collaboration as reflected in effective collaborative skills and behaviors (level 3). Graduates should demonstrate the knowledge that improved collaboration on the health care team will improve the health

care organization (level 4.a) by creating an environment of enhanced patient safety, quality of patient care, and effectiveness. The ultimate goal is to improve patient outcomes and the patient's well-being (level 4.b).

Research Related to Instrument Development

Although the body of research related to IPE is extensive, the majority of studies conducted with pre-licensure health care students have focused on level two of Kirkpatrick's framework: developing a positive attitude toward IPE. There does not seem to be a common consensus, however, on the best tool to make this assessment. Thus, there have been a considerable number of studies focused on designing tools to measure attitudes and perceptions related to IPE.

One of the earliest tools, the Interdisciplinary Education Perception Scale (IEPS) was developed by Leucht, Madsen, Taugher, and Petterson (1990) to measure attitudes important to interdisciplinary teamwork (Goelen, De Clercq, Huyghens, & Kerckhofs, 2006). The Readiness for Interprofessional Learning Scale (RIPLS), developed by Parsell and Bligh (1999), has been used to assess the perceptions towards interprofessional learning by undergraduate students and postgraduate practitioners from multiple disciplines (Horsburgh et al., 2001; McFadyen, Webster, & Maclaren, 2006). The Attitude Towards Health Professionals Questionnaire (AHPQ) measures interprofessional attitudes and how these attitudes change over time (Lindqvist, Duncan, Shepstone, Watts, & Pearce, 2005). The Generic Role Perception Questionnaire (GRPQ) measures perceptions about the role of a variety of professions (Mackay, 2004). Finally, the Attitudes Towards Health Care Teams Scale (ATHCTS) measures attitudes, knowledge, and skills about teams (Heinemann, Schmitt, Farrell, & Brallier, 1999; Hyer, Fairchild, Abraham, Mezey, &

Fulmer, 2000). Authorities have criticized the IPE body of research for containing a large number of studies using instruments that were not established as reliable or valid (CIHC, 2008).

Recently, Thannhauser et al. (2010) conducted a systematic review to identify instruments that could assess IPE and interprofessional collaboration across a variety of disciplines. The authors found eight instruments that were methodologically sound. Of them, three instruments attempted to measure "interactional factors" or behaviors needed for collaboration. The others assessed attitudes and perceptions towards IPE. Many of the instruments lacked sufficient information regarding their psychometric properties. Many instruments were used in only one study, and/or the instruments, because they were not published, could not be reviewed. Furthermore, results indicated that only a small number of instruments are available to be used with a wide range of health care disciplines. Of all the tools, the authors identified the RIPLS and IEPS as the two scales most easily accessible to researchers, commonly used, and psychometrically validated. In contrast, Ireland, Gibb, and West (2008) cited the RIPLS as the only validated and published instrument to measure attitudes. Consistent with other reports in the IPE literature, the authors concluded that further research is needed to develop quantitative instruments to measure collaborative behaviors for a wide range of professionals working together on the health care team.

Readiness for Interprofessional Learning Scale (RIPLS).

The Readiness for Interprofessional Learning Scale (RIPLS) developed by Parsell and Bligh (1999) measures the "readiness" of health care students to engage in shared learning activities. The purposes of interprofessional learning, as identified by the

researchers, are to diminish the prejudices which may exist among professionals, to improve understanding about the roles and duties of other professionals, and to improve teamwork and collaborative skills. The tool was designed to measure the characteristics and conditions needed to assure that interprofessional learning is effective.

This instrument was initially designed to measure attitudes and perceptions related to four key dimensions: (a) relationships between different professional groups; (b) collaboration and teamwork; (c) roles and responsibilities; and (c) benefits to patients, professional practice, and personal growth (Parsell & Bligh, 1999). The pilot study included 120 students from eight health care professions (dentistry, medicine, nursing, occupational therapy, orthoptics, physiotherapy, radiographic therapy, and radiographic diagnostics), and a follow-up study incorporated 914 students from the same professional groups. During factor analysis, three factors were extracted and further analyzed using varimax rotation. The final instrument was composed of 19 items contained in 3 factors, or sub-scales, each rated on a 5-point Likert scale (1 = *strongly disagree* and 5 = *strongly agree*). Internal consistency was determined using Cronbach's alpha coefficient: factor I (team-work and collaboration) had nine items ($\alpha. = 0.88$) factor II (professional identity) had seven items ($\alpha = 0.63$); and factor III (roles and responsibilities) had three items ($\alpha = 0.32$). The overall alpha coefficient was .90, revealing overall good reliability.

Concerned about the lower reliability findings in sub-scale 3 (roles and responsibilities), McFadyen et al. (2005) performed a study to improve the reliability for using the RIPLS with undergraduate health care students. Experienced health care professionals were consulted to review the items in each sub-scale of the instrument, providing content analysis. Based on expert input, a model was developed to use Structural

Equation Modeling (SEM) to test the data. The resulting model was then compared to the previous sub-scale models for RIPLS using SEM. The "goodness-of-fit" was evaluated using a sample of 308 undergraduate health care students from eight disciplines (dietetics, nursing, occupational therapy, physiotherapy, podiatry, prosthetics and orthotics, radiography, and social work), resulting in a new four sub-scale model (teamwork and collaboration, negative professional identity, positive professional identity, and roles and responsibilities). The second and fourth sub-scales required reverse scoring. The new model was tested again with the students at the end of the year, resulting in improved "goodness-of-fit" indicators (Chi-square per d.f. 1.78, Goodness of Fit Index = 0.904, Tucker-Lewis Index 0.932, Comparative Fit Index 0.942, Root Mean Error of Approximation 0.054). Cronbach's alpha was calculated to determine internal consistency for each sub-scale. Acceptable results were found for three sub-scales (teamwork and collaboration $\alpha = 0.88$, negative professional identity $\alpha = 0.76$, positive professional identity $\alpha = 0.81$); however, consistent with previous studies, low internal consistency was found for roles and responsibilities ($\alpha = 0.43$). Based on these data, the authors warned that the fourth sub-scale should be used and viewed with skepticism. Test-retest reliability measures were acceptable in sub-scale 1 (0.71), 3 (0.61), and 4 (0.62). The test-retest reliability for sub-scale 2 was low (0.38), however, the score fell within the 95% confidence interval (0.10–0.58). The authors recommended that further studies be conducted with a larger sample size to determine the reliability of sub-scale 2.

McFadyen et al. (2006) further investigated the reliability of the RIPLS using test-retest measures one week apart in a group of beginning undergraduate health care students who lacked clinical experience (n = 65). The test-retest pairs of scores on items for each

student were analyzed using a simple or Weighted Kappa coefficient as appropriate. An intra-class correlation model (2, 1), which is based on a random effects, two-way ANOVA, was performed to analyze the test-retest total scores of the instrument's sub-scales. Two individual items on the instrument resulted in low Kappa reliability scores and were not statistically significant at the 0.05 level and, therefore, may be considered unreliable in measuring the attitudes and perceptions of inexperienced health care students. Both items were in the negative professional identity sub-scale. Mean test-retest scores were high in sub-scale 1, teamwork and collaboration (39.3/39.8, possible maximum 45); sub-scale 2, negative professional identity (13.3/13.8, possible maximum 15); and sub-scale 3, positive professional identity (17.2/17.2, possible maximum 20). In sub-scale 4, roles and relationships, both mean test-retest scores were low (5.9/5.7, possible maximum 15). Results indicated that participants had positive attitudes regarding the interprofessional concepts related to teamwork and collaboration as well as negative and positive professional identity. Attitudes regarding roles and responsibilities were more negative; the researchers acknowledged that this finding may have been attributed to the participants' lack of experience in the professional role.

The original RIPLS tool was revised in 2005 by Parsell and his team to strengthen the third sub-scale, roles and responsibilities, and to explore the addition of a new sub-scale, patient-centeredness (Reid, Bruce, Allstaff, & McLernon, 2006). The revised version of the instrument consisted of 29 items, 10 of which needed further validation. The modified version of the RIPLS was tested in a post-graduate population, including general practitioners, nurses, pharmacists, and allied health professionals, in Scotland by Reid et al. (2006), eliciting a response rate of 68% (n = 799). Factor analysis using principal

component analysis and varimax rotation resulted in three factors comprising 23 items: teamwork and collaboration, professional identity, and patient-centeredness. The internal consistency of items measuring the factors was $\alpha = 0.76$. An analysis of variance (ANOVA) was performed on the resulting factors to test for differences in mean factor scores for each profession. Significant differences were found among the four disciplines. For factor 1 (teamwork and collaboration), the mean factor scores for general practitioners were significantly lower than those of nurses ($P < 0.001$). For factor 2 (patient-centeredness), pharmacists scored significantly lower than nurses ($P < 0.001$), general practitioners ($P = 0.001$), and allied health professionals ($P = 0.001$). Factor 3 (sense of professional identity) resulted in significantly higher mean factor scores for general practitioners than nurses and allied health professionals ($P < 0.001$). Study results indicated that the RIPLS is a valid instrument to assess readiness for IPE in the practice setting and that the health professionals surveyed had a positive attitude about IPE.

Interdisciplinary Education Perception Scale (IEPS).

Leucht et al. (1990) designed the Interdisciplinary Education Perception Scale (IEPS) to measure attitudes for allied health students that are considered important for interdisciplinary education. The authors acknowledged that Bassoff's philosophy addressing attitudes important for interdisciplinary service and cooperative efforts provided the basis for the instrument design. The four attitudes measured in the (IEPS) are professional competency and autonomy, perceived needs for professional cooperation, the perception of actual cooperation and resource sharing within and across professions, and understanding the value and contributions of other professions.

According to the researchers, content validity for the instrument items was achieved by consulting with five faculty researchers who used their clinical expertise to determine factors that appeared to be most relevant in interdisciplinary education (Leucht et al., 1990). Reliability of the final pool of 18 items was confirmed by the "consensus approach." Pilot testing of the instrument was conducted with 27 senior occupational therapy students. The majority (118) of the study sample (n = 143) consisted of undergraduate students in allied science fields (occupational therapy, medical records, speech pathology and audiology, and therapeutic recreation). A small number of graduate students (12) and administrators (13) also participated. The resulting instrument contained 18 items rated on a 6-point Likert scale (1 = *strongly disagree* to 6 = *strongly agree*).

Two phases of analysis were conducted on the instrument (Leucht et al., 1990). In the first phase, psychometric properties were assessed using factor analysis and reliability techniques. Four component factors, accounting for 58.6% of the variance, were further analyzed using principal component analysis and varimax rotation. Factor loading resulted in four factors; factor II consisted of only two items, and factor IV consisted of three items. Multiple regression analysis was used to test the fit of the item breakdowns and factor coefficients related to the four factor components. The researchers stated that the confirmatory factor analysis produced an excellent linear fit. Reliability for each factor was analyzed using Cronbach's alpha coefficient. Although internal consistency for items in factor I were high ($\alpha = 0.82$), reliability findings for factor II ($\alpha = 0.56$), factor III ($\alpha. = 0.54$), and factor IV ($\alpha = 0.52$) were marginal. A Cronbach's alpha value of 0.87 was reported for the entire scale. The researchers reasoned that the low number of items in factors II and IV may have impacted the upper bound on potentially higher reliabilities. In

the second phase of item analysis for the IEPS, normative data were determined for sample breakdown groups, and power estimations were calculated to suggest minimal sample size requirements for future research.

Because the internal consistency for three of the IEPS sub-scales was reported to be marginally low, many authorities agreed that additional studies were needed to analyze the instrument's psychometric properties before use in further research. McFadyen, Maclaren, and Webster (2007) designed a study using test-retest reliability and goodness-of-fit measures. Participants included health care students in dietetics, nursing, occupational therapy, physiotherapy, podiatry, prosthetics and orthotics, radiography, and social work. Initial data were collected with a sample of 308 students and, 7 months later, with a sample of 284 students.

Content analysis of the instrument was performed with 19 academic health and social care staff members to review the instrument items, specifying which sub-scale each item best fit. This approach allowed item content rather than data to create the structure for the structural equation modeling (SEM). Results from the content experts supported the original factor analysis results from Leucht et al. (1990) with the exception of switching two items from one sub-scale to another. A series of six Structural Equation Models were developed and tested using "goodness-of-fit" measures. The proposed model contained three sub-scales (sub-scale 1, competency and autonomy; sub-scale 2, perceived need for cooperation; and subscale 3, perception of actual cooperation). The fourth sub-scale from the original tool, understanding of others' values, was merged with sub-scale 3. The test-retest reliability of the items in each sub-scale was analyzed using a small sample (n = 65) of students who were asked to complete the IEPS twice, with a response rate of 85%.

Based on results from Weighted Kappa analysis and a paired, signed test on each item, three items were deleted from the instrument. The following test-retest reliability results were reported: sub-scale 1 (competency and autonomy), $\alpha = 0.78$ and 0.79; sub-scale 2 (perceived need for cooperation), $\alpha = 0.38$ and 0.40; and sub-scale 3 (perception of actual cooperation), $\alpha = 0.84$ and 0.83. Reliability for the total scale was $\alpha = 0.84$ and 0.86. The researchers advised others to interpret the results in sub-scale 2 with caution because there are only two items. The revised version of the IEPS only has 12 of the original 18 items and measures three sub-scales.

Attitudes to Health Professionals Questionnaire (AHPQ).

The most recent of the reported IPE instruments, the Attitudes to Health Professional Questionnaire (AHPQ), was developed by Lindqvist et al. (2005) to measure students' attitudes towards different health professions at the beginning of professional education programs. During the first stage of the instrument development focusing on item generation, a "construct exercise" was employed with 20 health care educators from various disciplines. These individual exercises were based on "Kelly's (1955) personal construct theory" (Lindqvist et al., 2005, p. 271). When presented with nine different health care professions, participants were asked to consider three of the nine professions, describing how two of the three were seen as similar and different from the third. Based on the attributes elicited, dichotomous visual analogue scales were generated, positioning the two opposite attributes as anchors on each end. Examples of dichotomous measures were *empathetic/not empathetic*, *independent/not independent*, and *approachable/ nonapproachable*. The results of the "construct exercises" were compiled to formulate the 20 item AHPQ instrument. The instrument was designed to include 20 item sections, with

the number of sections determined by the number of professions to be measured in a study. Participants were asked to rate, on the visual analogue scale, where they felt a "typical member" in each health profession would be placed for each dichotomous attribute. Items were scored by the distance from one end of the scale to the participants' mark.

In the first stage of development, test-retest reliability was conducted by administering the instrument to a group of 190 students representing five disciplines (nursing, medicine, midwifery, occupational therapy, and physiotherapy) on two occasions 3-7 days apart (Lindqvist et al., 2005). Factor analysis was computed using principal component analysis; the factor rotation was not reported. Two main components emerged: caring and subservient. The researchers reported that 17 of the 20 items loaded on two components. Factor I (caring) accounted for 33% of the total variance; the 13 items loading on this component showed an internal consistency of $\alpha > 0.91$. Factor II (subservient) was much weaker, accounting for 10% of the total variance and showed an internal consistency of $\alpha > 0.59$. The internal consistency for the initial 20 item instrument was $\alpha = 0.86$. The test-retest reliability for each item varied from 0.34 to 0.85.

Based on the data obtained from the first stage, the instrument was modified (Lindqvist et al., 2005). The revised 20-item AHPQ was administered to a sample of 160 health care students representing six disciplines (nursing, medicine, midwifery, occupational therapy, physiotherapy, and pharmacy). Factor analysis was again conducted using principal component analysis. The same two components emerged (caring and subservient), accounting for 50% of the total variance. Results revealed that factor I (13 items) accounted for 39% of the variance and had high reliability ($\alpha = 0.93$). Factor II (5 items) accounted for 11% of the variance and had a much lower reliability ($\alpha = 0.58$). A

two-way ANOVA conducted to test for significant differences ($p < 0.001$) in mean "caring" and "subservient" scores between groups produced some significant findings. Pharmacists were perceived to be less "caring" than medics, who were perceived as less "caring" than physiotherapists. Nurses, midwives, and occupational therapists were perceived to be significantly more "caring" than medics, pharmacists, and physiotherapists. Nurses were perceived to be the most "subservient" and medics the least. No studies that further analyzed the psychometric properties of the AHPQ could be found.

Summary of IPE Instruments.

All three instruments measure basic perceptions and attitudes in students upon entry to and during health care education programs. They serve the purpose of identifying preconceived stereotypes and misperceptions that students may have of their own or other professions. The RIPLS and IEPS also assess whether students are receptive to learning, and perhaps practicing, in an interprofessional environment. By assessing Level 2.a of the modified Kirkpatrick framework of evaluation, these instruments serve an important purpose in evaluating IPE.

Research Related to Attitude and Perception Outcomes

In an effort to establish an IPE evidence base, several comprehensive, systematic reviews utilizing stringent inclusion criteria have been conducted to examine existing IPE research in undergraduate education (Barr et al., 1999; Cooper et al., 2001; Davidson et al., 2008; Freeth et al., 2002; Reeves & Freeth, 2006; Reeves et al., 2009; Remington et al., 2006; Zwarenstein et al., 2003). Authorities have criticized the extensive body of IPE research for the lack of methodological rigor and the use of poorly developed measures. In reality, the literature contains a large amount of evaluation data accompanied by a

relatively small amount of research data (Cooper et al., 2001; Zwarenstein, Reeves, & Perrier, 2005). A summary of systematic study results indicates that, although IPE is likely to improve undergraduate students' short-term attitudes and perceptions toward other disciplines as well as teamwork knowledge and skills, there is little evidence of behavior change related to group interactions, problem solving, and communication that carries over into professional practice. Some of these findings may be due to the lack of sensitivity of the measurement instruments, a control group in the study design, and/or longitudinal data.

The findings reported by researchers conducting comprehensive studies is fairly consistent with other studies reviewed by this author. Parsell, Spalding, and Bligh (1998) conducted an interventional study in which 28 undergraduate students from seven disciplines (dentistry, medicine, nursing, occupational therapy, orthoptics, physiotherapy, and radiography) attended a two day workshop addressing interprofessional issues. A questionnaire designed to measure attitudes as well as the awareness of roles and teamwork was used to collect data pre- and post-workshop as well as 6 weeks later. Results indicated that participants gained increased knowledge and understanding about other health care professional roles, developed more positive attitudes, and recognized the importance of teamwork by participating in the IPE workshop. Using the RIPLS, Horsburgh et al. (2001) studied the attitudes of nursing, medical, and pharmacy students (n = 180) towards interprofessional learning in New Zealand. The majority of the participants reported positive attitudes towards shared learning, identifying the benefits of acquiring effective teamwork and communication skills that will enhance working relationships in professional practice. Mitchell et al. (2006) submitted a report on several courses that constituted a well-developed IPE curriculum in Washington that began in the 1950s for

dentistry, medicine, and nursing students. Although reports of outcome measures were provided for each course, the specific evaluation tools were not published. Outcome measures for one course titled "Collaboration Teams in Health Care" showed significant improvements in student attitudes; students were more able to envision working on an interdisciplinary team and believed that providing opportunities to work on a team were essential for health care education.

Hawk et al. (2002) used the IEPS to assess health care students' perceptions about interprofessional collaboration, comparing differences across disciplines. The study sample consisted of 588 students in chiropractic, nursing, medicine, osteopathy, physical therapy, physician assistant, podiatry, and social work programs during the pre-clinical phase of education. Results revealed a significant difference ($p = 0.001$) in the mean IEPS scores among the professional groups. Physician assistant students scored highest, indicating the most positive attitudes toward all four factors assessing interprofessional collaboration, and chiropractic students scored lowest, indicating the most negative attitudes towards interprofessional learning. The medical students scored significantly lower than physician assistant students ($p = 0.003$) and higher than chiropractic students ($p = 0.000$); medical students did not differ significantly at the $\alpha = 0.05$ level from students in osteopathy, physical therapy, nursing, podiatry, and social work. In their discussion, the researchers acknowledge the instrument's potential contribution in assessing changes in the attitudes of health care students as they progress through the curriculum and in assessing student attitudes during curriculum changes.

Some studies support the claim that many health care students enter the university with misperceptions and inappropriate stereotypical views that persist or become stronger

even after IPE. Mandy, Milton, and Mandy (2004) used the Health Team Stereotype Scale to study undergraduate physiotherapy (n = 85) and podiatry (n= 45) students before and after one semester of IPE. Results indicated that both groups of students had stereotypical perceptions of each other before the semester, which were reinforced during the shared learning.

A study by Tunstall-Pedoe, Rink, and Hilton (2003) measured the attitudes of medical, radiography, physiotherapy, and nursing students before and after they took an IPE course. Although a majority of the students had a positive attitude about the course, results indicated that students arrived at the university with stereotypical views of each other, and the views were exaggerated during the course. For example, nursing and allied science students considered medical students to be less caring, more arrogant, and highly academic, whereas medical students rated students in other disciplines as less academic. Similar results were found by Rudland and Mires (2005) who examined the perceptions of medical students upon entrance to the program for four consecutive years (n = 601) about the characteristics and backgrounds of nurses and physicians as well as attitudes towards shared learning. The quantitative instrument designed for the study included six parts: biographical data, characteristics of the profession, perceptions about the backgrounds of nurses and doctors, medical students' own perceptions of professional identity, similarities and differences between professions, and views about shared learning. Results indicated that the medical students considered nurses to have comparable life experience but to have lower academic ability, competence, and status in society. On the other hand, the students were generally positive about shared learning. Results of these studies suggested that further research is needed to determine how the timing, content, and educational methods

used in IPE impact students' attitudes and perceptions towards shared learning and other disciplines.

Using a qualitative design with focus group interviews, O'Neill and Wyness (2005) examined students' perceptions, or students' voice, in evaluating an elective IPE course offered to 23 students (medical, nursing, pharmacy, and social work). Three main themes emerged from the qualitative data: significance of practice-based learning, usefulness of student team interprofessional learning, and the value of experiencing interprofessional collaboration in class. Students reported that IPE deepened their understanding about the roles of other professions, improved their development of collaborative practice skills, and helped them to identify and value the similarities and differences among professions. Students described the IPE experience as a dual socialization process that enabled them to hear the professional voices of other disciplines and to articulate their own. Finally, the participants recognized that one profession alone cannot meet the complex health care needs of patients.

