Through the Lens of the Donabedian Structure-Process-Outcomes Model: Lessons Learned and Recommendations for Interprofessional Collaboration in Higher Education

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Abstract

Through interprofessional collaboration (IPC), scholars with diverse knowledge and skills enhance the integration and communication of ideas and services in the pursuit of high-quality education. This article explores the structure, process, and outcomes of IPC and proposes recommendations to create a culture of interprofessional collaboration in higher education. Semi-structured interviews were conducted with 17 participants with extensive IPC experience in a research-intensive university. Results regarding IPC were organized around structure-related factors, including physical structure, organizational characteristics, external and internal factors, and group structure, as well as process-related factors, which include intrapersonal, interpersonal, and institutional facilitators and barriers. Outcomes included intrapersonal, interpersonal, and institutional, including drawbacks and benefits. Structure-process-outcomes of IPC inform recommendations to strategically create a culture of IPC in higher education. Transformative culture change begins with the identification of champions of IPC, who spearhead the implementation of IPC goals within an organization's strategic plan. Policies, procedures, and resources of an organization are needed for successful interprofessional collaborations.

Keywords: collaboration, cross-disciplinary, Donabedian model, higher education, interdisciplinary research, interprofessional research

1. Introduction

1.1 The Problem

As the complexity of the world increases, academic institutions, governments, and funders seek dynamic solutions to societal problems (Cornman & Sharkey, 2019). Increasingly, institutions of higher learning are being called to lead transformational change beginning with a review of educational, research, and practice related outcomes of various disciplines and areas where interprofessional collaborations naturally align (Sherman et al., 2020). In alignment with these efforts is the World Health Organization's (WHO) (2010) report emphasizing the importance of institutional support and cultural mechanisms, such as communication strategies, conflict resolution policies, shared decision making, along with providing physical space and environments that facilitate and accommodate interprofessional collaboration.

One of the most significant trends in higher education over the past fifty years has been the movement to larger projects carried out by teams of scholars from multiple disciplines. With the emphasis on cross-disciplinary projects, new terminology emerged to describe these types of collaborations. In the health and social sciences, these projects are often referred to as multidisciplinary, interdisciplinary, interprofessional, or transdisciplinary collaborations (Chamberlain-Saloun et al., 2013; Choi & Pak, 2006), whereas in the hard sciences, such as physics, math, chemistry,

anatomy, collaborative research practice has been referred to as team science (Little et al., 2017). Regardless of the label, the goal of these types of projects is to bring together the best thinking of multiple disciplines to solve pressing and complicated problems. Interprofessional collaboration (IPC) represents the interaction between professionals from various disciplines who share the same goals with collective action (D'Amour & Oandson, 2005). Through interprofessional collaboration, scholars with diverse knowledge and skills enhance the integration and communication of ideas and services with a sense of group accountability, resulting in high quality education, research, and practice in institutions of higher learning (Rubenfeld & Scheffer, 2010).

As members of the University's Faculty Senate Interprofessional Cross-Disciplinary Committee, and in alignment with its Interprofessional Strategic Plan, the authors are committed to promoting interprofessional collaboration across the Colleges and Schools of the University.   In response to the calls for interprofessional collaboration, the specific aims of this study were to: 1) explore, through the lens of the Donabedian Model (2003), the structure, process, and outcomes of interprofessional collaboration at a research-intensive university, and 2) based on lessons learned, make recommendations to strategically create a culture of IPC in higher education.

1.2 Review of the Literature

Although the WHO (2010) report was written 40 years after the introduction of the concept of interprofessional education (IPE) and interprofessional collaboration (IPC) (Brandt et al., 2014), it was recognized that interprofessionalism requires a paradigm shift in education both within academic and health care settings. Karstadt (2012) proposed that a paradigm shift requires a recognition of shared values and codes of conduct, and a move from a sense of autonomy or independence to the sense of interdependence among professionals to solve complex problems.

The concept of interprofessional education (IPE) embodies the combination of knowledge, attitudes, skills, and values that facilitates team-based problem solving and promotes the best thinking of those from diverse professions who share the same goals with collective action (D'Amour & Oandson, 2005). As described by the Canadian Interprofessional Health Collaborative (2010), IPC is the process of developing and maintaining effective working relationships to obtain optimal health outcomes.