In an interventional study, Jacobsen and Lindqvist (2009) investigated the impact an interprofessional clinical experience had on the health care students' attitudes towards other professions. A sample of 162 students representing nursing, medicine, physiotherapy, and occupational therapy was exposed to a 2 week rotation on an interprofessional training unit. Students completed the Attitudes to Health Professionals Questionnaire before and after the rotation. Prior to the clinical experience, students viewed physicians as being the least "caring" and "subservient" profession, whereas nurses were seen as the most "caring" and "subservient" profession. Following the interprofessional clinical experience, students considered most professions as more "caring" and less "subservient" except for physicians,

who were considered more "subservient." The study did demonstrate that IPE clinical experiences can have a positive impact on students' attitudes regarding other health care professions.

Pollard and Miers (2008) recently conducted an extensive longitudinal study in England measuring the attitudes of health and social care students from the beginning of their education to professional practice. Data were collected using a questionnaire developed for the study and eliciting participants' responses using four and five point Likert scales on four attitude scales: communication and teamwork skills (Communication and Teamwork Scale, nine items); attitudes towards IPE (Interprofessional Learning Scale, nine items), perceptions of the quality of interprofessional interaction between other health care professionals (Interprofessional Interaction Scale, nine items), and perceptions about the quality of their own relationships with colleagues from their own and other disciplines (Interprofessional Relationship Scale, eight items).

To test the stability of the first three scales in the instrument, a test-retest administration of the instrument was conducted with 90 health care students who were not participating in the research program; each participant completed the questionnaire twice over a one to two week period (Pollard, Miers, & Gilchrist, 2004). Pearson's correlation coefficients of the scores on the scales were 0.78, 0.86, and 0.77 ($p = 0.001$), respectively. Cronbach's alpha coefficient was used to examine the internal consistency of each scale resulting in $\alpha = 0.76$, $\alpha = 0.84$, and $\alpha = 0.82$, respectively. Concurrent validity was established for two of the scales by comparing responses of the Communication and Teamwork Scale with an instrument previously used by the researchers (Interpersonal Communication Competence Scale) and the interprofessional learning scale with the

RIPLS (Parsell & Bligh, 1999). Forty nursing students who were not participating in the research program were asked to complete the two scales and the two study instruments at the same time. Inter-scale correlations were calculated to compare results. Pearson's correlation coefficients for the scores on the two pairs of scales were 0.85 and 0.84 ($p = 0.001$), respectively. No measures were found to establish concurrent validity for the other two scales, however, the researchers stated that data from an earlier qualitative study supported the scales' validity (Pollard et al., 2004).

The study followed two entire cohorts through the curriculum into professional practice (Pollard & Miers, 2008). Cohort one (n = 643) included students from 10 health care programs involved in an IPE curriculum (adult nursing, children's nursing, diagnostic imaging, learning disabilities nursing, mental health nursing, midwifery, occupational therapy, physiotherapy, radiotherapy, and social work). The second cohort (n = 209) included nursing students (adult, children's, and mental health) involved in an IPE curriculum. Cohort three (n = 250) comprised students in a uniprofessional curriculum in nine different professional programs (same as cohort one excluding occupational therapy). For each cohort, data were collected at four points: entry into the program, second year of study, qualification (or graduation), and 9-12 months of practice as qualified professionals.

Highlights from the results at each data collection are as follows (Pollard & Miers, 2008). At program entry, students reported a positive perception of their communication and teamwork skills as well as IPE; students' perceptions about interactions between health and social professionals were less positive. Students having previous health care work experience held more negative perceptions regarding the interactions of health care professionals (Pollard et al., 2004). During the second year, students perceived their

communication and teamwork skills as well as IPE to be less positive than at entry into education, however, still overall positive. At this point, students became less positive about the way health professionals interacted but remained positive about their own interprofessional relationships. At the point of qualification or graduation, students regained positive perceptions about their own communication and teamwork skills and became even more positive about their interprofessional relationships. Attitudes about IPE were unchanged; however, they became even less positive about interactions between health professions. Students in the IPE curriculum were more positive regarding their own interprofessional relationships than those in the uniprofessional curriculum.

At 9-12 months into practice, professionals in IPE cohorts one and two (n = 275) responded strongly positive about their communication and teamwork skills as well as their own interprofessional relationships (Pollard & Miers, 2008). Responses regarding IPE were weakly positive and neutral about the interprofessional interactions of health care professionals. Participants from cohort three (n = 139), the uniprofessional group, were positive about their communication and teamwork skills as well as their own interprofessional relationships and were neutral about the interprofessional interaction between disciplines. Comparing the curriculums, cohorts from both the IPE and uniprofessional curriculums conveyed confidence in their communication and teamworking skills, and they found their interprofessional relationships to be positive. Cohort three did respond less positively than the other two cohorts to the Interprofessional Interaction Scale ($p = 0.001$), indicating that those professionals viewed the interactions between the health care disciplines less favorably. The authors related these results to

qualitative data gathered earlier in which students with IPE reported increased awareness of interprofessional aspects in the clinical setting as a result of exposure to IPE.

Positive correlations were found for IPE participants between the respondents' assessment of their own communication and teamworking skills, and their attitudes to their interprofessional relationships; the relationship was relatively weak in the uniprofessional cohort. A notable finding was that professionals were less positive towards IPE than they had been as students. The researchers stated that this response reinforces arguments that individuals' perceptions of their own educational experiences are not necessarily adequate measures for IPE evaluation. Based on the study findings of alumni, the researchers concluded that professionals in health care practice involved in IPE during their pre-licensure education were more confident than at graduation about the following: their communication and teamwork skills, interprofessional relationships, and other professionals' interactions. In addition, they were more positive about their own interprofessional relationships than those educated in uniprofessional curriculums, and demonstrated a positive correlation between their perceptions of their own communicative skills and interprofessional relationships.

In another longitudinal study, McFadyen, Webster, Maclaren, and O'Neill (2010) investigated the impact of IPE on the attitudes and perceptions of health care students in Scotland. A quasi-experimental design was used to establish a control group (CG) and an experimental group (EG) using nonrandom assignment. The CG (n = 260) consisted of undergraduate students from seven health care programs (dietetics, nursing, occupational therapy, podiatry, prosthetics and orthotics, physiotherapy, and radiography) who were the last cohort to receive the uniprofessional curriculum at a Glasgow University. The EG (n =

313) was comprised of a cohort of six professional programs (same as the control group except dietetics) that, beginning the program the following year, were introduced to a new curriculum incorporating IPE. Data were collected over 4 years, using the RIPLS and IEPS at the beginning and end of each academic year. Nonparametric measures were used to make comparisons between the demographic variables of the two groups. A Restricted Maximum Likelihood (REML) analysis was used to examine results between the groups comprising three main factors (group, time, and profession) and the level two and three interventions for each of the sub-scales on both instruments.

Results of the first three RIPLS sub-scales showed that the mean scores exceeded 75% of their possible maximum (McFadyen et al., 2010). Mean scores for the CG remained consistent across time while those for the EG declined, showing lower levels of readiness for interprofessional learning related to teamwork and collaboration, negative professional identity, and positive professional identity for students in the IPE curriculum. The authors suggested this response indicated that, following the possible idealist levels initially perceived at the beginning students, scores lowered to more realistic levels as students progressed through the IPE curriculum. Mean scores for the fourth sub-scale, roles and responsibilities, increased slightly for both groups over time, possibly indicating that students' knowledge of future professional roles and responsibilities is limited in the early stages of education. On sub-scale 1, scores of occupational therapy, physiotherapy, and radiography students in the EG were more positive towards teamwork and cooperation as they progressed through the professional program. Considering the effect size of sub-scale 2 (negative professional identity), the same decline occurred and was more pronounced in radiography students. The results must be evaluated cautiously because this

sub-scale measuring negative professional identity is reverse scored, meaning a high score indicates strong support against a negative attitude. Nursing students were shown to increase their negative effect over time; therefore, they were the only professional group that did not show improvement related to the IPE intervention.

Results of the IEPS showed little variation in means scores for all three sub-scales in the CG but a slight decline in scores for the EG (McFadyen et al., 2010). REML analysis indicated that statistically significant differences were only found in the second sub-scale, perceived need for cooperation ($P = 0.001$). Once again, four disciplines (occupational therapy, podiatry, prosthetics and orthotics, and radiography) showed an initial negative effect while physiotherapy and nursing students were more positive. Over time, students from all disciplines exhibited a more positive effect. The first (competency and autonomy) and third (perception of actual cooperation) IEPS sub-scales were strongly supported for both the CG and EG. Initial scores were high, and a statistically significant effect was found for interventions on both sub-scales for all disciplines. The researchers concluded the results confirmed that pre-registration health care students begin their professional programs with strong positive views, however, their initial perceptions may be rather idealistic. Effects of the IPE intervention suggested that the aspects of readiness for interprofessional learning that relate to teamwork and collaboration, negative professional identity, and positive professional identity resulted in scores that were lower in the EG compared to the CG initially, but the effects weakened as the intervention proceeded. Positive attitudes towards IPE related to competency and autonomy and perception of actual cooperation increased more in the EG as compared to the CG; the effect also weakened over time. Finally, positive attitudes towards the perceived need for cooperation

increased more in the EG relative to the CG for some disciplines. The authors were unable to confirm why the IPE intervention did not affect all disciplines to the same extent.

Hammick, Freeth, Koppel, Reeves, and Barr (2007) conducted a systematic review of IPE provided to postgraduates through staff development at health care agencies to determine the effects of IPE on attitudes towards collaboration in professional practice. The researchers analyzed results from 21 of the strongest studies meeting the inclusion criteria. Results indicated that when IPE involves practitioners in the health care setting, although learners' collaborative knowledge and skills improve, attitudes and perceptions towards other health care team members are less likely to be positively influenced. These findings suggest that, for maximum impact, IPE should be offered at the undergraduate level while individuals are still developing their professional identity.

Research Related to Clinical Practice and Patient Outcomes

Research regarding the impact of IPE on clinical practice and patient outcomes in the practice setting has produced mixed results, is non-existent, or is limited to specific interventions. Zwarenstein et al. (2005) conducted a study of the existing empirical research examining the impact of pre-licensure IPE on collaborative interventions in post-licensure practice. However, no studies could be found measuring the impact of IPE delivered during pre-licensure programs on patient outcomes. The researchers cautioned that the absence of evidence does not mean that pre-licensure IPE is ineffective. Rather than assuming that the relationship does not exist, the lack of findings may mean that the effects are difficult to measure. Studying a causal relationship would require randomized, controlled studies comparing intervention and control groups from a large number of health professional education programs, a daunting, complex task. Employing a control

group in an experimental research design is highly desirable yet difficult to achieve in educational research. For this reason, quasi-experimental studies which lack random allocation to groups are more realistically achievable (McFadyen et al., 2010).

Many studies conducted with post-graduates and professionals in the practice setting focus on the impact of a specific IPE intervention, such as a continuing education program or learning module, on patient outcomes for a specific group of patients, such as improved glucose control measures for diabetic patients or decreased infection rates for critical care patients. In a systematic review by Zwarenstein et al. (2005), research was found for the impact of collaborative interventions by professionals in practice on patient outcomes. The aim of the study was to investigate what is known about the effectiveness of interventions designed to improve collaboration among different health care professionals and how the interventions contribute to the quality of patient care. Fourteen controlled, intervention studies which fit the inclusion criteria were found. The studies demonstrated that improved collaboration between disciplines had a positive impact on patient outcomes in a variety of areas, including geriatrics, neonatal care and screening, congestive heart failure management, acute care for abused women in the emergency department, sexually transmitted infection screening, substance abuse, and depression (Zwarenstein et al., 2005).

In an update of a 2000 Cochrane review in which the investigators found no studies meeting the inclusion criteria, Reeves et al. (2009) found six qualifying studies that measured the effect of IPE training programs with health care professionals on collaborative practice. Four studies showed positive outcomes in the emergency department and mental health settings. Three of these studies also reported that the positive

gains were sustained over time, from 8 to 21 months. However, two studies reported that the IPE intervention had no impact on patient care or outcomes; one study reported that patient satisfaction improved more in the control group than the intervention group; and one study reported no difference in outcomes between the control and intervention groups. These mixed findings suggest that the impact of IPE in the practice setting requires further investigation.

Focusing on the elderly population, Martin, Wolfgang, Manser, and Sprig (2010) reviewed 14 interventional studies investigating the impact of collaboration between nurses and physicians on patient outcomes in a variety of primary care settings. Interventional approaches included evidence-based treatment plans, care coordination, health status monitoring, coaching in self-management, and the promotion of community-based resources. Outcomes focused on mortality rates as well as functional, clinical and social measures. All but one study reported at least one statistically relevant outcome following the IPE interventions.

Mann, Sargeant, and Hill (2009) conducted a study to determine how an IPE conference on cancer care impacted interprofessional interaction and practice for health care professionals. The conference curriculum was designed to meet the learning needs of health care professionals in Nova Scotia. Participants (n = 411) included nurses (54%), pharmacists (23%), and physicians (11%). Qualitative and quantitative data were collected at the end of the conference and three months later using a questionnaire assessing satisfaction with the workshop content, perceptions regarding interprofessional learning, and intentions to make changes in clinical practice and/or interactions with other health care professionals.

Similar to many IPE program evaluations, the instrument used to measure outcomes was not validated. Pharmacists scored items rating the benefit of interprofessional learning significantly higher than both physicians and nurses. Most participants agreed or strongly agreed (95%) that they acquired new knowledge and skills. Although only 74% of participants reported that they intended to change their practice at the end of the workshop, 93% reported implementing changes in practice at the 3-month follow-up. Similar results were found regarding intentions to change interprofessional interactions; 44% of the participants reported intentions immediately post-workshop and 94% reported changes at the 3-month follow-up. The most frequently reported categories of intended changes for clinical practice described in the open ended questions included interactions with patients, use of the team and other resources, and patient treatment and care. The most frequently reported categories of intended changes related to interprofessional interaction included an increased confidence in the ability to interact, being more respectful and/or assertive in interactions, improved communication, and sharing resources. Despite the use of measures that were not established as valid or reliable, the results indicated that IPE may have a positive impact on collaborative practice among health care professionals, calling for the need for further investigation with more valid instruments.

Because collaboration of the interdisciplinary team is considered essential in caring for the complex health problems of critically ill patients, numerous studies have been conducted in the intensive care setting. Boyle and Kochinda (2004) conducted a pre- and post-measure intervention study to determine the impact of using a modular education program designed to enhance the collaboration skills of nurses and physicians in two

diverse intensive care units (ICUs). The course was implemented over an eight month period. Tools were used to measure collaborative communication skills before, immediately after the intervention, and six months after the intervention to evaluate the endurance of the skills. Results showed that communication skills between nurses and physicians improved significantly; participants indicated an increased satisfaction for their own leadership and communication skills as well as an improved perception of the leadership and problem-solving skills of other disciplines. These results supported the assumption that collaboration skills can be improved with IPE.

Manojlovich, Antonakos, and Ronis (2009) conducted a cross-sectional survey study to investigate the relationship between nurses' perception of physician-nurse communication and the characteristics of the practice environment and patient outcomes. Data were collected from 462 nurses practicing in 25 intensive care units in Michigan. The Intensive Care Unit Nurse-Physician Questionnaire was used to measure communication between the two disciplines, incorporating items of accuracy, openness, timeliness, understanding, and variability in understanding. The work environment was measured by the Conditions for Work Effectiveness Questionnaire, including measurements of opportunity, information, support, and resources. Data on patients included the Acute Physiology and Chronic Health Evaluation (APACHE) III which measures patient acuity level. Patient outcome data included ventilator-associated pneumonia (VAP), catheter-induced bloodstream infections, and pressure ulcers. Data analysis included correlation and multiple regression. Variability in understanding communication and capacity utilization predicted 27% of the variance in ventilator-associated pneumonia. Although scores on the total communication scale were not significantly related to any of the outcome measures,

timeliness of communication was inversely related to the incidence of pressure ulcers ($r = 0.38$, $p = 0.06$), suggesting that, as communication was more timely, the incidence of pressure ulcers decreased. Scores on the work place environment instrument and APACHE were positive predictors of VAP ($r = 0.36$, $p = 0.005$). The researchers concluded that not all elements of communication were related to adverse patient outcomes. Further research is necessary to determine the relationship between communication and collaboration and patient outcomes in critical care. The fact that perceptions were only measured in nurses, excluding insights from physicians, must be considered when evaluating the validity of the findings in the study.

Results of a large multidisciplinary study by Knaus, Draper, Wagner, and Zimmerman (1986) provides support for the importance of effective collaboration on the health care team, specifically between physicians and nurses. Models of health care were compared with the outcomes of 5030 patients in 13 tertiary hospitals' ICUs. Patients were stratified by the risk of death using diagnosis and the Acute Physiology and Chronic Health Evaluation (APACHE) score. The predicted and actual death rates were then compared. Performance reports and models of health care were compared among hospitals. The results indicated that the degree of coordination for care in the ICUs impacted patient outcomes. There were important differences between predicted and actual patient death rates that appeared to relate to the level of interaction and communication between physicians and nurses.

In addition to the promising research results found in intensive care, research conducted at 14 hospitals which had achieved "Magnet" designation (awarded to institutions demonstrating excellence in the provision of health care by the American

Nurses Credentialing Center) concluded that health collaborative relationships between nurses and physicians were not only possible, but were also directly linked to optimal patient outcomes (Lindeke & Seickert, 2008). The study findings supported the assumption that improving collaborative care in the practice setting positively impacts patient outcomes.

Primary care is another area that has received considerable attention regarding the impact of IPE on collaborative practice. Through survey research conducted in New Zealand, Pullon and Fry (2005) explored the perceptions of primary care professionals regarding how the interprofessional postgraduate education they received impacted their collaborative practice. The 153 participants included a majority (n=106) of physicians and nurses plus managers, paramedics, and a hygienist. As a result of the IPE intervention, 92% reported improvement in their own practice; 68% perceived a positive influence on their workplace practice; 48% increased their understanding of their own professional role; and 79% increased their understanding of the competencies and roles of other professions. The IPE experience was perceived as positive, contributing to improved collaboration among health care disciplines.

A comprehensive, longitudinal study by Carpenter, Barnes, Dickinson, and Wooff (2006) was conducted to evaluate a program in England designed to support health and social care postgraduate professionals who provided mental health services, including psychosocial interventions. Both attitudes and patient outcomes were addressed. The study tracked three successive cohorts of students (n=111) over a two- year period. Outcomes were measured using mixed methods, both quantitative measures and interviews. Although students evaluated the program positively, the mean drop-out rate (25%) was high due to

the stressful nature of the program. Students reported a "substantial increase" in knowledge and skills used in multidisciplinary teamwork and the psychosocial interventions at the end of the program. In addition to student evaluations, clients were randomly selected for measurement. The results indicated an improvement in social functioning and life satisfaction measures over a six month period and a high level of satisfaction with the students' knowledge, skills, and personal qualities. The study supported the belief that IPE is an effective method for teaching the interprofessional attitudes, knowledge, and skills required for effective teamwork in the practice setting.

Summary of IPE Research.

In measuring outcomes related to IPE, the literature suggests that IPE, especially when completed pre-licensure, does result in positive, short term changes in attitudes and perceptions towards other disciplines, as well as teamwork knowledge, thus addressing level two of Kirkpatrick's framework. Evidence regarding the impact of post-licensure IPE on organizational changes and patient outcomes, level four, is beginning to accumulate. Although the research related to level four focuses on specific health care populations with professionals in the practice setting, the fact that results are quite positive is promising.

One missing piece of the equation is research measuring whether IPE transfers to improved collaborative behaviors in professional practice, focusing on level three of Kirkpatrick's framework (Cooper et al., 2001; Zwarenstein et al., 2005). The fact that valid instruments have not been established to measure collaborative behaviors has inhibited the progress of research in this area. This missing component is key to determining whether IPE delivered in health care programs improves collaboration in professional practice. If evidence supports this association, IPE may be more readily embraced and implemented

by health care educators, despite the various barriers. Once instruments are developed, pre-licensure IPE may be more effectively linked to changes in health care practice, the health care environment, and patient outcomes. On the other hand, if there is no significant relationship between IPE and improved collaboration on the health care team, education and health care organizations will need to focus on other strategies to improve collaboration on the health care team.

Literature Related to Interprofessional Health Care Collaboration

Organizations and authorities claim that the impact of improved collaboration by the health care team will enhance the quality of patient care, enhance patient safety, improve standards of patient care, and promote a less fragmented, more holistic approach to health care (IPEC Conference Proceedings, 2011). However, there is little empirical evidence to support these assertions (Martin-Rodriguez, Beaulieu, D'Amour, & Ferrada-Videla, 2005; Petri, 2010). Experts agree that the lack of evidence circles back to the fact that collaboration has been difficult to define and measure.

Part of the difficulty in developing an instrument to measure the collaborative behaviors of health care students and professionals stems from the fact that the competencies expected for collaboration have not been fully developed and agreed upon. While the concept of interprofessional collaboration is recognized as an essential element for health care practice, a common definition of the concept does not exist in the IPE literature; therefore, operationalization of collaboration has presented a significant challenge (Petri, 2010; Thanhausser et al., 2010).

When presenting the Interprofessional Education for Collaborative Patient-Centered Practice (IECPCP) framework, D'Amour and Oandasan (2005) delineated the

concept of interprofessionality as a unifying means to foster IPE and interprofessional collaborative practice. The authors defined interprofessionality as "the process by which professionals reflect on and develop ways of practicing that provides an integrated and cohesive answer to the needs of the client/family/population" (p. 9). The concept involves continuous interaction and knowledge sharing by health care professionals, and optimizes patient participation. Because interprofessional practice entails unique characteristics in terms of values, codes of conduct, and methods of working, the authors emphasized that interprofessionality requires a paradigm shift (D'Amour & Oandasan, 2005).

A recent report by the CIHC titled *Interprofessional Education and Core Competencies* (2007) stated that in order to develop effective strategies, "IPE should be comprised of a common set of goals that every discipline can adhere to," and "one set of core competencies should exist regardless of discipline and geographic location" (p. 16). The competencies of interprofessional collaboration most commonly emphasized in the literature include describing one's role and responsibilities, recognizing and respecting the roles and competencies of other health professionals, effective communication, effective teamwork skills, conflict resolution, positive attitude, willingness to collaborate, tolerating differences, contributing to shared plans of care and goal setting, working with others to effect change, and mutual trust and respect (Barr, 1998; Freeth & Reeves, 2004; Suter et al., 2009).

Suter et al. (2009) conducted a qualitative study and interviewed 60 health care providers from various disciplines to investigate the competencies for collaborative practice which are considered most important by health care professionals. Study findings revealed that "understanding and appreciating professional roles and responsibilities and

communicating effectively emerged as the two perceived core competencies" (p. 48) for collaboration. According to the researchers, communication encompassed conflict resolution and negotiation skills, coordination of care, and the use of language appropriate to the target audience.

With funding from Health Canada, the CIHC published *A National Interprofessional Competency Framework* in February 2010 and included the characteristics considered ideal for collaborative practice. The framework, designed to provide guidance for IPE program development and evaluation, consists of six competency domains: (a) interprofessional communication, (b) patient/family/community-centered care, (c) role clarification, (d) team functioning, (e) collaborative leadership, and (f) interprofessional conflict resolution.

Most recently, *Core Competencies for Interprofessional Collaborative Practice* was published in the United States by the IPEC Expert Panel in May 2011. Because the document was distributed after data collection, the competencies were not integrated into the development of the instrument for this study. However, the framework will be addressed in Chapter Five.

Now that expected competencies are emerging, one of the "next steps" for focus in IPE research is to develop instruments measuring collaborative competencies for health care students and providers in order to determine if IPE impacts collaboration during the educational process and in professional practice (CIHC, 2010; IPEC Expert Panel, 2011). The instrument designed for this study is aimed at measuring such collaborative competencies, providing an important contribution to decision-making regarding IPE.

Literature Related to Instrument Constructs

The following paragraphs provide a rationale for the constructs and items used in the development of the researcher's instrument measuring interprofessional collaborative competencies for health care students. Authorities acknowledge that there has been a great deal of confusion and inconsistency with the terminology used in the IPE literature, making the task of defining constructs challenging. Despite the variation in words or phrases, the same general themes are cited in the literature repeatedly, providing a strong direction for the nature of the constructs.

Although mutual trust and mutual respect are not delineated as specific constructs measured in the instrument, they are woven throughout the items. Both concepts are cited as key elements to collaborative practice in the literature (CIHC, 2010; Henneman, Lee, & Cohen, 1995; IPEC Expert Panel, 2011; Martin-Rodriguez et al., 2005; Petri, 2010; Robinson, Gorman, Slimmer, & Yudkowsky, 2010; Thanhauser et al., 2010). The concept of trust requires self confidence in one's own role as a professional as well as confidence in the clinical competence of other team members. Trusting other team members incorporates the expectation that they will provide both personal and professional support (Martin-Rodriguez et al., 2005). Mutual respect implies acknowledgement and recognition for the contributions, unique skills, and values of each member for the health care team. Trust and respect are influenced by team members' competency level and experience. Building both trust and respect requires time, effort, patience, and previous positive experiences (Henneman et al., 1995; IPEC Expert Panel, 2011).

Patient-Centered Care.

The concept of patient-centered care, which is usually extended to include the family and community as appropriate, supports the participation of the patient as an integral partner on the health care team in planning, implementing, and evaluating health care (CIHC, 2010; IPEC Expert Panel, 2011; WHO, 2010). The concept embraces the belief that the patient and family are the sole reasons for the existence of health care, are valued, and should be provided with a safe environment that promotes health and well-being (Sammer et al., 2010).

As experts in their own life experiences, patients are critical to shaping a realistic plan of care (CIHC, 2010; Herbert, 2005; IPEC Expert Panel, 2011). The patient's input and values are integrated during all aspects of decision-making. In order to be well-informed in the decision-making process, information must be shared with patients at their level of understanding, and resources must be accessible.

Role Clarification.

To provide effective and competent patient-centered care, professionals must develop a sound understanding of the roles, responsibilities, scope of practice, and expertise of their own profession as well as other members of the health care team (CIHC, 2010; D'Amour & Oandasan, 2005; IPEC Expert Panel, 2011; Petri, 2010; Suter et al., 2009; WHO, 2010). Role clarification implies that professionals are able to clearly articulate their roles, skills, and knowledge to others. Individuals who are secure and confident in their professional roles are able to communicate their disciplines' and their individual strengths, values, contributions, and limitations during the interprofessional decision-making process (Henneman et al., 1995; IPEC Conference Proceedings, 2011).

Safe and effective care hinges upon clearly defined roles and responsibilities as well as role articulation (IPEC Expert Panel, 2011).

Role appreciation extends this concept to the recognition of valuing each team member's role. Individuals must develop the ability to recognize the unique knowledge, skills, and talents that other disciplines bring to the team. Having a clear understanding of the scope of practice for other disciplines prevents individuals from being placed in situations beyond their abilities (Henneman et al., 1995; Suter et al., 2009). On the other hand, this knowledge promotes the appropriate use of all team members' knowledge and skills, assures that each member has the opportunity to function within his or her full scope of practice, and helps to assure an equitable workload distribution (CIHC, 2010; IPEC Expert Panel, 2011). A lack of awareness about the roles of other health care professionals may lead to distrust in the competence of others, self-righteous behavior, competitive views of other disciplines, and turf battles.

While learning to understand and appreciate the roles of others on the health care team, caution must be taken to prevent the blurring of roles and boundaries between disciplines. In a qualitative study of medical and nursing students using one-to-one recorded interviews, Wakefield, Boggis, and Holland (2006) discovered that, although teamwork is important, the understanding that each discipline brings different perspectives to the team was recognized. Students emphasized that, if roles and boundaries were blurred too much, there was a danger of "watering down" the professional education program as well as a loss of professional identity.

Interprofessional Communication.

Communication could be considered the essence of collaboration because without effective communication the development of the relationships required for interprofessional practice is impossible (Petri, 2010). In their extensive review of the literature, Martin-Rodriguez et al. (2005) summarized three reasons why communication is considered a key determinant of collaboration. First, collaborative practice demands that health care professionals understand how their work contributes to the outcomes of the team and know how to communicate their contributions to others. Second, effective communication allows constructive negotiation with other professionals. Finally, communication is the vehicle for other critical components of collaboration, such as mutual sharing, trust, and respect.

Health care professionals must be able to communicate in a collaborative, responsive, and responsible manner. Respectful interprofessional communication is open, honest, unambiguous, and direct, involving full disclosure and transparency in interactions with others (CIHC, 2010; IPEC Expert Panel, 2011; Robinson et al., 2010; Suter et al., 2009). Effective communication requires attentive listening skills, assuring that the perspectives of others are heard and considered as well as paying attention to the messages others are trying to convey. Active listening, or listening for meaning and appreciating without interruption, improves the understanding of what an individual is saying, thinking, and feeling. At the same time, attentive listening validates the individual and thought process (Browning & Waite, 2010; Dennis, 2004; Robertson, 2005).

Effective communication demands an array of skills. Avoiding jargon and vague terminology contributes to a common team language (Apker, Propp, Zabava Ford, &

Hofmeister, 2006; IPEC Expert Panel, 2011). Team members must be assertive and sometimes persistent in presenting their own view points. Good communicators are able to negotiate constructively, drawing on the contributions of all team members during problem-solving and decision-making (Henneman et al., 1995; Suter et al., 2009). Team members must be able to not only solicit information, but also to critique its completeness and veracity. The ability to organize, filter, and provide pertinent information to other team members in an accurate, concise manner is imperative.

Communication for collaborative practice includes verbal, nonverbal, listening, and feedback skills. The meaning, tone, and pace of what is said carry as much importance as the content. Effective communication includes four key components: effectiveness, appropriateness, sensitivity, and communicating in a manner that maintains respect for self and others (Schuster & Nykolyn, 2010). Effective messages are those that are conveyed and interpreted in the way they are intended. The effects are dependent upon the level of appropriateness and sensitivity the message conveys to others. The verbal and nonverbal communication displayed during the message plays a significant role in determining the effect. The words expressed in a message are open to interpretation and will most likely be interpreted in different ways. Because words themselves do not have meaning, the meaning resides in the people who express and interpret them. This detail highlights the necessity for communicators to convey the intended message as accurately and effectively as possible (Petri, 2010; Schuster & Nykolyn, 2010).

Because all observed behavior has communicative value, nonverbal communication is a highly significant component of effective communication (Schuster & Nykolyn, 2010). Tone of voice and body language are sometime used deliberately but, most often,

accompany verbal messages unconsciously or without thought. Nonverbal communication provides important clues regarding how team members feel about each other as well as the status and power differentials in relationships. If used effectively, nonverbal behaviors can help others understand the meaning intended in the verbal message conveyed.

Finally, feedback and closing the loop include the verbal and nonverbal responses to the message (Schuster & Nykolyn, 2010). Feedback conveys the effectiveness of the message, thoughts and feelings associated with the message, and interpretation of the message. If used effectively, feedback provides an opportunity for clarification and validation of the message meaning so that misinterpretations can be corrected. Closing the loop, or communicating that the message is understood, has been identified as a critical factor to promote safety in health care (IPEC Expert Panel, 2011; Sammer et al., 2010).

Conflict Resolution.

Considering the differences in training and the skill sets of health care professionals, the fact that conflicts may arise when working on a health care team is not surprising. The inability to resolve disagreements or conflict among team members is a major impediment to collaborative practice; thus, it is essential for health care professionals to acquire a conflict resolution skill set. Conflict resolution refers to a set of strategies used to diffuse conflict, thereby satisfying the wishes of the individuals involved (Disch, 2010). The CIHC (2010) promotes the use of "conflict positive" as a term that promotes a more healthy way of interpreting differences of opinion and encouraging constructive interactions. Openly discussing conflicts can serve to facilitate change and to improve collaborative relationships. Respecting others' perspectives, thought processes,

and communication styles is important during conflict, as is the flexibility to adjust one's own communication style as needed (Henneman et al., 1995; Suter et al., 2009).

Events leading to differences of opinions come from positive or negative sources and include roles (differing accountability, role ambiguity, role overload, or role blurring), goals (dissimilar philosophies or approaches in providing care, or different spiritual or religious beliefs), values, personality traits, and real or perceived power/hierarchy in interprofessional relationships (CIHC, 2010). Common issues that lead to disagreements, or "triggers to conflict," center on treatment approaches, informed consent, medical diagnosis, and patient and family input regarding goal setting and discharge planning. Awareness of these triggers allows team members to be prepared to address the conflict in an appropriate and acceptable manner. Throughout the process, patients and families should be given opportunities to voice their preferences and needs; their values and expertise must be respected (CIHC, 2010).

Effective response strategies include a willingness to address and resolve conflicts, constructive dissent, and commitment to evaluating and managing one's own behaviors during conflict (CIHC, 2010). Confronting conflicts directly, yet respectfully, and remaining objective, rather than defensive, in response to disagreements are essential (Apker et al., 2006). Henneman et al. (1995) describe responses to conflict on a continuum from collaboration, in which individuals are both assertive and cooperative, to avoidance, in which the individuals are unassertive and uncooperative. In between the two extremes are accommodation (unassertive and cooperative) and compromise (moderately assertive and cooperative).

Collaborative Leadership/Teamwork.

The shared decision-making process on the health care team is termed "collaborative leadership" by the CIHC (2010), capturing the essence of the literature. Some authorities refer to the concept as teamwork. The hierarchical power structure of the traditional health care setting, with physicians assuming full responsibility and control for patient care, has created a health care environment that does not embrace collaborative practice. In order to collaborate as a team, the health care culture must foster an equal playing field in which all team members can work together with equal power and responsibility. In addition, patients and families assume a responsibility to become active on the health care team (Hall, 2005). Collaborative practice requires a dynamic, flexible distribution of status and authority with leadership responsibilities shifting from point to point, depending on which discipline has the expertise and competence to address the task at hand. In this sense, the power is based on knowledge and expertise rather than title or role. Professionals from each discipline must have autonomy within their scope of practice in order to fully contribute to the team process (CIHC, 2010; Fewster-Thuente & Velsor-Friedrich, 2008; Petri, 2010).

Shared leadership implies that, as a team, problems are identified and analyzed, goals are defined, and all team members assume shared accountability for the processes chosen to accomplish the goals and outcomes (Hall, 2005; Petri, 2010). The CIHC (2010) outlines two components of the leadership role: task orientation, in which the leader focuses on helping team members stay focused on achieving the agreed upon goal; and, relationship orientation, in which the leader fosters members to work more effectively as a team. In some cases, there may be more than one leader, or the patient may take the lead.

Some authorities challenge whether the concept of collaborative leadership should be presented as a realistic goal in IPE given the hierarchical nature of many health care settings. Whitehead (2007) delineates the barriers for physicians and medical education to embrace and engage in the collaborative process. Because power and status are influenced by political, economic, and societal factors, they cannot simply be redistributed or transferred to others. Status is a relative ranking that diminishes if shared. Because status is a stereotypical approval or disapproval that is located in the minds of others, opinions must be changed in order to alter status. Flattening the hierarchy will presumably reduce the traditional status, power, and decision-making of physicians, therefore flattening the privilege position enjoyed by the profession (Whitehead, 2007).

Furthermore, the concept of collaborative leadership contradicts the socialization process in medical education. In order to presume an authoritative role and transcend the pressures inherent in life and death situations, physicians are socialized to take the role of leader and decision maker in a manner leading to detachment, entitlement, and self-interest (Hall, 2005; Whitehead, 2007). Whitehead (2007) proposes that in order for IPE to be successful, a clear conceptualization of what interaction and shared work is expected must be presented. Collaboration must either occur between health care professionals who are not equal in terms of status and power, or the structure of the current health care system must change.

Summary of Literature Review

Despite the numerous endorsements by governmental, philanthropic, and professional organizations, as well as accrediting bodies, the implementation of IPE has been limited in most of the country's health professional education curriculums. This

limitation is due to the multiple barriers imposed on IPE and the fact that IPE has not been fully embraced and valued by faculty and students (Remington et al., 2006). Despite these challenges, health professional education must address the call for change.

Developing effective IPE within the curricula of health care professionals is a key component to improving the health care practice environment. For all disciplines, the ultimate goal of IPE is to improve collaboration among health care teams to ensure safe, high quality, efficient, and cost effective patient care. There has been an extensive amount of research on IPE. Most authorities agree that the evidence supports that incorporating IPE into the curricula of health care professions generally improves students' attitudes, perceptions, and knowledge of teamwork skills on a short term basis. Early evidence is also suggesting that the impact of IPE with professionals in the practice setting improves collaborative and communication skills and improves patient outcomes. However, the long term effects of incorporating IPE in health professional education programs have not been established. In order to examine the impact of IPE on collaboration in clinical practice, instruments must be developed to measure the collaborative competencies expected for health care students and professionals.

CHAPTER THREE. METHODS

Overview

A purpose of this study was to develop and examine the psychometric properties of an instrument designed to measure collaborative competencies learned during IPE by health care students. Focusing on baccalaureate nursing students, this study served to build a foundation for future research measuring collaboration in other health care disciplines. In addition, this study examined the impact of IPE on undergraduate nursing students' ability to collaborate with other members of the health care team. The primary research questions underlying this study were as follows:

1. Can the constructs identified to define collaborative competencies learned by health care students be measured in the development of a new psychometric instrument?

2. Do the collaborative competencies of baccalaureate nursing students who have IPE incorporated into the curriculum differ from nursing students who do not have IPE incorporated into the curriculum?

Survey Development

Initial and Ongoing Activities Related to Validity.

Based on an extensive review of the literature, the author developed a set of potential items to measure collaborative competencies for health care students. The items were designed to measure competencies that students should acquire by the completion of the health care program and that graduates should demonstrate as a result of IPE 3-6 months into professional practice. The constructs originally identified to be used in the development of instrument items were based on the study by Suter et al. (2009) because they coincided with those emphasized in the IPE literature. Initially, 33 items were

developed to measure the student's ability to collaborate with other members of the health care team, as defined by the core competencies of role understanding/appreciating and communication. A six point Likert scale was designed to rate each item, ranging from *strongly agree* to *strongly disagree*, with a seventh option, "unable to answer," providing the participants with a choice if they could not answer the question.

During the initial item development, many activities were directed towards establishing face and content validity. Besides the Literature Review, content validity was further established by conducting an internet survey using the Group Decision Center at North Dakota State University during the fall semester of 2009. Experts in IPE throughout Canada and the United States were invited to participate in refining items. The expert list was created using contacts gathered at an international IPE conference the researcher attended the previous semester. Employing the snowball method, the initial IPE contacts were asked to identify other IPE experts and to provide contact information; these additional experts were invited to complete the survey. Using five point continuous scales, experts were asked to rate each item from two perspectives: how important the item was in measuring the collaborative behavior in their discipline (1 = *not important* to 5 = *very important*) and the degree to which the behavior was realistically achievable for undergraduate students in their discipline to meet by completion of the professional program (1 = *unrealistic to achieve* to 5 = *realistic to achieve*).

Nine experts representing nursing, medicine, and pharmacy provided responses to the internet survey. Mean ratings for the importance of items to specific disciplines ranged from 4.22 ("provides input when working with other members of the health care team") to 5.0 on three items ("demonstrates respect for different perspectives when working with

other professions on the health care team," " demonstrates respect for the roles/responsibilities of other professions on the health care team," and "acknowledges the expertise of other disciplines e.g. turns to other members of the health care team for answers related to their expertise"). Mean ratings of realistic achievability for students in their discipline to develop the behaviors were lower, ranging from 3.25 ("interrelates with other members of the health care team in a constructive manner to resolve conflict") to 4.67 ("exhibits effective verbal communication skills when interacting with the health care team members"). Items related to conflict resolution were considered to be least achievable by students, many experts rating them 3.25 to 3.75. Feedback from IPE experts focused on improving the clarity of the items, reducing overlap, and making the collaborative behaviors more explicit and measurable. Examples of narrative statements included "what does 'effective' look like?", "combine with statement 3," and "[this is a] high level for a student."

Based on input from the international experts, instrument items were revised to make them more measurable. For example, the item "responds positively to feedback provided from other members of the health care team" was revised to state "refrains from behaving defensively when responding to feedback provided by other team members." The item "uses appropriate language when working with patients and families" was modified to state "shares information with patients and families using language appropriate to their level of understanding." The item "displays trust in other members of the health care team" was changed to "displays trust in other team members by turning over decision-making to the member with the greatest expertise." Finally, the item "exhibits effective nonverbal communication skills when interacting with the health care team members" was

made more measurable when revised to state "exhibits facial expressions and body language that invite others to communicate."

Following the internet survey of IPE experts, local educational and practice experts were consulted to validate the revised instrument during the spring semester of 2010. Four experts in nursing education (three with M.S. degrees and one with a Ph.D. degree) at North Dakota State University were asked to review the revised instrument to determine if items appeared to operationalize the identified constructs, providing face validity. Along with the educational experts, feedback from the practice industry was elicited. Three experts in staff education positions at a local health care facility were asked to appraise the revised instrument. The practice experts had master's degrees (two in nursing and one in counseling) and were involved in planning and implementing the orientation and education programs for new staff and graduates for all health care disciplines hired at their health care facility. In addition to face validity, these educational and practice experts provided feedback addressing the clarity and comprehensiveness of the instrument, resulting in additional revisions.

Since initial development, the literature has been reviewed on an ongoing basis for further instrument refinement. The most recent instrument revisions resulted from the publication of *A National Interprofessional Competency Framework* in February 2010 by the CIHC. Based on the framework, the current instrument includes 39 items measuring the following constructs: patient-centered care, role clarification, interprofessional communication, interprofessional conflict resolution, and collaborative leadership or teamwork. The study instrument is titled the Collaborative Healthcare Interprofessional Survey (CHIPS). A six-point Likert scale containing no neutral point was used to rate each

item from *strongly agree* (6) to *strongly disagree* (1). Because it was reasonable to expect that participants would be able to answer each item, the "unable to answer" option was excluded in the final rating scale, imposing the need to answer each item. Participants were asked to rate their perceptions of their own abilities related to each item. For this reason, the items were phrased in a manner for self-raters (students) to answer with the preceding stem "I know how to:"

Self-rating instruments bring both advantages and disadvantages to the study design. The reliability of self-report data measures to determine collaborative competencies may be questioned. Some authorities argue that self-reported data may not provide an accurate description of the respondents' actual collaborative abilities on the health care team (Thannhauser et al., 2010). The accuracy of self-appraised performance will be discussed further in Chapter Five. The responses provided by self-raters may also reflect the influence of social norms in that there is a tendency for respondents to provide answers that they believe are expected on them (Trochim & Donnelly, 2008). On the other hand, students' self-perception of their collaborative abilities provides valuable information during the education evaluation process as well as provides a basis for comparisons in future research evaluating how instructors and colleagues perceive students' collaborative abilities. The most compelling reason for surveying students rather than instructors or preceptors is the large sample size required for factor analysis.

Regional Expert Survey.

During the dissertation study, educational experts from selected health care programs in the region (dietetics, medicine, occupational therapy, pharmacy, physical therapy, and social work) were consulted to evaluate the CHIPS instrument. The goal of

the activity was to assure that the instrument represents desirable collaborative competencies across the health care disciplines. The Group Decision Center at North Dakota State University was consulted to develop an electronic version of the instrument. For each item on the instrument, experts were asked to determine if the measure applied to their discipline using a continuous five point scale (5 = *applies well to my discipline* to 1 = *does not apply to my discipline*). When rating the items, respondents were asked to consider if the behavior reflects desirable and relevant collaborative outcomes for graduates in their discipline. If not, experts were asked to insert narrative comments suggesting how the item could be revised to apply to their discipline. Screen captures of the expert survey are presented in Appendix G.