Given issues in health care of preventable mortality and morbidity, medical errors, costly and fragmented systems of care, as well as the lack of patient-centered care (Olenick, Allen, & Smego, 2010; Sherman & Wilkinson, 2019), IPE and IPC are recognized by clinicians, researchers, professional groups, and governments as critical to the promotion of quality health care (Engel & Prentice, 2013; Gilbert, Yan, & Hoffman, 2010). Verhaegh et al. (2017) purport that IPE in graduate health care education will lead to greater interest and support for interprofessional collaboration in health care settings.

In 2020, Sherman and colleagues from within the College of Nursing and Health Sciences conducted an integrative literature review to critically evaluate evidence related to IPC in health care education. Through a search of six databases, using keys words of interprofessional, interdisciplinary, interprofessional, multidisciplinary, collaboration, and teamwork, and with search limitations of years from 1995 to 2019, English only, and research studies, 216,885 articles were identified. Following the PRISMA search strategy and following quality appraisal and evaluation, 18 studies were included in the review. The majority of articles addressed interprofessional education in academic and clinical settings; were focused on the knowledge, attitudes, and behaviors of students and faculty, across health disciplines, toward IPE and IPC; or tested educational strategies and initiatives to improve interprofessional competencies.

Sherman et al. (2020) used the lens of the Donabedian Model to examine the structure, process, and outcomes of interprofessional collaboration in health care education. A synthesis of the evidence regarding the structure of IPC in health care education identified undergraduate and graduate students, faculty and staff, across health professions, who were responding to the clarion call of the WHO (2010) for transformational change in health care education. The review identified the processes of IPC in health care as the various types of curricular and course initiatives, as well as transactions and interpersonal processes related to collaboration. The outcomes identified through the review cited positive changes in knowledge, attitudes, and behaviors/skills of participants, as well as challenges related to structure, process, and outcomes. The article's discussion presented valuable ideas regarding the structure, process and outcomes of IPC with important implications and recommendations for the University administration and faculty to promote interprofessional collaboration. It was concluded that through grass root efforts of faculty and with university support and resources, the institutionalization and normalization of IPC in education, practice, and research in higher education has the potential to create a cultural shift in support of IPC (Sherman et al., 2020).

Building on this prior work, the authors of this current study, as members of the Faculty Senate Interprofessional Cross-Disciplinary (IPCD) Committee, recognized that interprofessional collaboration in higher education goes beyond the health sciences. In spring of 2021, a workshop entitled "Stronger Together Through Collaboration" was hosted by the Faculty Senate IPCD Committee with support of the University Provost and Dean of Research. Individuals identified as champions of collaboration from across the University served on a panel to discuss the successes and challenges of collaboration. Interprofessional initiatives were showcased by faculty members, including the nationally and internationally recognized collaboration of a physicist and an artist. This sparked the quest of the authors to learn about interprofessional collaboration at a University-wide level, going well beyond health care education.

As a first step, a literature search was conducted in the Education Database, CINAHL, and EBSCO Host with no research studies identified that examined interprofessional collaboration at a University-wide level, thereby indicating a gap in the literature. The majority of published studies explore the knowledge, attitudes, or behaviors of healthcare students, faculty, or practitioners from various healthcare professions towards IPC, or test educational strategies measuring various outcomes. The current study is therefore of great value as a University-wide study, guided by the Donabedian model, to explore the structure, process and outcomes of interprofessional collaboration. Based on the perceptions and experiences of participants, who are University faculty and administrators recognized for their interprofessional efforts, the lessons learned and recommendations provide new knowledge which is of value in creating a culture of IPC in higher education.

1.3 Research Question

The research question of this study was as follows: Based on the perceptions and experiences of individuals, recognized at the University for their engagement in interprofessional initiatives, what can be learned about the structure, process, and outcomes of interprofessional collaboration at a University-wide level in order to create a culture of IPC in higher education?

1.4 Conceptual Framework

Ravitch and Riggan (2016) propose that a conceptual framework allows researchers to make meaning between core concepts of a study to produce deeper understanding of the topic and contexts of the study. In qualitative research, conceptual frameworks can provide an organizing worldview to guide the inquiry and to interpret the research evidence (Polit & Beck, 2021). The use of preexisting orienting concepts or theories enhance knowledge, understanding, and interpretation of the issues under investigation and shape qualitative analyses (MacFarlane & O'Reilly- Brun, 2012).