Mean responses from experts ranged from 4.5 (SD .84) to 5.0 on all items except two, indicating they applied well to the other disciplines. The "intervene to assure that patients' rights are incorporated into the health care provided" and "facilitate interprofessional team meetings or case conferences related to patients and families" items were both ranked 4.0 (SD 1 and .82, respectively), meaning the items applied to their disciplines to a lesser degree then the other items. Because patients' rights are highly emphasized in the IPE literature, this item was not deleted or edited. The second item was revised to state "facilitate interprofessional team discussions or patient conferences when issues focus on my area of expertise," making the item more applicable to all health care disciplines and less physician-oriented. The results of the expert survey are presented in Appendix I.

Narrative feedback regarding the CHIPS instrument from the educational experts was generally positive in nature, often reinforcing the importance of the item. Examples

included "absolutely critical to client success"; "the social work profession respects the

inherent dignity and worth of the person, therefore, we actively listen to the needs

expressed by the patient and family when planning care" was stated under the item "listen

respectfully to the needs expressed by the patient and family when planning care"; the

comment "so critical in an environment where duties can/do overlap" under the item

"clearly demonstrate an understanding of my own scope of practice"; and the comment

"lack of mutual trust and respect can be a potential barrier to collaborative care" under the

item "display trust in other team members by turning over decision-making to the member

of the team with the greatest experience."

Pilot Study.

Once the CHIPS instrument was refined by revising the question identified above,

the Group Decision Center (GDC) at North Dakota State University was again consulted to

administer the revised electronic survey for the study. In an effort to reduce the response

time to complete the 39 item instrument, the web format was constructed to include eight

questions per screen using a matrix format. Care was taken to assure that the questions

were presented in an uncluttered, clear, and consistent manner and that the Likert scale

choices were evenly spaced. A consistent page layout across screens was designed to ease

the survey process and to prevent participants from being distracted so that the primary

focus would be on the task of answering the instrument questions. A welcoming screen

was designed to be informative and inviting, and a closing screen was created to express

appreciation for participation (Dillman, Smyth, & Christian, 2009).

The GDC used software to randomly organize the items during the development of

the electronic survey. Instrument items were presented in the same order for each

participant. Demographic data, including nursing program enrolled in, age on last birthday, gender, cumulative grade point average, and previous work experience in a health care setting, were collected at the end of the survey.

Pilot testing of the electronic CHIPS instrument was completed with 18 senior nursing students from a state university in Minnesota. The goal of the pilot study was to evaluate the functioning of the instrument's instructions, items, and survey administration. In addition, the researcher met with two students from the pilot group to review the instructions, instrument items, and survey process. Based on feedback, one item was slightly revised to improve clarity: the item "exhibit knowledge about the scope of practice of other disciplines on the health care team" was revised to state "demonstrate understanding about the scope of practice of other disciplines on the health care team." Pilot participants indicated that both the survey and process were easy to understand and complete. Results of the pilot study are presented in Appendix J.

Table 2 presents the final wording of the items developed for each construct measured by the CHIPS instrument. Screen captures of the actual electronic survey are presented in Appendix H.

Table 2. Instrument Items Related to Constructs

Patient-Centered Care
I know how to:
1. Share information with patients and families using language appropriate to their level of understanding.
2. Encourage patient and family participation in decision-making regarding the plan of care.
3. Communicate with patients and families in a manner that reflects sensitivity to their needs.
4. Listen respectfully to the needs expressed by the patient and family when planning care.
5. Provide education and resources necessary to meet the learning needs of patients and families.
6. Intervene to assure that patients' rights are incorporated into the health care provided.
7. Communicate the needs and preferences expressed by patients to team members.

Table 2. (Continued)

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Role Clarification and Appreciation

I know how to:

1. Clearly demonstrate understanding of my own professional role and responsibilities when working with team members.
2. Clearly demonstrate understanding of how my role interrelates with the roles and responsibilities of other team members.
3. Clearly demonstrate an understanding of my own scope of practice.
4. Demonstrate understanding about the scope of practice of other disciplines on the health care team.
5. Utilize the expertise of other disciplines on the health care team.
6. Demonstrate respect for different perspectives when working with other disciplines on the health care team.

Interprofessional Communication

I know how to:

1. Communicate respectfully in a professional manner with other team members.
2. Exhibit facial expressions and body language that invite others to communicate.
3. Listen attentively when other team members are sharing input, perspectives, and concerns.
4. Provide concise, thorough, and systematic data in a timely manner to other team members when communicating patient information.
5. Use a common language when speaking to other members of the health care team.
6. Provide constructive feedback to other team members.
7. Refrain from behaving defensively when responding to feedback provided by other team members.
8. Demonstrate active listening by seeking clarification from other team members when needed.

Conflict Resolution

I know how to:

1. Assume responsibility for addressing a problem or issue by speaking with the individual team member involved.
2. Express thoughts in a respectful, objective manner when disagreeing with other team members.
3. Relate to other team members in a constructive manner to resolve conflicts.
4. Negotiate effectively with other team members to resolve conflicts.
5. Acknowledge the ideas and solutions of other team members that appear to be better than my own.
6. Consider all points of view when working with team members to resolve conflicts.
7. Participate to establish consensus during conflict resolution.

Teamwork/Collaborative Leadership

I know how to:

1. Demonstrate confidence in sharing professional viewpoints with other team members.
2. Work with other team members to identify changes that need to be made in the provision of patient care.
3. Provide team members with information they need in order to be a contributing member of the team.
4. Collaborate with other team members to examine alternatives when problem-solving.

Table 2. (Continued)

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5. Work with team members to coordinate activities of all disciplines in providing effective patient care.

6. Facilitate interprofessional team discussions or patient conferences when issues focus on my area of expertise.
7. Acknowledge the contributions of other team members by eliciting their ideas and perspectives in the shared decision-making process.
8. Display trust in other team members by turning over decision-making to the member with the greatest expertise.
9. Work collectively with team members to demonstrate cohesiveness when interacting with patients and families.
10. Assume the role as team leader when appropriate to the situation.
11. Demonstrate awareness of my own strengths and limitations as a team member.

Research Design.

Data were collected during the spring semester of 2011 to refine and establish

psychometric properties of the CHIPS instrument. Although the instrument will be used for

all health care disciplines in the future, this initial study was limited to baccalaureate

nursing students, allowing for more control of extraneous variables such as curriculum,

culture, professional identity, and socialization. Experts in other health care disciplines

who were consulted to evaluate the instrument as part of earlier validation efforts (see

above) provided strong feedback indicating that the items apply to their disciplines. Once

the instrument's psychometric properties have been established with nursing students,

future studies will be conducted to further validate the instrument with other health care

disciplines. Because a comparable validated tool to measure collaborative competencies in

health care students does not exist, triangulation could not be used to confirm findings

about the newly developed instrument. Again, this fact emphasizes the importance of the

study.

Approval for the study was granted through the Institutional Review Board (IRB) at North Dakota State University. Two other study sites (the University of North Dakota and Minot State University) required approval through the IRB offices at their universities. Because the survey was electronic and faculty members at the participating institutions were not considered investigators in the study, the other study sites (Bemidji State University, Saint Cloud State University, South Dakota State University, the University of Minnesota, and Winona State University) did not require formal IRB approval. The IRB administrator at one participating site that did not require formal approval described the faculty's role as a "human bulletin board" in that the professor was simply expected to disperse an announcement about the study. The IRB approval letters, study consent form, and text of solicitations for participation are provided in the appendices.

Toward the end of spring semester in 2011, the final version of the CHIPS instrument was distributed electronically at each study site. Faculty, or gatekeepers, at each institution were contacted to announce the study invitation in classes and to send out an e-mail invitation on their student list serve. In an effort to generate a higher response rate at the two IPE sites, because these sites were fewer and, therefore, the number of potential IPE participants was smaller than the non-IPE sites, the researcher visited the two IPE sites to personally announce the study invitation and to answer questions. Although the researcher used the same script presented to students in the on-line format at non-IPE sites, the fact the announcement might have impacted the validity of findings in some way is acknowledged. The initial invitation was sent to study site gatekeepers for list serve distribution on April 15, 2011. The first follow-up invitation was sent one week after the

initial invitation and a second invitation was sent two weeks after the initial invitation, providing timely, yet reasonable, reminders to complete the survey (Dillman et al., 2009).

Sample.

Study participants included baccalaureate nursing students enrolled at two midwest state universities that incorporated IPE into the curriculum and six midwest state universities that did not incorporate IPE into the curriculum. While the nonrandom, convenience sample that was used in the study limits the generalizability of the findings, there is no reason to believe that students in the selected nursing programs differ significantly from students in other baccalaureate nursing programs. Each program included in the study is accredited by the American Association of Colleges of Nursing or the National League of Nursing. Both accrediting bodies require graduates to exhibit competencies related to patient-centered care, role clarification, communication, interdisciplinary teamwork, conflict resolution, and leadership. Thus, each program has developed a curriculum and graduate outcomes designed to meet the accreditation standards, which also encompass the instruments' constructs. In the curricula of nursing programs for the IPE sites, nursing students were enrolled in at least one required course, and sometimes other elective courses, where other health care disciplines were taught together, in an integrated format, involving small group class activities.

Although a precise number of the target frame was difficult to determine because the internet survey was distributed to senior nursing students registered on list serves at each study site, the estimated number of study participants was 596 based on the number of potential graduates at each study site. The target number of completed surveys for the planned factor analysis was 390, accounting for 10 measures per survey item, an early but

prevalent rule-of-thumb ratio (Costello & Osborne, 2005). Response rates at each study site ranged from 28% to 90%, with a total response rate of 49%. The majority of participants were female (90%) in the traditional age ranges of 21 to 23 (66%) or 24 to 26 (14%). Most (90%) of the participants reported a cumulative GPA of 3.26 or higher on a 4.0 scale. Finally, 78% of the participants had previous experience in the health care system as a nurse aide, nurse intern, volunteer, or other position. Table 3 summarizes the demographic data of the study participants.

Data Screening Process.

The online survey was completed by 322 students. Of interest to note, 31 students entered the website but did not complete any survey items. A number of reasons may be speculated for this finding, including curiosity regarding the survey yet a lack of commitment to complete, the number or nature of the items, and lack of time. Responses from 20 participants were deleted because they did not complete all items. Seven participants were deleted because they did not proceed beyond the first set of eight questions to the next web page, indicating a possible flaw in the electronic design. One participant quit the survey after completing 17 items, all of which were ranked low, perhaps indicating discouragement with his or her own perception of abilities. Following data cleaning, a sample of 293 viable survey responses remained, creating 7.5 cases per variable. Disagreement among authorities exists in the literature regarding the desirable cases per variable, ranging from 5-20. According to Costello and Osborne (2005), "strict rules regarding sample size for exploratory factor analysis have mostly disappeared. . . . adequate sample size is partly determined by the nature of the data" (p. 4). Results of

Table 3. Demographic Data

Nursing Program	n (Responses)	N (Students enrolled)	Response Rate
Bemidji State University	24	33	73 %
Minot State University	17	19	90 %
North Dakota State University	39	59	67 %
Saint Cloud State University	63	94	71 %
South Dakota State University	29	100	29 %
University of Minnesota	61	120	51 %
University of North Dakota	24	61	39 %
Winona State University	31	110	28 %
Total:	293	596	49 %

Age	n (Responses)	Response Rate
21–23	192	66%
24–26	40	14%
27–30	20	7%
31–40	28	9%
41–50	9	3%
> 50	1	0.3%

Gender	n (Responses)	Response Rate
Female	264	90%
Male	25	9%

GPA	n (Responses)	Response Rate
3.76–4.0	89	30%
3.51–3.75	95	32%
3.26–3.5	79	28%
3.01–3.25	23	8%
2.76–3.0	6	2%
<2.75	1	0.3%

Previous Health Care Experience	n	Volunteer	Nurse Aide	Nurse Intern	Other
Yes	227	24	120	42	43
No	65				

analysis reported in this study indicate that the sample was sufficient for factor analysis, as discussed in Chapter Four.

Data Analysis.

Data management and analysis were conducted using IBM Statistical Software for Social Sciences (SPSS) Version 19. Demographic data for the study participants were summarized using descriptive statistics to analyze frequency distributions. Because the six point Likert scale incorporated in the CHIPS instrument is considered to have equal intervals (Trochim & Donnelly, 2008), the scale was treated as interval data. For each survey item, a mean score was computed along with standard deviations and distributions; these data were examined to analyze variability and to check for normal distributions.

To answer the first research question, exploratory factor analysis (EFA) was used to establish construct validity for the CHIPS instrument by identifying response sets of items measuring similar health care collaboration constructs. In the first stage, factor extraction, principle axis factoring was used to determine which factors to rotate in stage two. Kaiser criterion (all factors with eigenvalues greater than one) and the scree test were used to determine the number of factors to be extracted for rotation. In the second stage, the extracted factors were rotated, making results more interpretable. More details about the factor rotation process are discussed in Chapter Four. Results of the factor analysis were used to determine the underlying structure around which the instrument was developed.

To answer the second research question, a t-test utilizing an alpha value of .05 was conducted to compare the mean factor scores of students from programs that incorporate IPE with those that do not incorporate IPE. In addition, one-way analysis of variance

(ANOVA) was conducted, comparing the mean factor scores on each demographic variable to determine if age, gender, grade point average, and previous experience in health care significantly impacted participants' responses.

CHAPTER FOUR. RESULTS

Overview

As a review, a purpose of this study was to develop and examine the psychometric properties of an instrument designed to measure collaborative competencies learned during IPE by health care students. Focusing on baccalaureate nursing students, this study served to build a foundation for future research measuring collaboration in other health care disciplines. In addition, this study examined the impact of IPE on undergraduate nursing students' ability to collaborate with other members of the health care team. The primary research questions underlying this study were as follows:

1. Can the constructs identified to define collaborative competencies learned by health care students be measured in the development of a new psychometric instrument?

2. Do the collaborative competencies of baccalaureate nursing students who have IPE incorporated into the curriculum differ from nursing students who do not have IPE incorporated into the curriculum?

Data Analysis

Before beginning factor analysis, internal consistency reliability was analyzed using Cronbach's alpha on the items developed to measure the five theoretical constructs used to design the CHIPS instrument. The rationale for this step was the intention to delete unreliable items before performing factor analyses in order to improve the resulting model. All scales produced a high degree of reliability as outlined in Table 4: patient-centered care (7 items: Cronbach's alpha 0.841), role clarification (6 items: Cronbach's alpha 0.789), interprofessional communication (8 items: Cronbach's alpha 0.805), conflict resolution (7 items: Cronbach's alpha 0.809), and collaborative leadership/ teamwork (11 items:

Cronbach's alpha 0.885). These findings indicated that all items were reliable in measuring

the construct they were designed to measure. Therefore, no items were deleted before

further factor analysis.

Table 4. Reliability Analysis of Theoretical Constructs Around Which Instrument Structured

Construct/Item	M	SD	Cronbach's alpha If Item Deleted
Patient-Centered Care (7 Items, α = 0.84)			
*Intervene to assure that patients' rights are incorporated into the health care provided.	5.20	.648	.833
*Communicate the needs and preferences expressed by patients to team members.	5.33	.628	.815
*Communicate with patients and families in a manner that reflects sensitivity to their needs.	5.50	.595	.816
*Provide education and resources necessary to meet the learning needs of patients and families.	5.06	.687	.820
*Encourage patient and family participation in decision-making regarding the plan of care.	5.32	.696	.809
*Listen respectfully to the needs expressed by the patient and family when planning care.	5.62	.506	.819
*Share information with patients and families using language appropriate to their level of understanding.	5.35	.610	.820
Role Clarification (6 Items, α = 0.79)			
*Clearly demonstrate an understanding of my own scope of practice.	5.06	.554	.761
*Demonstrate understanding about the scope of practice of other disciplines on the health care team.	4.65	.714	.764
*Clearly demonstrate understanding of how my role interrelates with the roles and responsibilities of other team members.	5.20	.628	.750
*Clearly demonstrate understanding of my own professional role and responsibilities when working with team members.	5.17	.625	.738
*Demonstrate respect for different perspectives when working with other disciplines on the health care team.	5.53	.570	.768
*Utilize the expertise of other disciplines on the health care team.	5.33	.709	.760

Table 4. (Continued)

Construct/Item	M	SD	Cronbach's alpha If Item Deleted
Communication (8 Items, α = 0.81)			
*Provide concise, thorough, and systematic data in a timely manner to other team members when communicating patient information.	4.95	.639	.799
*Listen attentively when other team members are sharing input, perspectives, and concerns.	5.61	.534	.789
*Exhibit facial expressions and body language that invite others to communicate.	5.36	.720	.771
*Refrain from behaving defensively when responding to feedback provided by other team members.	5.17	.712	.784
*Demonstrate active listening by seeking clarification from other team members when needed.	5.46	.599	.765
*Communicate respectfully in a professional manner with other team members.	5.51	.540	.772
*Use a common language when speaking to other members of the health care team.	5.30	.652	.783
*Provide constructive feedback to other team members.	4.73	.887	.805
Conflict Resolution (7 Items, α = 0.81)			
*Negotiate effectively with other team members to resolve conflicts.	5.00	.761	.795
*Assume responsibility for addressing a problem or issue by speaking with the individual team member involved.	5.02	.723	.798
*Express thoughts in a respectful, objective manner when disagreeing with other team members.	5.27	.700	.787
*Consider all points of view when working with team members to resolve conflicts.	5.30	.617	.779
*Acknowledge the ideas and solutions of other team members that appear to be better than my own.	5.44	.549	.782
*Relate to other team members in a constructive manner to resolve conflicts.	5.29	.585	.772
*Participate to establish consensus during conflict resolution.	4.97	.730	.780

Table 4. (Continued)

Construct/Item	M	SD	Cronbach's alpha If Item Deleted
Teamwork (11 Items, α = 0.89)			
*Display trust in other team members by turning over decision-making to the member with the greatest expertise.	5.34	.691	.889
*Assume the role as team leader when appropriate to the situation.	4.88	.828	.882
*Provide team members with information they need in order to be a contributing member of the team.	5.27	.583	.877
*Acknowledge the contributions of other team members by eliciting their ideas and perspectives in the shared decision-making process.	5.34	.608	.873
*Demonstrate confidence in sharing professional viewpoints with other team members.	4.98	.778	.872
*Work collectively with team members to demonstrate cohesiveness when interacting with patients and families.	5.23	.647	.870
*Facilitate interprofessional team discussions or patient conferences when issues focus on my area of expertise.	4.64	.898	.875
*Work with other team members to identify changes that need to be made in the provision of patient care.	5.20	.669	.871
*Collaborate with other team members to examine alternatives when problem-solving.	5.20	.610	.866
*Work with team members to coordinate activities of all disciplines in providing effective patient care.	5.13	.693	.868
*Demonstrate awareness of my own strengths and limitations as a team member.	5.22	.643	.876

Note. α = Chronbach's alpha.

Factor Analysis.

Factor analysis was conducted as the primary method to answer the first research

question. Initially, the factorability of the 39 instrument items was reviewed by analyzing

the correlation matrix, presented in Appendix L. The Kaiser-Meyer-Olkin measure of

sampling adequacy was 0.944, well above the recommended value of greater than 0.5

(Field, 2005), suggesting that the sample was factorable. Values close to 1.0 indicate that

the patterns of correlation are relatively compressed, thus, factor analysis should result in distinct and reliable factors. Bartlett's test of sphericity was significant at 0.00, indicating the correlation matrix was not an identity matrix; therefore, some relationships exist between variables in the analysis. A significance value less than 0.05 is desirable (Field, 2005). The communalities, which demonstrate how much of the variance in the variables was accounted for by the extracted factors, ranged from 0.353 to 0.677. Fifteen items had communalities below 0.5, indicating that a considerable amount of the variance is unexplained by the extracted factor; however, no items were deleted at this time. The researcher decided to keep the original instrument intact until further research can be conducted using a broader range of health care disciplines. Factor analysis was conducted with all 39 items related to IPE.

Because the method analyzes the common and unique variance in each variable (Costello & Osborne, 2005), principal component analysis was used to reduce the data to a set of factors. The initial eigenvalues demonstrated that the first factor explained 38.58% of the variance (eigenvalue 15.04); the second factor explained 6.64% of the variance (eigenvalue 2.59); the third factor accounted for 3.59% of the variance (eigenvalue 1.4); the fourth factor accounted for 3.48% of the variance (eigenvalue 1.36); the fifth factor accounted for 2.96% of the variance (eigenvalue 1.15); and the sixth factor explained 2.91% of the variance (eigenvalue 1.13). Thus, 58.14% of the item variance could be explained by factors with eigenvalues over 1.0.

Based on the sharp differences in eigenvalues and the leveling of the scree plot (Figure 4), initially two factors were extracted for rotation. Parallel analysis was conducted and also suggested that extracting two factors for rotation was appropriate. However, the

extracted two factor rotation produced low ranking communalities and only accounted for
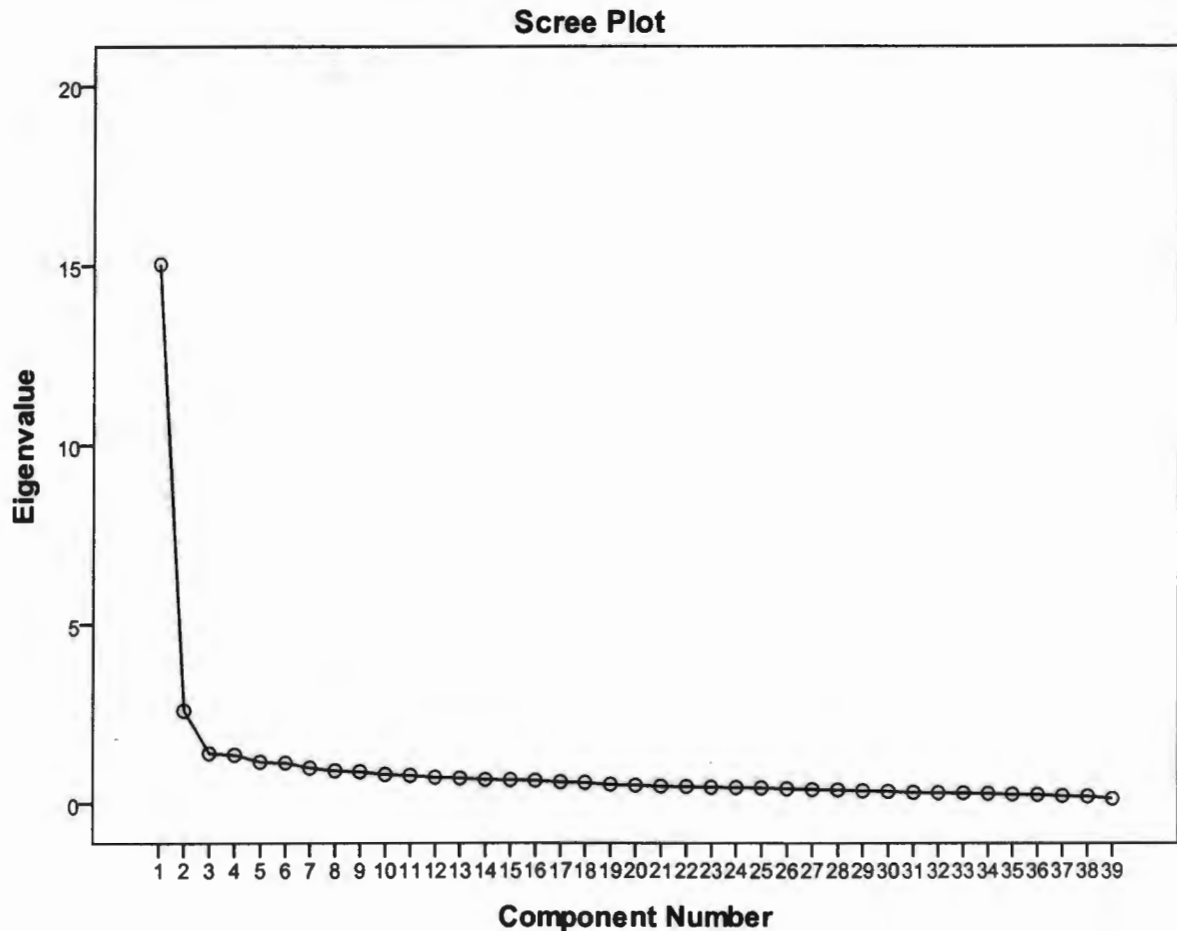
45.21% of the variance.

Scree Plot

Figure 4. Scree Plot

Analyzing the factors that resulted in the two factor model varimax rotations, items

that loaded on the first factor focused heavily on interprofessional communication. Items

loading on the second factor strongly addressed clarifying roles and patient-centered care.

These findings reflected the qualitative study by Suter et al. (2009), who found that

understanding and appreciating roles as well as communicating effectively were the two

core competencies for effective collaboration by the health care team. In their study, Suter

et al. (2009) concluded that conflict resolution was encompassed in communication.

However, in the two factor rotation, items designed to measure conflict resolution were

dispersed equally across both factors. Although items related to teamwork were also

included in factors one and two, five items designed to measure this construct cross loaded

between the two factors. Appendix M summarizes the factor loading for the two factor

model with promax rotation. Chapter Five will include further discussion related to the two

factor model.

Based on the fact that the two factor model only accounted for 45.2% of the

variance and that there were six factors with eigenvalues greater than 1.0, further rotations

were conducted. Four, five, and six factor rotations were examined using both varimax

(orthoganol) and promax (oblique) rotations of the loading matrix. Although varimax

rotation, an orthogonal method, is the most commonly used rotation method, some

authorities argue that rotation is not always the best choice (Costello & Osborne, 2005;

Thompson, 2004). Orthogonal rotation minimizes the factor co-variation, producing

factors which are uncorrelated, resulting in a structure that is easy to interpret and has

conceptual clarity. In SPSS output, orthogonal rotations produce a single rotated factor

matrix (Thompson, 2004). However, for many of the constructs examined in the social

sciences, correlation between the constructs is expected. Oblique rotations permit

correlation among factors, producing both a pattern matrix and structure matrix in SPSS

output. The pattern matrix is typically examined for factor and item loadings producing

substantive interpretations similar to the orthogonal rotation output. Although oblique

rotation output is more complex than orthogonal rotation, the difference is only slight

(Costello & Osborne, 2005). Thus, oblique rotations may provide a more realistic and accurate picture of how such constructs are related to one another. Knowing the extent to which factors are correlated may be useful in analyzing the conceptual nature of common factors (Costello & Osborne, 2005; Fabigar, MacCallum, Wegener, & Strahan, 1999).

The five-factor rotations produced low communalities and one factor comprising only two items. Communalities were higher with the six factor promax and varimax rotated models, however, in that case, two factors only contained two items each and twelve items cross-loaded. The four factor varimax and promax rotations resulted in identical factor structures; the two items loading on the weak factor in the five factor model integrated into another factor with the four factor model. The varimax rotation produced five cross loading of items while the promax rotation produced only two.

To determine if a larger sample would produce stronger statistical findings, data were re-analyzed by incorporating study participants who were missing one to two items (n = 321) on the instrument, using means replacement. The resulting analysis produced a qualitatively identical factor structure but did not improve statistical measures. Because of the drawbacks associated with imputation, final data analysis incorporated only the completed surveys.

Based on the above findings and rationale, the four factor model with promax rotation was used because it provided the best defined factor structure, demonstrating a combination of empirical findings and theoretical constructs. The magnitudes of primary loadings for the items on the pattern matrix included communalities ranging from .323 to .767. One item cross loaded between factors 2, 3, and 4, and another item cross loaded across factors 1 and 3.

Communalities are considered high if they are .8 or higher, however, these findings are unlikely to occur when working with real data, such as the data used in the social sciences. More frequently, communalities of .40 to .70 are found in social science research (Costello & Osborne, 2004). When an item has a communality of less than .40 it may not be related to the other items or may suggest that an additional factor should be explored. The researcher must decide why, or why not, the item should be incorporated at this point. According to Tabachnick and Fidell (2001), a communality of .32 is a good "rule of thumb" for minimum loading of an item, which equates to about 10% overlapping variance with other items in the factor. Cross loading indicates an item that loads .32 or higher on two or more factors (Costello & Osborne, 2004).

The nature of the items that loaded under each factor was examined to determine a label for each factor. Although there were some overlaps with the item construction as outlined in the literature, a definite pattern was evident. The researcher consulted with other experts in nursing education to determine the nature or label of factors resulting from factor analysis. Items in factor 1 focused on interprofessional communication, factor 2 on role clarification, factor 3 on health care teamwork, and factor 4 on patient-centered care. The empirical factors resulting from factor analysis aligned well with the theoretical constructs around which the instrument was designed. The factor loading matrix for the promax rotation is presented in Table 5.

T-Test.

To answer the second research question, results were compared between students from nursing programs that incorporate IPE in the curriculum to students from programs

Table 5. Factor Loadings for the 4-Factor Model with Promax Rotation

Item	Factor 1 Interpro-fessional Communication	Factor 2 Role Clarification	Factor 3 Health Care Teamwork	Factor 4 Patient-Centered Care	Communality
Demonstrate active listening by seeking clarification from other team members to resolve conflicts	.762	.061	.039	-.074	.591
Demonstrate respect for different perspectives when working with other disciplines on the health care team.	.738	.197	-.191	.016	.584
Acknowledge the ideas and solutions of other team members that appear to be better than my own.	.727	-.134	.121	.052	.590
Consider all points of view when working with team members to resolve conflicts.	.709	-.018	.223	-.152	.560
Refrain from behaving defensively when responding to feedback provided by other team members.	.677	-.060	.182	-.151	.456
Communicate respectfully in a professional manner with other team members.	.614	.132	-.150	.260	.626
Express thoughts in a respectful, objective manner when disagreeing with other team members.	.610	.100	.195	-.164	.473
Relate to other team members in a constructive manner to resolve conflict.	.608	-.118	.346	.014	.617
Listen attentively when other team members are sharing input, perspectives, and concerns.	.603	.133	-.294	.242	.513
Display trust in other team members by turning over-decision-making to the member with the greatest expertise.	.551	.027	-.116	.131	.353
Exhibit facial expressions and body language that invite others to communicate.	.533	-.021	.145	.091	.443
Acknowledge the contributions of other team members by eliciting their ideas and perspectives in the decision-making process.	.524	-.083	.411	-.037	.553
Utilize the expertise of other disciplines on the health care team.	.323	.108	.157	.195	.404
Clearly demonstrate an understanding of my own scope of practice.	.097	.720	-.175	.011	.477
Demonstrate understanding about the scope of practice of other disciplines on the health care team	.021	.625	.238	-.213	.466

Table 5. (Continued)

Item	Factor 1 Interpro-fessional Communication	Factor 2 Role Clarification	Factor 3 Health Care Teamwork	Factor 4 Patient-Centered Care	Communality
Assume responsibility for addressing a problem or issue by speaking with the individual team member involved.	.244	**.619**	-.066	-.178	.393
Provide concise, thorough, systematic data in a timely manner to other team members when communicating patient information.	-.132	**.611**	.090	.148	.487
Negotiate effectively with other team members to resolve conflict.	.084	**.558**	.064	.004	.409
Assume the role of team leader when appropriate to the situation.	-.222	**.538**	.316	.091	.514
Clearly demonstrate understanding of my own professional role and responsibilities when working with team members.	.088	**.534**	.165	.111	.575
Participate to establish consensus during conflict resolution.	.144	**.430**	.326	-.031	.533
Clearly demonstrate understanding of how my role inter-relates with the roles and responsibilities of other team members.	.210	**.421**	.114	.062	.411
Facilitate interprofessional team discussions or patient conferences when issues focus on my area of expertise.	-.193	.226	**.705**	.040	.615
Work with team members to coordinate the activities of all disciplines in providing effective patient care.	.201	-.129	**.639**	.171	.636
Demonstrate confidence in sharing professional viewpoints with other team members.	-.034	.252	**.603**	-.017	.548
Provide constructive feedback to other team members.	-.129	.249	**.602**	.062	.545
Collaborate with other team members to examine alternatives when problem-solving.	.175	-.078	**.574**	.263	.657
Work collectively with team members to demonstrate cohesiveness when interacting with patients and families.	.299	-.025	**.570**	.010	.569
Work with other team members to identify changes that need to be made in the provision of patient care.	.179	-.069	**.512**	.227	.538
Demonstrate awareness of my own strengths and limitations as a team member.	.064	.068	**.382**	.280	.438

Table 5. (Continued)

Item	Factor 1 Interprofessional Communication	Factor 2 Role Clarification	Factor 3 Health Care Teamwork	Factor 4 Patient-Centered Care	Communality
Encourage patient and family participation in decision-making regarding the plan of care	-.144	-.066	.232	**.767**	.623
Listen respectfully to the needs expressed by the patient and family when planning care.	.369	-.094	-.201	**.701**	.677
Share information with patients and families using language appropriate to their level of understanding.	.088	-.099	.120	**.679**	.560
Provide education and resources necessary to meet the learning needs of patients and families.	-.247	.164	.205	**.622**	.531
Use a common language when speaking to other members of the health care team.	.059	-.132	.317	**.528**	.495
Communicate with patients and families in a manner that reflects sensitivity to their needs.	.325	.134	-.105	**.484**	.559
Communicate the needs and preferences expressed by patients to team members.	.124	.236	.092	**.406**	.505
Cross Loading Items					
Intervene to assure that patients' rights are incorporated into the health care provided.	-.133	.280	.205	.347	.386
Provide team members with information they need in order to be a contributing member of the team.	.385	.092	.430	-.151	.452
Eigenvalue	15.04	2.58	1.4	1.36	
% of Total Variance	38.58%	6.64%	3.59%	3.48%	
Total Variance				52.28%	

Note. Loadings = > .10.
Note. Items in bold indicate primary loadings.

that do not incorporate IPE. The response rate of the two study sites that incorporated IPE was 51% (n = 93, N =181). The six study sites representing programs that do not incorporate IPE had a response rate of 54% (n = 223, N =415).

An independent-samples t-test was conducted to compare factor scores between the IPE and non-IPE groups. Results are summarized in Table 6. Significant differences were found between the mean scores for the interprofessional communication factor and health care teamwork factor between the non-IPE and IPE groups. For the communication factor, the difference between the non-IPE group and the IPE group resulted in a *t* score of (286) 2.607, p = 0.010; effect size, however, was small (effect size *r* = 0.152; Steinberg, 2011). The differences in the teamwork factor between the non-IPE group and the IPE group produced a *t* score of (286) 2.026, p = 0.044; the effect size was small (effect size *r* = 0.119).

One-way ANOVAs.

One-way ANOVAs were conducted to test for differences in mean factor scores on each demographic variable: age, gender, grade point average (GPA), and previous health care experience. No significant differences were found for either gender or previous experience. Although comparing GPA across the mean factor scores did produce significant results for the interprofessional communication factor [F (3, 288) = 2.86, *p* = 0.037], post-hoc Tukey HSD comparisons for the factor did not show significant differences in pairwise comparisons.

Because the cell size of some age groups was small (n = 10) and would weaken analysis, before conducting one-way ANOVA tests between mean factor scores and age, some age groups were combined to increase cell size. The age group of 24–26 was

Table 6. Independent T-Test Comparing Factor Scores in Non-IPE Curriculum and IPE Curriculum

	Non-IPE Curriculum	IPE Curriculum
df	203	85
Factor 1 (interprofessional teamwork)		
M	.110	-.225
SD	.976	1.035
Std Error	.069	.112
t 2.607, p (two-tailed) .010		
Factor 2 (role clarification)		
M	.059	-.120
SD	1.00	.992
Std Error	.070	.108
t 1.381, p (two-tailed) .168		
Factor 3 (health care teamwork)		
M	.082	-.178
S	.951	1.088
Std Error	.0668	.118
t 2.026, p (two-tailed) .044		
Factor 4 (patient-centered care)		
M	.055	-.090
SD	1.00	.999
Std Error	.070	.108
t 1.113, p (two-tailed) .267		

combined with the 27–30 group, and the age group of 31-40 was combined with the >41 group. Despite this effort, the cell size of the youngest age group (n = 192) was larger than the cell size of the next two succeeding age groups (n = 59 and n = 30, respectively), suggesting that the findings must be interpreted cautiously. According to Steinberg (2011), a relatively large sample size and relatively equal sample sizes are important conditions that should exist when employing the ANOVA technique.

Results showed significant differences among groups at the $\alpha < .05$ level in the role clarification factor [F (2, 287) = 6.17, $p = 0.002$], health care teamwork factor [F (2, 287) = 8.30, $p < 0.001$], and patient-centered care factor (F 2, 287) = 9.61, $p < 0.001$]. In each case, post-hoc comparisons (Tukey HSD) indicated significant differences in the mean factor score between age groups. In both the role clarification ($p = 0.002$) and interprofessional teamwork ($p < 0.001$) factors, students in the older age group (>31) rated themselves significantly higher than students in the youngest group (21–23); no significant differences were found in the 24–30 age group. For the patient-centered care factor, students in the older age group (> 31) rated themselves significantly higher than the 24–30 age group ($p = 0.003$) and the 21-23 age group ($p = 0.000$). One-way ANOVA results are summarized in Table 7.

Table 7. One-way ANOVA and Tukey HSD Post-Hoc Tests for Factors and Demographic Variables

Variable	Mean	F	Significance. Between Groups		Significance, Mean Differences Post-Hoc Tukey HSD				
Gender									
Factor 1									
Male (n = 25)	-0.0679	.152	.697						
Female (n = 264)	0.0147								
Factor 2									
Male	0.0613	.081	.776						
Female	0.0016								
Factor 3									
Male	-0.2237	1.39	.239						
Female	0.0224								
Factor 4									
Male	0.1202	.331	.566						
Female	0.0004								
Previous Experience									
Factor 1									
Yes (n = 227)	0.0025	.000	.999						
No (n = 65)	0.0026								
Factor 2									
Yes	0.0324	.743	.389						
No	-0.0886								
Factor 3									
Yes	0.0226	.304	.582						
No	-0.0549								
Factor 4									
Yes	0.0314	.705	.402						
No	-0.0866								
GPA					A -B	A-C	A-D	B-C	B-D	C-D
Factor 1					.397	.204	.996	.959	.240	.067
<3.25 (n = 29)	-0.2436	2.86	.037						
3.26-3.50 (n = 81)	0.0935								
3.51-3.75 (n - 99) 0.1675									
3.76-4.0 (n = 83) -0.1972									

Table 7. (Continued)

Variable	Mean	F	Significance. Between Groups	Significance, Mean Differences Post-Hoc Tukey HSD		
				21-23/ 24-30	21-23/>31	24-30/>31
<3.25	-0.1372	1.11	.344			
3.26-3.50	0.1560					
3.51-3.75	0.0110					
3.76-4.0	-0.0981					
Factor 3						
<3.25	0.1964	2.56	.055			
3.26-3.50	0.1390					
3.51-3.75	0.0430					
3.76-4.0	-0.2368					
Factor 4						
<3.25	-0.0558	.708	.548			
3.26-3.50	-0.0488					
3.51-3.75	0.1240					
3.76-4.0	-0.0626					
Age						
Factor 1				21-23/ 24-30	21-23/>31	24-30/>31
21–23 (n = 192)	-0.0302	.442	.643	.962	.617	.817
24–30 (n = 59)	0.0096					
>31 (n = 39)	0.1353					
Factor 2						
21–23	-0.1025	6.17	.002	.413	.002	.107
24–30	0.0812					
>31	0.4885					
Factor 3						
21–23	-0.1221	8.30	.000	.265	.000	.060
24–30	0.1022					
>31	0.5570					
Factor 4						
21–23	-0.0914	9.61	.000	.866	.000	.003
24–30	-0.0190					
>31	0.6380					

CHAPTER FIVE. DISCUSSION

Overview

As a review, a purpose of this study was to develop and examine the psychometric properties of an instrument designed to measure collaborative competencies learned during IPE by health care students. Focusing on baccalaureate nursing students, this study served to build a foundation for future research measuring collaboration in other health care disciplines. In addition, this study examined the impact of IPE on undergraduate nursing students' ability to collaborate with other members of the health care team. The primary research questions underlying this study were as follows:

1. Can the constructs identified to define collaborative competencies learned by health care students be measured in the development of a new psychometric instrument?

2. Do the collaborative competencies of baccalaureate nursing students who have IPE incorporated into the curriculum differ from nursing students who do not have IPE incorporated into the curriculum?

Data were collected during the spring semester of 2011 using an electronic version of the instrument distributed through the Group Decision Center at NDSU. The convenience sample included baccalaureate nursing students enrolled at two midwest state universities that incorporated IPE in the curriculum and six midwest state universities that did not incorporate IPE in the curriculum. Faculty, or gatekeepers, at each institution were contacted to announce the study invitation in classes and send an e-mail invitation on their student list serve.

Study Findings

Although the design of the present study incorporated only baccalaureate nursing students, the CHIPS instrument was developed to measure collaborative competencies in students from all health care disciplines. Results of the educational expert survey provided strong support that the items developed to measure the collaborative abilities in the instrument applied to the health care disciplines of dietetics, medicine, occupational therapy, pharmacy, physical therapy, respiratory therapy, and social work. Mean ratings of experts on all items except two were 4.5 or higher (SD .4) on a five-point Likert scale (1 = *does not apply to my discipline* to 5 = *applies well to my discipline*), indicating that the instrument measured desirable collaborative competencies across disciplines. The other two items were rated 4.0. Narrative comments from experts were positive regarding the instrument items, mostly providing additional support regarding the validity of the items. In fact, one expert commented in a follow-up e-mail reply: "This is the best collaborative instrument I've seen." These findings substantiate the researcher's future plans to further validate the instrument with students from other health care disciplines.

Despite the effort employed to assure a high response rate for the study survey, the estimated overall response rate was moderately low (49%), creating a potential for error and threat to external validity due to non-response (Fowler, 2009). The response rate was influenced by a variety of factors. The gatekeepers consulted at each site agreed to send the invitation to participate along with the survey link through student list serves as well as to announce the study in class. Whether the messages reached each possible participant or were ignored is unknown; therefore, the exact number of possible participants or sample frame is difficult to estimate. Because the number of senior students enrolled in each

program was used to determine the sample size, rather than the actual number of students who received the invitation to participate in the study, the response rate is most likely underestimated.

The influence each gatekeeper had over students' willingness to participate at each site may have been a factor in determining the response rate because students are likely to follow through on tasks directed by some faculty members more than others. Another factor that impacted the response rate was the timing of the first invitation's distribution after the request was made. The initial request asking gatekeepers to send the invitation with the survey link to students was sent on April 15, 2011; follow-up invitations were sent at 7- and 14-day intervals from the initial invitation. The only assurance that the invitations and follow-up invitations were sent in a timely manner was if the gatekeeper sent an e-mail reply back indicating this task was done. At one study site with a possible 100 participants, the initial invitation and survey link were not sent by the gatekeeper until the week of graduation, which most likely impacted the response rate for that site. Including a random drawing for an iPod touch or a gift of similar value as an incentive to participate did not produce an above average response rate. Finally, the researcher traveled to the IPE sites to personally announce the study in class, inviting students to participate. To minimize the potential threat to validity posed by this action, a script identical to the on-line invitation was used. Despite these efforts, the response rate at IPE sites (47%) was less than those at non-IPE sites (49%), suggesting that the personal invitation had no influence on the response rate. In hindsight, the researcher contemplated whether the benefits out-weighed the risks of making a personal announcement. The researcher was certainly introduced to the realities of survey research.

Results Related to Research Question #1.

The first research question asked whether the constructs used to define

collaborative competencies in health care students can be measured via the development of

a new psychometric instrument. Factor analysis provided the statistical evidence to

evaluate the instrument constructs and the items designed to measure the constructs. The

communalities of the measures or items ranged from .323 to .767, and the total percentage

of variance accounted for by the four factors was 52.8%. These results may be explained

by a number of claims from authorities in the literature that collaboration is a complex

process which is difficult to define and measure (Petri, 2010; Thanhausser et al., 2010).

The findings also reinforced the guiding principles outlined by Kirkpatrick in designing his

framework evaluating educational outcomes; that is, as evaluation progresses to the higher

level outcomes of behavior changes, organizational changes, and changes in patient

outcomes, gathering trustworthy and accurate data becomes more difficult. On the other

hand, the communalities found in this study are not unusual findings in the social sciences,

according to Costello and Osborne (2004), where communalities most often range from .40

to .70.

The somewhat low communalities could also have been explained by the fact that

the study sample was a convenience sample of senior-level B.S.N. nursing students.

Although the sample size was determined to be adequate using the Kaiser-Meyer-Olkin

measure of sampling adequacy and Bartlett's test of sphericity, the degree of variance in

measures was less than desirable. The mean values for instrument items ranged from 4.64

to 5.62 on a 6-point Likert scale (1 = *strongly disagree* to 6 = *strongly agree*) with standard

deviations ranging from 0.506 to 0.898. The study sample was used to control for

extraneous variables impacting collaborative competencies, however, this design may have created a sample too homogenous in nature. These results may also be explained by the nature of self-rated instruments, which will be further discussed later in this chapter. Replicating the study using a variety of health care disciplines may result in data with greater variance and, therefore, stronger factor analysis results.

Initially, extracting two factors for rotation in the factor analysis seemed to be logical because the first two factors had higher eigenvalues and were followed by a sharp drop and leveling of the scree plot. When evaluating the resulting items that loaded under the two rotated factors, one seemed to focus on role clarification and patient-centered care while the other focused on interprofessional communication. These results are consistent with findings by Suter et al. (2009) indicating that "professional role understanding" and "communicating effectively" were the two core competencies for collaboration. These authors also concluded that conflict resolution, negotiation, and coordination of care were components of communication. The items designed to measure conflict resolution and teamwork loaded on both factors in the two factor analysis; five of the seven items that cross loaded were related to teamwork. The two factor rotation only accounted for 45.2% of the variance in items and resulted in seven items that cross loaded, suggesting that the rotation was not the best choice. These findings support the need for further research.

Along the same line, the five factor structural model would seem to logically align with the theoretical structure because the study instrument was designed around five theoretical constructs. However, in the structure that resulted from the five factor rotation, only two items emerged under the last factor, both of which were designed to measure conflict resolution. Four of the other seven items designed to measure the construct of

conflict resolution loaded under the communication factor while the other three cross loaded. Thus, conflict resolution did not emerge as a separate factor in the structure resulting from this rotation. Because a rotation resulting in one factor with only two items and six items that cross loaded did not produce the strongest structure, the four factor model was chosen instead of the five factor model.

Although the structure produced from the four factor rotation of factor analysis was consistent with the literature and the CIHC framework in that four of the five constructs around which the instrument was designed emerged as factors, the factor analysis structure differed from the theoretical structure in that the items designed to measure each construct did not always load under the designated factor. Eight items were designed to measure the construct of interprofessional communication; five of these items loaded under the communication factor, one loaded under the teamwork factor, one loaded under the patient-centered care factor, and one item cross loaded.

Thirteen items loaded under the communication factor in factor analysis; in addition to the five items designed to measure communication, four of the items were designed to measure the construct of conflict resolution, two for the construct of role clarification, and two for the construct of teamwork. Six items were designed to measure the role clarification construct: four items loaded under the role clarification factor and the other two loaded under the communication factor.

Nine items loaded under the role clarification factor in the factor analysis; in addition to the four items designed to measure role clarification, three items were designed to measure the construct of conflict resolution, one the construct of communication, and one the construct of teamwork. Eleven items were designed to measure the teamwork

construct; seven items loaded under the teamwork factor, two under the communication factor, one under the role clarification factor, and one cross loaded. In factor analysis, eight items loaded under the teamwork factor and all items were designed to measure the construct of teamwork except one, which was designed to measure the construct communication.

Seven items were designed to measure the construct of patient-centered care; six of these items loaded under the patient-centered care factor and the other cross loaded. Six of the seven items that loaded under the patient-centered care factor were designed to measure the construct of patient-centered care; the other item was designed to measure the construct of communication. Finally, seven items were designed to measure the construct of conflict resolution, which did not emerge as a separate factor in the four factor model with promax rotation. Four of the items loaded under the communication factor and three under the role clarification factor.

When analyzing the nature of the items that did not load under the factors or constructs they were designed to measure, the findings are not surprising. The constructs used to design the instrument items (patient-centered care, role clarification, communication, conflict resolution, and teamwork) overlap in nature, creating competencies or behaviors that integrate with each other and are difficult to measure separately. This detail may explain why a reasonable number of factors could not account for the variance of the measures. For example, the item "display trust in other team members by turning over decision-making to the member with the greatest expertise" was designed to measure the construct of teamwork; however, in the factor analysis, the item loaded under the interprofessional communication factor. The item "assume the role as

team leader when appropriate to the situation" was developed to measure the construct of teamwork, yet in the factor analysis, the item loaded under the role clarification factor. The item "use a common language when speaking to other members of the health care team," designed to measure interprofessional communication, loaded under the patient-centered care factor. Again, the items designed to measure conflict resolution loaded across the factors of interprofessional communication and role clarification. The construct of patient-centered care aligned most closely with the designed theoretical structure. There could be a number of reasons why items loaded on factors they were not designed to measure, including problems with the specific wording of the item, the lack of variations in the participants' responses, or the problems inherent in using self-report data, as discussed in the next section.

The structure presented in the four factor model with promax rotation seemed to essentially split from the two factor rotation model. The first factor emerging from the two factor model, which focused on role clarification and patient-centered care, separated into two factors in the four factor model (role clarification and patient-centered care). The second factor, which focused on interprofessional communication, became more clearly delineated to focus on the construct of communication. Finally, the construct of interprofessional teamwork became more clearly defined as an independent factor. The four factor model reflected the constructs outlined in the literature, CIHC framework, and findings from Suter et al. (2009). Furthermore, the model reflected four of the five theoretical constructs around which the instrument was developed: patient-centered care, role clarification, interprofessional communication, and teamwork. Based on this finding, the structure created with factor analysis provided some empirical evidence that the

constructs used to design the instrument exist and are relevant for this population. The high inter-correlation coefficients among the items for each construct also provided evidence that the items are reliable in measuring the constructs.

Results indicate that patient-centered care, role clarification, interprofessional communication, and teamwork are constructs that can be used to design competencies for collaboration. The fact that items related to conflict resolution are integrated into the communication and role clarification factors may be explained in a number of ways. The findings may indicate that the items designed to measure conflict resolution are not effective measures of this construct. A more plausible explanation is that, rather than being a separate construct, conflict resolution integrates throughout the collaborative process. Much of the literature related to conflict resolution points to the importance of respecting the roles and perspectives of other team members and using communication techniques to address and resolve the conflicts. Thus, these behaviors certainly intertwine with the constructs of communication, and role clarification.

Other explanations about why conflict resolution did not emerge as a separate factor may be the use of self-report data and the lack of variability in the participant responses. Findings that may result when preceptors or supervisors rate students' collaborative behaviors may produce different data, resulting in a factor structure different than the structure produced in the current study. A final possible explanation for this finding is the influence of age-related aspects on the participants' ratings of the items designed to measure conflict resolution. A majority (66%) of the study participants were age 21 to 23; they may have had less experience with conflicts and conflict resolution, particularly conflicts that arise in the work setting.

Possible Impact of Self-Report Data on Findings.

The literature addressing the self-appraisal instruments does suggest that the nature of self-report data could have impacted study findings, producing a factor structure slightly different than the theoretical structure reflected in the literature. When asked to complete a self- assessment, numerous studies have demonstrated that people typically overestimate the quality of their performance and abilities related to intellectual and social tasks (Ehrlinger, Johnson, Banner, Dunning, & Kruger, 2008; Kruger & Dunning, 2009). Kruger and Dunning (2009) describe this phenomenon as metacognition, which refers to the "ability to know how well one is performing, when one is likely to be accurate in judgment, and when one is likely to be in error" (p. 31). Studies reveal that the overestimation of abilities is more profound for those individuals who perform poorly or at an incompetent level because they lack the skills and knowledge necessary to evaluate competence in themselves or others. Incompetence in individuals creates a double curse in that the knowledge that is lacking to perform well is the same knowledge that is lacking to recognize the magnitude of their deficits. Thus, incompetence or a lack of knowledge hinders self-insight leading to the saying "you don't know what you don't know." The same research indicates that top performers consistently underestimate how superior or distinctive their abilities are as compared to their peers, which interferes with their self-insight. The literature also suggests that people hold beliefs about their competence to a logically impossible degree, sometimes described as the "above average effect" or the tendency of all individuals to believe their performance is "above average," which is statistically impossible. (Ehrlinger et al., 2008; Kruger & Dunning, 2009).

Throughout the literature, three plausible explanations for the dramatic over confidence or inaccurate self-assessment that is seen in unskilled people are suggested by authorities (Ehrlinger et al., 2008). The first explanation is that unskilled individuals lack the competence for accurate self-assessment. Second, some authorities argue that the results can be explained by statistical error or artifact, for example regression to the mean. A third explanation is the unskilled participants' goal to preserve a positive self-image even if the assessment is not accurate; incompetent participants are not unable to provide an honest self-appraisal; they are simply not motivated to be accurate in the process.

Ehrlinger et al. (2008) conducted a series of five studies to examine the relationship between self-insight and level of competence as well as the prevailing explanations found in the literature for inaccurate self-assessments. The methodology included the use of "real world" or "ecologically valid" measures that were not simply contrived in a laboratory setting. Four of the studies were conducted in the college setting, investigating performance on a class examination and at a debate competition. In an effort to include the non-student population, one of the studies examined knowledge related to gun safety at a gun club competition. In each study, participants were asked to estimate their scores on the measured task and to estimate their performance compared to their peers.

Overestimation of abilities among poor performers was found in all the tasks measured and in each setting. Poor performers were over confident in their absolute performance (e.g., actual test scores or judge's ratings on debate performance) and when comparing their performance to peers. Test-retest reliability and internal consistency measures demonstrated that the pattern of overestimation was not attributed to statistical artifact. In two studies, participants were provided monetary motivation ($5.00 and

$100.00) to provide accurate self-assessments; poor performers overestimated their abilities despite the incentives for accuracy. In study five, a social incentive to improve accuracy was employed, having a random group of students justify their answers to the professor after the exam. Results indicated no improvement in the accuracy with which poor performers appraised their performance. In all the studies, top performers were more accurate in their self-assessments but misjudged the performance of their peers. When asked to compare their performance with peers, top performers consistently underestimated their performance because they tended to overestimate how well their peers were performing. Because they did well, they assumed others performed equally well. However, on absolute measures when asked to assess only their performance, top performers were accurate in their self-appraisal.

Similar findings were found by Kruger and Dunning (2009), who conducted a series of four studies to examine the relationship between inaccurate views of self- abilities and metacognitive skills on tests of humor, grammar, and logic among undergraduate students. Participants were asked to rate their scores on the exam (absolute performance) and their skills and performance on the exam as compared to the other participants (comparative performance). In all four studies, participants in the bottom quartile grossly overestimated their test performance and perceived themselves to perform above average. The researchers concluded that these findings point to the lack of metacognitive skills among the less competent participants. In the fourth study, after a logical reasoning test was administered, half of the participants were randomly selected to complete a brief logical training packet describing the techniques for logical testing. The other participants were given a filler task. Afterward, the participants reviewed their test and re-estimated

their performance. Overall, competent and incompetent participants who received the training packet graded their tests more accurately than those participants who did not receive the training during the re-assessment process. Poor performers became significantly more accurate in self-appraisal after their logical reasoning skills were improved. These findings suggest that improving participants' metacognitive skills improves the accuracy of self-appraisal.

Like previous studies, Kruger and Dunning (2009) found that participants in the top quartile underestimated their ability. The researchers concluded that the top performers fall prey to the "false consensus effect" in assuming that, because they performed well, all participants must have performed well. Although they underestimated their comparative abilities, estimates of their absolute abilities, or actual scores, were accurate. Once the top quartile participants learned how poorly many of their peers performed, their self-appraisals were raised to more accurate levels.

The literature related to self-appraisal may explain the findings related to the factor structure in the current study. All students in this study perceived their collaborative abilities to be strong, as evidenced by the high mean ratings on every instrument item and the narrow range of variation in responses. In contrast, IPE experts who evaluated the instrument items considered many of the behaviors to be high level and potentially unrealistic. These findings are consistent with the self-report literature indicating that people tend to overestimate their abilities and believe they perform "above average." Some participants, perhaps those who were less competent, may have overestimated their abilities while other participants, perhaps those who were highly competent, may have underestimated their abilities. Thus, the fact that most students believed they demonstrated

a high level of competence in all the collaborative behaviors measured by the instrument may be explained by a lack of metacognitive skills to provide an accurate self-appraisal. Another explanation is that because students believe that they are expected to rate highly on the collaborative behaviors, they automatically rate themselves high. Finally, the explanation that students who enter nursing tend to be collaborative in nature and well prepared to hone collaborative skills is also plausible. The uncertainty about the best explanation for these study findings points to the need for further research.

Results Related to Research Question #2.

The second research question addressed whether the collaborative competencies of baccalaureate nursing students who have IPE incorporated into the curriculum differ from nursing students who do not have IPE incorporated into the curriculum. Although t-test results indicated that significant differences existed between the IPE and non-IPE groups for the interprofessional communication and teamwork factors, the small effect size suggests that the results may not be meaningful (Steinberg, 2011). Because standard deviations on item analysis for the entire group ranged from .506 to .898, there may not have been enough variance in responses to create a larger effect size.

Despite the low effect size, the t-test findings were interesting, revealing that students who did not experience IPE rated themselves higher in achieving communication and teamwork competencies than those who did have IPE in their curriculum. These findings are not consistent with those in the longitudinal study conducted by Pollard and Miers (2008). Their study differed from this study in that collaborative attitudes and perceptions of students and graduates were measured rather than the participants' perceptions of their collaborative abilities; the study sample consisted of nine to ten

different health care disciplines rather than one, and data were collected on three different cohort groups at four points between program entry and up to one year into practice. For both the IPE and non-IPE groups in Pollard and Miers' (2008) study, students exhibited positive perceptions about their own communication and teamwork skills at the point of graduation. Students exposed to IPE were more positive about their own interprofessional relationships than those taught in a uniprofessional curriculum. Comparing results from Pollard and Miers to the current study results is challenging because the two studies varied significantly in methodology. The longitudinal nature of the data collection in their study allowed for data comparisons over time so that changes in perceptions and attitudes could be better tracked. Also, incorporating many disciplines may have produced more variation in participant responses, providing strong data for analysis. Finally, instrument items measuring attitudes and behaviors are different from the items measuring collaborative behaviors in the current study, making comparisons between the two study findings even more difficult.

The differences between the IPE and non-IPE group results can also be compared to the longitudinal study by McFadyen et al. (2010) who investigated the impact of IPE on the attitudes and perceptions of students in seven health care disciplines using RIPLS and IEPS instruments. Mean scores on the RIPLS remained consistent across time for students in the non-IPE curriculum while those in the IPE group declined, showing lower levels of readiness for interprofessional learning related to teamwork and collaboration as well as professional identity. The authors suggested the responses indicated that the idealistic perceptions and attitudes often present in the pre-IPE curriculum lowers to more realistic levels during the IPE curriculum. Mean scores for the sub-scale measuring roles and

responsibilities increased slightly for both the IPE and non-IPE groups over time as students became more aware of their roles and responsibilities with more education and clinical practice. The nursing students in the McFadyen et al. study (2010) were the only discipline group that did not show improvement in attitudes and perceptions related to IPE over time. This finding is consistent with t-test results in the current study, indicating that the nursing students exposed to IPE had less positive perceptions of their communication and teamwork skills than nursing students in non-IPE curriculums. IEPS results in McFadyen et al. (2010) revealed that students in the IPE curriculum showed a greater improvement over time in their perceptions of actual cooperation and the perceived need for cooperation among health care disciplines than students in the non-IPE curriculum. These aspects were not measured in the instrument designed for the current study.

A possible explanation for the t-test results between the IPE and non-IPE groups in this study and for findings by McFadyen et al. (2010) is the nature of self-reporting data. The fact that students in the non-IPE group rated themselves higher than the IPE group in collaborative skills related to communication and teamwork may be explained by a lack of metacognitive skills to accurately appraise their own abilities. Students who lack exposure to IPE in the classroom and clinical activities may lack awareness about the complex nature of collaboration, underestimating the knowledge and skills required to collaborate effectively. In other words, the non-IPE students might not know what they do not know when perceiving their own collaborative abilities, hindering self-appraisal. Nursing students who have interacted with other disciplines in IPE may have a greater appreciation of the skills required for effective collaboration and, therefore, may have been more realistic in their self-appraisal.

Results of the one-way ANOVA reveal that age makes more of a difference than GPA, gender, or previous health care experience in students' perceptions about their collaborative abilities. Older students rate their collaborative abilities related to role clarification, teamwork, and patient-centered care higher than younger students. Because the number of students in the 24-30 (n = 59) and > 41 (n = 39) age groups was small as compared to the 21-23 (n = 192) age group, ANOVA results comparing mean factor scores should be interpreted cautiously.

The fact that older than average students perceived their collaborative abilities related to role clarification, interprofessional teamwork, and patient-centered care to be significantly higher than younger students may be explained by adult learning theory. According to the theory, older than average students come to the learning process with more life and job related experience, providing them with a rich resource for learning and application (Merriam, Caffarella, & Baumgartner, 2007). Adults have a greater volume and different quality of life experiences than younger learners, which most likely arms them with better resources to build higher level skills such as the interpersonal skills required for collaboration. For example, older than average students have often had experiences with a family member or significant other admitted to the hospital or involved in a complex situation, providing them an opportunity to see teamwork in action or to be involved in the collaborative process. Because older than average students may have more job experience or may be working towards a second career, they may have developed more sophisticated interpersonal skills. Often, they have had more experience interacting with seasoned adults. In addition, because adult learners are known to be self-motivated and task-oriented, when they are learning and encountering new experiences, they may reflect more on how new

information and skills can be applied to life skills and future responsibilities. Because they are influenced by both intrinsic and extrinsic motivators, adult learners may come to the education process hoping to develop higher level skills such as those required by collaboration. Finally, adult learners are relevancy-oriented, which suggests that they are more likely to acknowledge the practical implications of developing collaborative skills. From an adult theory and developmental perspective, older students may be better equipped to collaborate with other disciplines, and therefore, be more confident in their own abilities (Merriam et al., 2007).

Recently Published Collaborative Competency Framework

The CHIPS instrument designed to measure collaborative behaviors in health care students for this study was based on an extensive literature review, a qualitative study by Suter et al. (2009), and the Canadian Interprofessional Health Collaborative (CIHC) framework (2010). During the data collection phase of this study, the Interprofessional Education Collaborative (IPEC) Expert Panel in the United States published *Core Competencies for Interprofessional Collaborative Practice* (May 2011). The competencies were analyzed by this study's author for comparison with the study instrument. Of importance to note, the IPEC Expert Panel cited the study by Suter et al. (2010) and the CIHC framework as key documents used in developing the competencies, providing evidence that experts in IPE agree with the author of the current study about the most relevant data for competency development. The competencies outlined by IPEC are broad and include statements that encompass several collaborative behaviors, similar to the competencies presented in the CIHC framework. To become objective measurements, the

competencies will need to be further developed into items on an instrument in an operationalized manner.

The IPEC framework includes four competency domains: values/ethics for interprofessional practice; roles/ responsibilities; interprofessional communication; and teams and teamwork (IPEC Expert Panel, 2011). The last three domains compare well with the constructs around which the present study instrument was designed, the findings by Suter et al. (2009), and the CIHC competency framework (2010). The first domain places values and ethics into their own separate entity rather than integrating them into other competencies, emphasizing that they are important aspects in the development of professional identity. IPEC authorities argue that the traditional educational approach in which disciplines teach values and ethics as a part of professionalism in their own program creates barriers among the professions. IPEC promotes a new, "virtues in common" approach, addressing values and ethical principles common across all the health care disciplines (IPEC Expert Panel, 2011). In contrast, the CIHC framework (2010) emphasizes that mutual respect and trust are considered foundational to interprofessional collaboration and are woven throughout all aspects of collaboration, an argument well supported in the literature.

Like other IPE authorities, the panel of experts creating the IPEC framework identified the need for well-developed instruments to evaluate collaborative competencies for health care students, echoing this need as the "next step" in IPE development and research (IPEC Expert Panel, 2011). Based on current changes in the health care system, IPEC experts predict that the momentum towards adopting IPE in health care curricula will

accelerate in the near future, indicating that the time is right for transformational changes in health care education.

Study Conclusions

Health care education has been challenged by governmental, philanthropic, and accreditation agencies to prepare graduates with the collaborative skills required to practice effectively on the health care team. To answer this call, health care education must incorporate these skills into the curriculum, and students must develop and practice the attitudes, knowledge, and behaviors that embrace and promote collaboration in order to enter practice prepared for teamwork. IPE has been identified as an effective strategy to accomplish this goal.

In order to determine if IPE improves collaboration in graduates of health care programs, outcomes must be evaluated in education and the practice setting at all levels outlined in the modified Kirkpatrick evaluation framework. Valid tools have been developed to measure students' attitudes and perceptions regarding IPE (level 2) and have produced evidence that IPE does improve attitudes and perceptions related to collaboration, at least on a short-term basis. Authorities agree that the next step in IPE research is to evaluate whether IPE improves health care students' collaborative skills or behaviors and to determine whether this transfers to professional practice (level 3). A major factor hindering this research is the lack of valid instruments measuring collaborative behaviors. The fact that authorities have had difficulty agreeing upon and defining collaborative behaviors has made instrument development difficult. However, frameworks outlining collaborative competencies for health care students have been

emerging in the literature over the past 2-3 years, providing the necessary information to move IPE forward.

This study provides beginning empirical evidence that the constructs defining collaborative competencies outlined in the literature and the CIHC framework exist and can be used to measure the perceptions health care students have about their ability to collaborate on the health care team. The constructs of patient-centered care, role clarification, communication, and teamwork were delineated in a factor analysis of the study instrument. Additional research will reveal if conflict resolution is a separate construct or is integrated throughout role clarification and communication. If the effectiveness of IPE can be substantiated, faculty and administrators for health care programs will be more eager to incorporate IPE into their curriculums.

Once the relationship between IPE and collaboration is determined, the next step in IPE evaluation will be to examine whether IPE delivered pre-licensure improves teamwork in the practice setting. If so, whether improved collaboration leads to improved safety, quality, and effectiveness in patient care within the health care delivery system (level 4.a) will need to be determined. The final step, as depicted in the modified Kirkpatrick framework is to evaluate if IPE has a positive impact on patient outcomes (level 4.b). Evidence at each level will be imperative in determining the future of IPE.

Study Implications

Now that the IPEC collaborative competency framework has been published, the CHIPS instrument developed in the present study must be evaluated to determine if the items reflect the competencies outlined by the United States' IPE organization. Based on

this review, items may need to be revised, added, or deleted. Once completed, research must be done to establish psychometric measures of the revised instrument.

In order to further establish the instrument's validity and reliability, future research is needed to investigate the CHIPS instrument's psychometric properties using factor analysis with a larger, broader sample that incorporates various health care disciplines. Such a sample may provide more variance in item responses, creating stronger data to evaluate the measures. Using this study design, collaborative competencies can be compared across disciplines. Once additional instruments are created to evaluate collaborative abilities, research should be done to compare the results between instruments, establishing concurrent validity.

This study provides a comparison for future studies in which instructors, preceptors, supervisors, and/or colleagues can rate the collaborative competencies of students and/or new graduates. Minor adaptations can be made in the phrasing of items to revise the CHIPS instrument from that of self-rating to ratings by others. Such studies will require a new factor analysis, comparing the structure created with self-rating data to the structure created by other raters. In addition to a research tool, the instrument can be used as a teaching tool in evaluating student performance. Comparing students' self-perception of their abilities to the ratings of others will provide valuable information to evaluate students' actual collaborative abilities and to provide direction in developing strategies to improve collaborative performance.

Once the CHIPS instrument's psychometric properties are well established, it can be used to determine whether IPE is effective in developing collaboration skills among in students and new health care professionals. The collaborative competencies of graduates

from health care programs that incorporate IPE should be compared to graduates without IPE. The instrument should be used to study graduates of health care programs at graduation and at 3-6 months into practice to determine whether collaborative skills are being used in professional practice, and if those who had IPE collaborate more or less effectively compared to those who did not have IPE. Study methodology could incorporate a 360-degree approach to evaluation, including self, colleague, and supervisor evaluations of the graduate's collaborative abilities. In addition, longitudinal studies should be conducted to measure collaborative competencies for health care students before IPE, after IPE, at graduation, and 3-6 months into practice to determine if collaboration improves.

Finally, assuming that the value of IPE is substantiated, research should focus on analyzing different methods or approaches to IPE to determine if one approach is more effective in improving collaboration than others. Ongoing research must also be conducted in health care organizations to determine if graduates from health care programs that incorporate IPE are better prepared to collaborate on the health care team. Research must continue to be conducted in the health care industry to determine if improved collaboration by the health care team contributes to positive organizational changes (Kirkpatrick's level 4.a) and improved patient outcomes (Kirkpatrick's level 4.b).

Health care education has been challenged to incorporate IPE in curriculums for over 30 years. Recent changes in the country's health care system and national health care reform have resulted in more pressure to change the way health care professionals are educated, creating more momentum for IPE. By providing beginning empirical evidence for the development of an instrument to measure collaborative behaviors for health care

students, the current study has made progress in answering the call to take the "next step"

in IPE research.

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APPENDIX A. NDSU IRB APPROVAL

NDSU

NORTH DAKOTA STATE UNIVERSITY

701.231.8995
Fax 701.231.8098

Institutional Review Board

Office of the Vice President for Research, Creative Activities and Technology Transfer
NDSU Dept. 4000
1735 NDSU Research Park Drive
Research 1, P.O. Box 6050
Fargo, ND 58108-6050

Federaltwide Assurance #FWA00002439
Expires April 24, 2011

Monday, January 31, 2011

Dr. Nathan Wood
School of Education
201G FLC

Re: IRB Certification of Human Research Project:

"Development of an Instrument to Measure Collaborative Competencies in Interprofessional Education (IPE)"
Protocol #**HE11158**

Co-investigator(s) and research team: **Carla Gross**

Study site(s): **SDSU, UND, U of M, MSUM, and NDSU**   Funding: **n/a**

It has been determined that this human subjects research project qualifies for exempt status (category # 2) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, *Protection of Human Subjects*). This determination is based on the protocol form received 1/28/11 and consent/information sheet received 1/28/11.

Please also note the following:

- This determination of exemption expires 3 years from this date. If you wish to continue the research after 1/30/2014, the IRB must re-certify the protocol prior to this date.
- The project must be conducted as described in the approved protocol. If you wish to make changes, pre-approval is to be obtained from the IRB, unless the changes are necessary to eliminate an apparent immediate hazard to subjects. A *Protocol Amendment Request Form* is available on the IRB website.
- Prompt, written notification must be made to the IRB of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.
- Any significant new findings that may affect the risks and benefits to participation will be reported in writing to the participants and the IRB.
- Research records may be subject to a random or directed audit at any time to verify compliance with IRB policies.

Thank you for complying with NDSU IRB procedures; best wishes for success with your project.

Sincerely,

Kristy Shirley, CIP, Research Compliance Administrator

APPENDIX B. NDSU PROTOCOL AMMENDMENT FORM

Institutional Review Board   ...for the protection of human participants in research

North Dakota State University
Sponsored Programs Administration
1735 NDSU Research Park Drive
NDSU Dept #4000
PO Box 6050
Fargo, ND 58108-6050   231-8995(ph) 231-8098(fax)

APR 1

Protocol Amendment Request Form

Changes to approved research may not be initiated without prior IRB review and approval, except where necessary to eliminate apparent immediate hazards to participants. Reference: SOP 7.5 Protocol Amendments.

Examples of changes requiring IRB review include, but are not limited to changes in: investigators or research team members, purpose/scope of research, recruitment procedures, compensation scheme, participant population, research setting, interventions involving participants, data collection procedures, or surveys, measures or other data forms.

Protocol Information:

Protocol #: **HE11158**   Title: **Development of an Instrument to Measure Collaborative Competencies in Interprofessional Education (IPE)**

Review category: ☒ Exempt   ☐ Expedited   ☐ Full board

Principal Investigator: **Dr. Nathan Wood**   Email address: **Nathan.Wood@ndsu.edu**
Dept: **Doctoral Education**

Co-Investigator: **Carla Gross**   Email address: **Carla.Gross@ndsu.edu**
Dept: **Doctoral Education/ Nursing**

Principal Investigator signature, Date:

Description of proposed changes:

1. Date of proposed implementation of change(s)*: **April 15, 2011**
   * *Cannot be implemented prior to IRB approval unless the IRB Chair has determined that the change is necessary to eliminate apparent immediate hazards to participants.*

2. Describe proposed change(s), including justification:
   In an effort to increase the number of responses to the survey for factor analysis data, the following additional sites (BSN nursing programs at state universities in North Dakota and Minnesota) were added to the study: Minot State University, Saint Cloud State University, Bemidji State University, and Winona State University. Only Minot State University required a formal IRB board approval submission (in process). The other three sites did not require IRB approval since the principal investigator was not formally associated with the institution.

3. Will the change involve a change in principal or co- investigator?

APPENDIX C. MINOT STATE IRB APPROVAL

Institutional Review Board

M I N O T   S T A T E   U N I V E R S I T Y

500 University Avenue West • Minot, North Dakota 58707 • (701) 858-3125 • 1-800-777-0750 • FAX (701) 858-4286

<u>Notice of IRB Approval</u>

Name of Principal Investigator: Carla Gross

University Address: NDSU Nursing

Title of Project: *Development of an Instrument to Measure Collaborative Competencies in Interprofesssional Healthcare Education*

April 8, 2011

The above project has been reviewed and approved by the IRB under the provisions of Federal Regulations 45 CFR 46.

This approval is based on the following conditions:

1. The materials you submitted to the IRB provide a complete and accurate account of how human subjects are involved in your project.

2. You will carry on your research strictly according to the procedures as described in materials presented to the IRB.

3. You will report to the chair of the Institutional Review Board any changes in procedures that may have a bearing on this approval and require another IRB review.

4. If any changes are made, you will submit the modified project for IRB review.

5. You will immediately report to the IRB Chair any problems that you encounter while using human subjects in your research.

Dr. Brent A. Askvig
Chair, Minot State University's IRB

APPENDIX D. MINNESOTA STATE UNIVERSITY MOORHEAD

IRB APPROVAL

February 13, 2011

Carla Gross, MS, RN

Dear Carla,

This is to inform you that the MSU Moorhead School of Nursing and Healthcare Leadership faculty and Departmental Review Committee (DRC) have reviewed your request to invite our nursing students to participate in your research Pilot project this spring. This permission is granted.

We look forward to working with you in this process. Please contact me to continue with this process, so we may utilize our listserve to invite students.

Please contact me with any questions or concerns.

Regards,

Barbara J. Matthees, PhD, RN, CNE
Professor and Chair

218.477.2695
matthees@mnstate.edu

APPENDIX E. UND IRB APPROVAL

U N I V E R S I T Y   O F   UND   N O R T H   D A K O T A

February 9, 2011

Carla Gross
NDSU Dept. 2670, P. O. Box 6050
Fargo, ND 58108-6050

Dear Ms. Gross:

We are pleased to inform you that your project titled, "Development of an Instrument to Measure Collaborative Competencies in Interprofessional Healthcare Education" (IRB-201102-225) has been reviewed and approved by the University of North Dakota Institutional Review Board (IRB). The expiration date of this approval is March 15, 2012.

As principal investigator for a study involving human participants, you assume certain responsibilities to the University of North Dakota and the UND IRB. Specifically, any adverse events or departures from the protocol that occur must be reported to the IRB immediately. It is your obligation to inform the IRB in writing if you would like to change aspects of your approved project, prior to implementing such changes.

When your research, including data analysis, is completed, you must submit a Research Project Termination form to the IRB office so your file can be closed. A Termination form has been enclosed and is also available on the IRB website.

If you have any questions or concerns, please feel free to call me at (701) 777-4079 or e-mail michellebowles@mail.und.edu.

Sincerely,

Michelle L. Bowles, M.P.A.
IRB Coordinator

MLB/jle

Enclosures

APPENDIX F. CONSENT FORM

North Dakota State University (NDSU)
School of Education
Family Life Center 210
NDSU Dept. #2625
Fargo, ND 58108-6050

NDSU RESEARCH STUDY

Dear Nursing Student,

I am a doctoral student at North Dakota State University who is conducting research on a newly developed survey instrument to measure the collaborative competencies of students in health care professional programs. The University supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present research study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

The present research study is designed to assess your perception of your ability to collaborate with other members of the health care team. The information obtained will help to establish validity and reliability of the survey. You are asked to connect to the internet link and complete the online survey. The time estimated to complete the survey is approximately 15 minutes. Although your participation in this study may not directly benefit you, the information will be useful in defining and measuring the collaborative behaviors of students during the education of health care professionals and entry into professional practice.

Your participation is solicited, although strictly voluntary. In an effort to compensate you for your time, you will be invited to submit your name and contact information in a random drawing for an iPod Touch. Your chances of winning the drawing are approximately one in four hundred. The link for the random drawing will be separate from the survey link assuring that no identifying information will be stored with the survey data. Your information will be combined with information from other people taking part in the study; any reports written will present combined information that has been gathered. You will not be identified in these written materials. The results of the study may be published, however, your name and other identifying information will be kept private. There are no known risks associated with participation. By completing and submitting the survey, you are consenting to participate in the study.

If you have questions about this survey or study, contact Carla Gross at (701) 231-7840 or by e-mail Carla.Gross@ndsu.edu. Additionally, if you have questions regarding the right of human research subjects or to report a problem, please contact the NDSU IRB (701) 231-8908. Thank you for your participation in this study.

Sincerely,
Carla Gross, Associate Professor
Nursing Department
North Dakota State University
Fargo, ND 58108

APPENDIX G. ELECTRONIC EXPERT SURVEY

Collaborative Healthcare Interprofessional Survey (CHIPS)

Although student attitudes and perceptions related to interprofessional education (IPE) have been measured extensively, collaborative behaviors have not been investigated. For my dissertation, I plan to measure the psychometric properties of an instrument designed to measure interprofessional collaborative abilities in healthcare students. The most current version of the instrument includes items related to the constructs outlined in the collaborative framework published by the Canadian Interprofessional Health Collaborative (February, 2010): patient-centered care, role clarification and appreciation, interprofessional communication, conflict resolution, and collaborative leadership/ teamwork. The instrument items are designed to measure collaborative behaviors achieved by the student at the end of the professional program (outcome) and alumni early in professional practice. The instrument can be used as a self evaluation tool or as a tool rated by an instructor, colleague, or supervisor.

Although this research study will focus on baccalaureate nursing students, future research on the instrument is planned to incorporate students from other healthcare disciplines. As an expert in healthcare education, I am asking you to examine each instrument item to determine whether or not it applies to your discipline. In the comment section, please indicate how the instrument could be revised to make it more applicable to your discipline or to make it more clear in general. As a token of appreciation for your time and effort, you will be compensated with a visa gift card once your input is submitted.

Please submit the survey by February 18th.

Collaborative Healthcare Interprofessional Survey (CHIPS)

Patient-Centered Care

1 Share information with patients and families using language appropriate to their level of understanding.

        1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

2 Encourage patient and family participation in decision-making regarding the plan of care.

        1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

3 Communicate with patients and families in a manner that reflects sensitivity to their needs.

        1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

4 Listen respectfully to the needs expressed by the patient and family when planning care.

        1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

5 Provide education and resources necessary to meet the learning needs of patients and families.

        1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

6 Intervene to assure that patients' rights are incorporated into the health care provided.

        1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

7 Communicate the needs and preferences expressed by patients to team members.

        1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

Other behaviors related to patient-centered care important to include?

20%

Collaborative Healthcare Interprofessional Survey (CHIPS)

Role Clarification

1 Clearly demonstrate understanding of my own professional role and responsibilities when working with team members.

            1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

2 Clearly demonstrate understanding of how my role interrelates with the roles and responsibilities of other team members.

            1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

3 Clearly demonstrate an understanding of my own scope of practice.

            1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

4 Exhibit knowledge about the scope of practice of other disciplines on the health care team.

            1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments: _____

5 Utilize the expertise of other disciplines on the health care team.

            1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

6 Demonstrate respect for different perspectives when working with other disciplines on the health care team.

            1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

Other behaviors related to role clarification important to include?

35%

Save Next

Collaborative Healthcare Interprofessional Survey (CHIPS)

Interprofessional Communication

1 **Communicate respectfully in a professional manner with other team members.**

      1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

2 **Exhibit facial expressions and body language that invite others to communicate.**

      1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

3 **Listen attentively when other team members are sharing input, perspectives, and concerns.**

      1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

4 **Provide concise, thorough, and systematic data in a timely manner to other team members when communicating patient information.**

      1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

5 **Use a common language when speaking to other members of the health care team.**

      1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

6 **Provide constructive feedback to other team members.**

      1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

7 **Refrain from behaving defensively when responding to feedback provided by other team members.**

      1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments:

8 **Demonstrate active listening by seeking clarification from other team members when needed.**

    1 2 3 4 5

Does not apply to my discipline ○ ○ ○ ○ ○ Applies well to my discipline

Comments: _____

Other behaviors related to interprofessional communication important to include?

55%

Save Next

Collaborative Healthcare Interprofessional Survey (CHIPS)

Conflict Resolution

1 Assume responsibility for addressing a problem or issue by speaking with the individual team member involved.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments.

2 Express thoughts in a respectful, objective manner when disagreeing with other team members.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments:

3 Relate to other team members in a constructive manner to resolve conflicts.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments:

4 Negotiate effectively with other team members to resolve conflicts.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments:

5 Acknowledge the ideas and solutions of other team members that appear to be better than my own.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments:

6 Consider all points of view when working with team members to resolve conflicts.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments:

7 Participate to establish consensus during conflict resolution.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments.

Other behaviors related to conflict resolution important to include?

73%

Collaborative Healthcare Interprofessional Survey (CHIPS)

Teamwork/ Collaborative Leadership

1 Demonstrate confidence in sharing professional viewpoints with other team members.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments

2 Work with other team members to identify changes that need to be made in the provision of patient care.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments

3 Provide team members with information they need in order to be a contributing member of the team.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments

4 Collaborate with other team members to examine alternatives when problem-solving.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments

5 Work with team members to coordinate activities of all disciplines in providing effective patient care.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments.

6 Facilitate interprofessional team meetings or case conferences related to individual patients and families.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments

7 Acknowledge the contributions of other team members by eliciting their ideas and perspectives in the shared decision-making process.

        1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments

8 Display trust in other team members by turning over decision-making to the member with the greatest expertise.

1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments:

9 Work collectively with team members to demonstrate cohesiveness when interacting with patients and families.

1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments:

10 Assume the role as team leader when appropriate to the situation.

1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments:

11 Demonstrate awareness of my own strengths and limitations as a team member.

1 2 3 4 5

Does not apply to my discipline   Applies well to my discipline

Comments:

Other behaviors related to teamwork important to include?

100%   Save Next

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Collaborative Healthcare Interprofessional Survey (CHIPS)

Thank you. Your time and effort in participating in this survey are greatly appreciated.

Finish

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APPENDIX H. ELECTRONIC STUDY SURVEY

Collaborative Healthcare Interprofessional Survey (CHIPS)

North Dakota State University (NDSU)
School of Education
Family Life Center 210
NDSU Dept #2625
PO Box 6050
Fargo ND 58108-6050

NDSU RESEARCH STUDY

Dear Nursing Student,

I am a doctoral student at North Dakota State University who is conducting research on a newly developed survey instrument to measure the collaborative competencies of students in health care professional programs. The University supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present research study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

The present research study is designed to assess your perception of your ability to collaborate with other members of the health care team. The information obtained will help to establish validity and reliability of the survey. You are asked to connect to the internet link and complete the online survey. The time estimated to complete the survey is approximately 10 minutes. Although your participation in this study may not directly benefit you, the information will be useful in defining and measuring the collaborative behaviors of students during the education of health care professionals and entry into professional practice.

Your participation is solicited although strictly voluntary. In an effort to compensate you for your time, you will be invited to submit your name and contact information in a random drawing for an iPod Touch or item of similar value. Your chances of winning the drawing are approximately one in four hundred. The link for the random drawing will be separate from the survey link assuring that no identifying information will be stored with the survey data. Your information will be combined with information from other people taking part in the study; any reports written will present combined information that has been gathered. You will not be identified in these written materials. The results of the study may be published; however, your name and other identifying information will be kept private. There are no known risks associated with participation. By completing and submitting the survey, you are consenting to participate in the study.

If you have questions about this survey or study, contact Carla Gross at (701) 231-7840 or by e-mail Carla Gross @ndsu.edu. Additionally, if you have questions regarding the right of human research subjects or to report a problem, please contact the NDSU IRB (701) 231-8908. Thank you for your participation in this study.

Sincerely,
Carla Gross, Associate Professor
Nursing Department
North Dakota State University
Fargo ND 58108

Collaborative Healthcare Interprofessional Survey (CHIPS)

Thank you for taking time to complete this survey. As a doctoral student at North Dakota State University, I am conducting a survey to evaluate your collaborative abilities. Your feedback will be used to improve the way nursing education prepares students to collaborate with other professionals on the healthcare team. This survey should only take about ten minutes of your time. Your answers will be anonymous

Next

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Collaborative Healthcare Interprofessional Survey (CHIPS)

Section I: Response Items

I know how to:	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
clearly demonstrate an understanding of my own scope of practice.						
provide concise, thorough, and systematic data in a timely manner to other team members when communicating patient information.						
demonstrate understanding about the scope of practice of other disciplines on the health care team						
negotiate effectively with other team members to resolve conflicts						
assume responsibility for addressing a problem or issue by speaking with the individual team member involved						
listen attentively when other team members are sharing input, perspectives, and concerns.						
display trust in other team members by turning over decision-making to the member with the greatest expertise						
clearly demonstrate understanding of how my role interrelates with the roles and responsibilities of other team members						

Next

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Collaborative Healthcare Interprofessional Survey (CHIPS)

I know how to:	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
work collectively with team members to demonstrate cohesiveness when interacting with patients and families						
exhibit facial expressions and body language that invite others to communicate						
refrain from behaving defensively when responding to feedback provided by other team members						
demonstrate active listening by seeking clarification from other team members when needed.						
consider all points of view when working with team members to resolve conflicts.						
acknowledge the ideas and solutions of other team members that appear to be better than my own						
relate to other team members in a constructive manner to resolve conflicts						
utilize the expertise of other disciplines on the health care team						

Next

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Collaborative Healthcare Interprofessional Survey (CHIPS)

I know how to:	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
facilitate interprofessional team discussions or patient conferences when issues focus on my area of expertise						
communicate the needs and preferences expressed by patients to team members						
participate to establish consensus during conflict resolution						
communicate respectfully in a professional manner with other team members				●		
work with other team members to identify changes that need to be made in the provision of patient care						
communicate with patients and families in a manner that reflects sensitivity to their needs						
collaborate with other team members to examine alternatives when problem-solving						
work with team members to coordinate activities of all disciplines in providing effective patient care						

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Collaborative Healthcare Interprofessional Survey (CHIPS)

I know how to:	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
provide education and resources necessary to meet the learning needs of patients and families.						
encourage patient and family participation in decision-making regarding the plan of care						
use a common language when speaking to other members of the health care team						
listen respectfully to the needs expressed by the patient and family when planning care.						
provide constructive feedback to other team members.						
demonstrate awareness of my own strengths and limitations as a team member						
share information with patients and families using language appropriate to their level of understanding						

Next

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Collaborative Healthcare Interprofessional Survey (CHIPS)

Section II: Demographics

To be completed by student participant:

What nursing program are you enrolled in?

- Bemidji State University
- Minot State University
- North Dakota State University
- Saint Cloud State University
- South Dakota State University
- University of Minnesota
- University of North Dakota
- Winona State University

Age on last birthday:

- 21 - 23
- 24 - 26
- 27 - 30
- 31 - 40
- 41 - 50
- > 50

Gender?

- Male
- Female

Cumulative GPA:

- < 2.75
- 2.76 - 3.0
- 3.01 - 3.25
- 3.26 - 3.50
- 3.51 - 3.75
- 3.76 - 4.0

Have you previously worked in a health care setting?

- No
- Yes

If yes, what was your position?

- volunteer
- ward clerk
- nurse aide
- nurse intern
- other

(University of Minnesota students only):
Did you participate in an interprofessional course or activity during your professional program other than the ethics course?

- No
- Yes

If so, was it a separate course or interprofessional activity?

- Course
- Activity

Please list:.

APPENDIX I. EXPERT SURVEY RESULTS TABLE

Table 8. Expert Survey Results

Item	Mean Score (N=7) 1 -------------------- 5 (Does not (Applies apply to my well to discipline) discipljne)	SD
Share information with patients and families using language appropriate to their level of understanding.	4.86	0.38
Encourage patient and family participation in decision-making regarding the plan of care.	4.71	0.49
Communicate with patients and families in a manner that reflects sensitivity to their needs.	4.86	0.38
Listen respectfully to the needs expressed by the patient and family when planning care.	4.86	0.38
Provide education and resources necessary to meet the learning needs of patients and families.	4.71	0.49
Intervene to assure that patients' rights are incorporated into the health care provided.	4.0	1.00
Communicate the needs and preferences expressed by patients to team members.	4.5	0.84
Clearly demonstrate understanding of my own professional role and responsibilities when working with team members.	4.86	0.38
Clearly demonstrate understanding of how my role interrelates with the roles and responsibilities of other team members.	5.0	0.00
Clearly demonstrate an understanding of my own scope of practice.	5.0	0.00
Exhibit knowledge about the scope of practice of other disciplines on the health care team.	4.57	0.53
Utilize the expertise of other disciplines on the health care team.	5.0	0.00
Demonstrate respect for different perspectives when working with other disciplines on the health care team.	5.0	0.00
Communicate respectfully in a professional manner with other team members.	5.0	0.00
Exhibit facial expressions and body language that invite others to communicate.	4.71	0.49
Listen attentively when other team members are sharing input, perspectives, and concerns.	5.0	0.00
Provide concise, thorough, and systematic data in a timely manner to other team members when communicating patient information.	4.86	0.38
Use a common language when speaking to other members of the health care team.	4.71	0.49
Provide constructive feedback to other team members.	4.86	0.38
Refrain from behaving defensively when responding to feedback provided by other team members.	4.71	0.49

Table 8. (Continued)

Item	Mean Score (N=7) 1 ------------------- 5 (Does not apply to my discipline) (Applies well to discipline)	SD
Demonstrate active listening by seeking clarification from other team members when needed.	4.86	0.38
Assume responsibility for addressing a problem or issue by speaking with the individual team member involved.	4.86	0.38
Express thoughts in a respectful, objective manner when disagreeing with other team members.	4.86	0.38
Relate to other team members in a constructive manner to resolve conflicts.	4.86	0.38
Negotiate effectively with other team members to resolve conflicts.	4.71	0.49
Acknowledge the ideas and solutions of other team members that appear to be better than my own.	4.86	0.38
Consider all points of view when working with team members to resolve conflicts. .	4.83	0.41
Participate to establish consensus during conflict resolution	4.67	0.82
Demonstrate confidence in sharing professional viewpoints with other team members.	4.86	0.38
Work with other team members to identify changes that need to be made in the provision of patient care.	4.86	0.38
Provide team members with information they need in order to be a contributing member of the team.	4.57	0.53
Collaborate with other team members to examine alternatives when problem-solving.	4.86	0.38
Work with team members to coordinate activities of all disciplines in providing effective patient care.	4.86	0.38
Facilitate interprofessional team discussions or patient conferences when issues focus on my area of expertise.	4.0	0.82
Acknowledge the contributions of other team members by eliciting their ideas and perspectives in the shared decision-making process.	4.86	0.38
Display trust in other team members by turning over decision-making to the member with the greatest expertise.	4.86	0.38
Work collectively with team members to demonstrate cohesiveness when interacting with patients and families.	4.86	0.38
Assume the role as team leader when appropriate to the situation.	4.71	0.49
Demonstrate awareness of my own strengths and limitations as a team member.	5.0	0.00

APPENDIX J. PILOT STUDY RESULTS TABLE

Table 9. Pilot Study Results

Item Strongly disagree = 1, Disagree = 2, Somewhat Disagree = 3, Somewhat Agree = 4, Agree = 5, and Strongly Agree = 6	Mean N = 19	SD
Negotiate effectively with other team members to resolve conflicts.	5.16	0.5
Provide concise, thorough, and systematic data in a timely manner to other team members when communicating patient information.	5.0	0.67
Exhibit knowledge about the scope of practice of other disciplines on the health care team.	4.26	0.87
Clearly demonstrate an understanding of my own scope of practice.	4.89	0.66
Assume responsibility for addressing a problem or issue by speaking with the individual team member involved.	5.11	0.46
Listen attentively when other team members are sharing input, perspectives, and concerns.	5.63	0.5
Display trust in other team members by turning over decision-making to the member with the greatest expertise.	5.37	0.76
Clearly demonstrate understanding of how my role interrelates with the roles and responsibilities of other team members.	5.21	0.54
Intervene to assure that patients' rights are incorporated into the health care provided.	5.16	0.50
Assume the role as team leader when appropriate to the situation.	5.16	0.76
Clearly demonstrate understanding of my own professional role and responsibilities when working with team members.	5.16	0.6
Demonstrate respect for different perspectives when working with other disciplines on the health care team.	5.53	0.51
Express thoughts in a respectful, objective manner when disagreeing with other team members.	5.32	0.58
Provide team members with information they need in order to be a contributing member of the team	5.16	0.69
Acknowledge the contributions of other team members by eliciting their ideas and perspectives in the shared decision-making process.	5.42	0.61
Demonstrate confidence in sharing professional viewpoints with other team members.	5.05	0.52
Work collectively with team members to demonstrate cohesiveness when interacting with patients and families.	5.26	0.65
Exhibit facial expressions and body language that invite others to communicate.	5.21	0.85
Refrain from behaving defensively when responding to feedback provided by other team members.	4.63	0.83
Demonstrate active listening by seeking clarification from other team members when needed.	5.37	0.50
Consider all points of view when working with team members to resolve conflicts.	4.95	0.78
Acknowledge the ideas and solutions of other team members that appear to be better than my own.	5.26	0.73

Table 9. (Continued)

Item Strongly disagree = 1, Disagree = 2, Somewhat Disagree = 3, Somewhat Agree = 4, Agree = 5, and Strongly Agree = 6	Mean N = 19	SD
Relate to other team members in a constructive manner to resolve conflicts.	5.21	0.63
Utilize the expertise of other disciplines on the health care team.	5.42	0.61
Facilitate interprofessional team discussions or patient conferences when issues focus on my area of expertise.	4.79	0.85
Communicate the needs and preferences expressed by patients to team members.	5.53	0.51
Participate to establish consensus during conflict resolution.	5.11	0.57
Communicate respectfully in a professional manner with other team members.	5.42	0.51
Work with other team members to identify changes that need to be made in the provision of patient care.	5.32	0.48
Communicate with patients and families in a manner that reflects sensitivity to their needs.	5.26	0.45
Collaborate with other team members to examine alternatives when problem-solving.	5.37	0.50
Work with team members to coordinate activities of all disciplines in providing effective patient care.	5.21	0.63
Provide education and resources necessary to meet the learning needs of patients and families.	5.28	0.75
Encourage patient and family participation in decision-making regarding the plan of care.	5.06	0.64
Use a common language when speaking to other members of the health care team.	5.28	0.57
Listen respectfully to the needs expressed by the patient and family when planning care.	5.5	0.51
Provide constructive feedback to other team members.	4.78	0.88
Demonstrate awareness of my own strengths and limitations as a team member.	5.22	0.73
Share information with patients and families using language appropriate to their level of understanding.	5.44	0.51

APPENDIX K. STUDY SURVEY RESULTS TABLE

Table 10. Study Survey Results

Item Strongly disagree = 1, Disagree = 2, Somewhat Disagree = 3, Somewhat Agree = 4, Agree = 5, and Strongly Agree = 6	Mean N=293	SD
Clearly demonstrate an understanding of my own scope of practice.	5.06	0.55
Provide concise, thorough, and systematic data in a timely manner to other team members when communicating patient information.	4.95	0.64
Demonstrate understanding about the scope of practice of other disciplines on the health care team.	4.65	0.71
Negotiate effectively with other team members to resolve conflicts.	5.0	0.76
Assume responsibility for addressing a problem or issue by speaking with the individual team member involved.	5.02	.723
Listen attentively when other team members are sharing input, perspectives, and concerns.	5.61	0.53
Display trust in other team members by turning over decision-making to the member with the greatest expertise.	5.34	0.69
Clearly demonstrate understanding of how my role interrelates with the roles and responsibilities of other team members.	5.20	0.63
Intervene to assure that patients' rights are incorporated into the health care provided.	5.20	0.65
Assume the role as team leader when appropriate to the situation.	4.88	0.83
Clearly demonstrate understanding of my own professional role and responsibilities when working with team members.	5.17	0.63
Demonstrate respect for different perspectives when working with other disciplines on the health care team.	5.53	0.57
Express thoughts in a respectful, objective manner when disagreeing with other team members.	5.27	0.70
Provide team members with information they need in order to be a contributing member of the team.	5.27	0.58
Acknowledge the contributions of other team members by eliciting their ideas and perspectives in the shared decision-making process.	5.34	0.61
Demonstrate confidence in sharing professional viewpoints with other team members.	4.98	0.78
Work collectively with team members to demonstrate cohesiveness when interacting with patients and families.	5.23	0.65
Exhibit facial expressions and body language that invite others to communicate.	5.36	0.72
Refrain from behaving defensively when responding to feedback provided by other team members.	5.17	0.71
Demonstrate active listening by seeking clarification from other team members when needed.	5.46	0.60
Consider all points of view when working with team members to resolve conflicts.	5.30	0.62

Table 10. (Continued)

Item Strongly disagree = 1, Disagree = 2, Somewhat Disagree = 3, Somewhat Agree = 4, Agree = 5, and Strongly Agree = 6	Mean N=293	SD
Acknowledge the ideas and solutions of other team members that appear to be better than my own.	5.44	0.55
Relate to other team members in a constructive manner to resolve conflicts.	5.29	0.59
Utilize the expertise of other disciplines on the health care team.	5.33	0.71
Facilitate interprofessional team discussions or patient conferences when issues focus on my area of expertise.	4.64	0.90
Communicate the needs and preferences expressed by patients to team members.	5.33	0.63
Participate to establish consensus during conflict resolution.	4.97	0.73
Communicate respectfully in a professional manner with other team members.	5.51	0.54
Work with other team members to identify changes that need to be made in the provision of patient care.	5.20	0.67
Communicate with patients and families in a manner that reflects sensitivity to their needs.	5.50	0.60
Collaborate with other team members to examine alternatives when problem-solving.	5.20	0.61
Work with team members to coordinate activities of all disciplines in providing effective patient care.	5.13	0.69
Provide education and resources necessary to meet the learning needs of patients and families.	5.06	0.69
Encourage patient and family participation in decision-making regarding the plan of care.	5.32	0.70
Use a common language when speaking to other members of the health care team.	5.30	0.65
Listen respectfully to the needs expressed by the patient and family when planning care.	5.62	0.51
Provide constructive feedback to other team members.	4.73	0.89
Demonstrate awareness of my own strengths and limitations as a team member.	5.22	0.64
Share information with patients and families using language appropriate to their level of understanding.	5.35	0.61

APPENDIX L. CORRELATION MATRIX TABLE

Table 11. Correlation Matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
1.	1.000																		
2.	.405	1.000																	
3.	.439	.391	1.000																
4.	.268	.401	.294	1.000															
5.	.235	.321	.295	.517	1.000														
6.	.189	.227	.182	.258	.290	1.000													
7.	.202	.153	.130	.250	.182	.456	1.000												
8.	.346	.331	.357	.381	.314	.355	.411	1.000											
9.	.298	.354	.270	.293	.268	.281	.225	.365	1.000										
10.	.330	.410	.354	.386	.251	.193	.123	.348	.426	1.000									
11.	.481	.458	.429	.361	.324	.345	.260	.486	.447	.549	1.000								
12.	.313	.230	.251	.273	.268	.485	.446	.398	.214	.189	.412	1.000							
13.	.238	.151	.284	.336	.251	.394	.302	.368	.291	.225	.371	.493	1.000						
14.	.296	.347	.242	.311	.293	.331	.320	.377	.341	.277	.389	.376	.413	1.000					
15.	.249	.298	.175	.291	.231	.385	.360	.403	.367	.304	.393	.452	.429	.564	1.000				
16.	.273	.363	.361	.353	.299	.225	.193	.451	.383	.485	.515	.291	.326	.392	.473	1.000			
17.	.254	.366	.355	.384	.281	.309	.306	.390	.307	.364	.433	.323	.385	.462	.477	.453	1.000		
18.	.225	.231	.299	.234	.227	.360	.279	.310	.215	.311	.409	.410	.469	.286	.393	.364	.453	1.000	
19.	.223	.161	.208	.229	.185	.321	.311	.243	.215	.162	.316	.378	.415	.317	.384	.261	.455	.499	1.000
20.	.270	.246	.247	.221	.259	.422	.315	.342	.239	.261	.423	.527	.537	.439	.541	.310	.410	.550	.524
21.	.244	.218	.339	.236	.253	.380	.414	.367	.264	.182	.363	.484	.458	.408	.478	.286	.462	.415	.443

Table 11. (Continued)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
22.	.255	.255	.201	.266	.241	.401	.458	.350	.228	.165	.306	.501	.391	.427	.526	.281	.456	.408	.453
23.	.217	.266	.283	.302	.332	.442	.369	.402	.293	.239	.397	.444	.448	.438	.571	.391	.502	.471	.480
24.	.311	.307	.379	.294	.238	.347	.302	.434	.289	.235	.379	.401	.318	.366	.396	.368	.422	.377	.326
25.	.239	.352	.465	.339	.235	.139	.201	.371	.376	.497	.459	.233	.316	.314	.363	.532	.486	.295	.253
26.	.350	.364	.294	.296	.352	.365	.259	.436	.384	.391	.462	.409	.334	.364	.418	.388	.365	.332	.352
27.	.385	.437	.389	.407	.390	.306	.269	.370	.301	.482	.445	.372	.389	.363	.384	.469	.419	.344	.299
28.	.335	.318	.252	.321	.311	.504	.309	.394	.240	.263	.406	.552	.483	.319	.450	.306	.455	.481	.446
29.	.233	.327	.283	.351	.344	.310	.262	.337	.360	.314	.425	.369	.355	.435	.457	.450	.574	.364	.366
30.	.307	.306	.261	.360	.307	.413	.297	.372	.365	.361	.429	.417	.322	.288	.371	.351	.437	.485	.352
31.	.276	.341	.341	.356	.354	.393	.345	.397	.412	.399	.511	.376	.414	.506	.519	.501	.552	.439	.307
32.	.273	.300	.360	.351	.294	.298	.289	.413	.341	.366	.384	.375	.438	.450	.515	.456	.553	.410	.371
33.	.349	.435	.314	.328	.218	.220	.254	.401	.412	.319	.399	.218	.267	.346	.297	.355	.339	.221	.231
34.	.257	.311	.294	.319	.196	.303	.260	.378	.399	.326	.423	.298	.332	.238	.326	.412	.361	.360	.234
35.	.296	.347	.289	.272	.195	.318	.266	.319	.303	.250	.433	.356	.317	.399	.360	.379	.433	.402	.277
36.	.234	.241	.155	.299	.259	.489	.374	.293	.290	.288	.370	.482	.360	.294	.440	.238	.403	.437	.315
37.	.279	.382	.412	.339	.240	.213	.183	.436	.356	.461	.462	.251	.370	.391	.362	.477	.420	.275	.243
38.	.267	.384	.238	.387	.261	.280	.278	.424	.322	.370	.432	.321	.348	.335	.358	.408	.444	.331	.297
39.	.267	.315	.243	.313	.199	.361	.321	.353	.363	.284	.380	.362	.328	.345	.371	.321	.402	.425	.310

Table 11. (Continued)

	20.	21.	22.	23.	24.	25.	26.	27.	28.	29	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.
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23.	.479	.551	.632	1.000																
24.	.403	.455	.454	.480	1.000															
25.	.240	.273	.228	.327	.327	1.000														
26.	.369	.344	.389	.419	.396	.444	1.000													
27.	.365	.413	.363	.419	.401	.570	.513	1.000												
28.	.591	.439	.530	.491	.435	.278	.486	.478	1.000											
29.	.377	.388	.398	.476	.417	.478	.486	.474	.517	1.000										
30.	.483	.379	.453	.513	.420	.316	.524	.418	.584	.414	1.000									
31.	.357	.444	.528	.570	.371	.462	.497	.527	.452	.635	.492	1.000								
32.	.411	.432	.439	.561	.458	.502	.469	.460	.459	.567	.412	.719	1.000							
33.	.250	.242	.286	.282	.389	.411	.454	.358	.326	.415	.331	.422	.416	1.000						
34.	.302	.338	.335	.407	.418	.380	.422	.374	.380	.372	.469	.497	.492	.613	1.000					
35.	.374	.414	.374	.391	.389	.368	.378	.370	.338	.412	.333	.477	.461	.389	.504	1.000				
36.	.453	.347	.444	.434	.357	.238	.472	.315	.613	.433	.567	.453	.399	.368	.456	.441	1.000			
37.	.333	.316	.215	.387	.338	.523	.390	.486	.266	.391	.282	.454	.434	.419	.433	.373	.216	1.000		
38.	.381	.317	.365	.413	.342	.417	.384	.422	.394	.424	.391	.534	.452	.281	.393	.436	.362	.502	1.000	
39.	.381	.353	.352	.382	.430	.329	.446	.352	.428	.435	.465	.431	.398	.377	.441	.569	.514	.409	.502	1.000

Table 12. Factor Loading for the 2-Factor Model with Promax Rotation

Item	Factor 1	Factor 2	Communality
Acknowledge the ideas and solutions of other team members that appear to be better than my own.	**.746**	.161	.551
Demonstrate active listening by seeking clarification from other team members when needed.	**.725**	.194	.531
Communicate respectfully in a professional manner with other team members.	**.710**	.268	.555
Demonstrate respect for different perspectives when working with other disciplines on the health care team.	**.698**	.175	.480
Relate to other team members in a constructive manner to resolve conflicts.	**.694**	.305	.553
Consider all points of view when working with team members to resolve conflicts.	**.679**	.216	.475
Listen respectfully to the needs expressed by the patient and family when planning care.	**.645**	.245	.445
Listen attentively when other team members are sharing input, perspectives, and concerns.	**.639**	.144	.384
Refrain from behaving defensively when responding to feedback provided by other team members.	**.625**	.143	.366
Acknowledge the contributions of other team members by eliciting their ideas and perspectives in the shared decision-making process.	**.615**	.338	.470
Exhibit facial expressions and body language that invite others to communicate.	**.612**	.257	.409
Express thoughts in a respectful, objective manner when disagreeing with other team members.	**.593**	.266	.392
Communicate with patients and families in a manner that reflects sensitivity to their needs.	**.569**	.376	.466
Display trust in other team members by turning over decision-making to the member with the greatest expertise.	**.568**	.120	.291
Utilize the expertise of other disciplines on the health care team.	**.498**	.393	.383
Facilitate interprofessional team discussions or patient conferences when issues focus on my area of expertise	.136	**.726**	.511
Assume the role as team leader when appropriate to the situation.	.064	**.705**	.448
Provide constructive feedback to other team members.	.178	**.689**	.471
Demonstrate confidence in sharing professional viewpoints with other team members.	.228	**.666**	.465
Clearly demonstrate understanding of my own professional role and responsibilities when working with team members.	.321	**.657**	.512
Provide concise, thorough, and systematic data in a timely manner to other team members when communicating patient information.	.118	**.640**	.370
Participate to establish consensus during conflict resolution.	.333	**.626**	.481

Table 12. (Continued)

Item	Factor 1	Factor 2	Communality
Provide education and resources necessary to meet the learning needs of patients and families.	.208	**.608**	.377
Demonstrate understanding about the scope of practice of other disciplines on the health care team.	.126	**.590**	.316
Intervene to assure that patients' rights are incorporated into the health care provided.	.194	**.569**	.325
Encourage patient and family participation in decision-making regarding the plan of care.	.346	**.542**	.392
Negotiate effectively with other team members to resolve conflicts.	.227	**.536**	.307
Demonstrate awareness of my own strengths and limitations as a team member.	.365	**.532**	.396
Communicate the needs and preferences expressed by patients to team members.	.425	**.530**	.443
Clearly demonstrate understanding of how my role interrelates with the roles and responsibilities of other team members.	.370	**.520**	.387
Clearly demonstrate an understanding of my own scope of practice.	.195	**.491**	.247
Assume responsibility for addressing a problem or issue by speaking with the individual team member involved.	.250	**.412**	.212

Cross Loading Items

Item	Factor 1	Factor 2	Communality
Provide team members with information they need in order to be a contributing member of the team.	.464	.405	.361
Work collectively with team members to demonstrate cohesiveness when interacting with patients and families.	.493	.492	.469
Work with other team members to identify changes that need to be made in the provision of patient care.	.464	.511	.460
Collaborate with other team members to examine alternatives when problem-solving.	.500	.573	.567
Work with team members to coordinate activities of all disciplines in providing effective patient care.	.488	.533	.508
Use a common language when speaking to other members of the health care team.	.428	.456	.373
Share information with patients and families using language appropriate to their level of understanding.	.475	.422	.385

	Factor 1	Factor 2	
Eigenvalue	15.04	2.58	
% of Total Variance	38.58	6.64	
Total Variance		45.21	

Note. Loadings = > .10.
Note. Items in bold indicate primary loadings.