While the Donabedian model is a well-known quality improvement model in health services research, adaptations of the model beyond health care have been proposed (Mitchell, Ferketich, & Jennings, 1998). The Donabedian (2005) Model was therefore selected as the conceptual framework for this study given that the authors sought to understand the structure, process, and outcomes of interprofessional collaboration in an effort to improve collaboration University-wide. Furthermore, with a recognition of Donabedian's proposed sequential progression from structure to process to outcome, which is linear in nature and considered as a model limitation, it was recognized that the three domains of structure, process, and outcomes may influence and interact with each other, as suggested in the literature (Mitchell, Ferketich, & Jennings, 1998).

According to Berwick and Fox (2016), Donabedian proposed that structure, as a prerequisite to process, encompasses both the physical and organizational aspects of an institution along with the administration of quality systems, available resources (i.e., money, equipment), and the attributes of professionals. Process describes culture and the nature of interactions, as well as the cooperation within and between professions. Outcomes are validators of effectiveness and quality, and indicative of goal achievement and competence development (Donabedian, 2005; Kunkel et al., 2007). In addition, the study was informed by the work of Gaboury et al. (2009) and Burzotta and Noble (2011), who developed an interprofessional interview guide that aligned with the structure, process, and outcomes model of Donabedian (2005), and which will be further discussed under study measures.

2. Method

2.1 Study Design and Setting

This study was based on the qualitative methodology known as descriptive qualitative research. In discussing qualitative research and disciplinary traditions, Polit and Beck (2021) identify grounded theory, phenomenology, and ethnography as qualitative disciplinary research traditions. Yet, Polit and Beck (2021) note that the majority of qualitative studies can be best described as qualitative descriptive research (p.479). "Descriptive qualitative studies

often borrow or adapt methodologic techniques from other qualitative traditions and produce finding closer to the data than within such traditions as phenomenology and grounded theory" (Polit & Beck, 2021, p.479.) A descriptive qualitative study is a type of qualitative research design that aims to systematically obtain information to describe a phenomenon, situation, or population by understanding questions such as what, when, where and how, rather than focusing on why (Polit & Beck, 2021).

The setting of this study was a Research-Intensive (R1) State university focusing on high-quality education, state-of-the-art research, and practice, including collaborative engagement with local and global communities. The university is in one of the most ethnically diverse and cosmopolitan regions in the Southern United States, federally designated as a Hispanic and minority serving institution.

2.2 Participants

Study participants included 17 individuals with extensive experience in interprofessional collaborations e.g., led an interprofessional research team; held an administrative role that included supporting university faculty engaged in interprofessional teaching, research, or practice; or were involved in day-to-day activities of an interprofessional initiative. Among the 17 study participants, 9 identified as female and 8 identified as male, representing a nearly even split across gender. Nine of the participants were Caucasian, 5 were Hispanic, 2 were Asian, and 1 was Black/African American. The respondents represented research administrators (4), senior administrators in education and practice (4), research faculty (4), center directors (3), clinical lab director (1), and institute director (1).

Although the demographic form elicited information regarding gender and ethnicity/race to describe the sample, it should be noted that no interview questions were asked regarding the influence of gender or ethnicity/race on interprofessional collaboration. However, some participants did comment in their interviews that gender influences interprofessional collaboration; however, no reference was made to ethnicity/race.

2.3 Data Collection and Management Procedures

Prior to the initiation of recruitment, the study protocol was reviewed and approved by the Institutional Review Board. Potential participants were contacted via email by the Principal Investigator (PI) to discuss the purpose of the study, along with a follow-up phone call to answer any questions and determine their interest in study participation. Tacit consent acknowledged the participant's decision to be interviewed. Expectations regarding participation involved a 30-to-60-minute zoom interview, with a possible follow-up contact to clarify or expand upon participants' responses. Individual interviews were arranged at a convenient time for both the interviewer, who was a member of the research team, and the participant. All team members conducted participant interviews.

The study measures included the Demographic and Professional Data Form which was administered through a Qualtrics Survey, and a semi-structured interview guide based on the Donabedian Model (structure, process, and outcome), as well as questions, related to group composition; structure; development; process; effects of collaboration on members; facilitators, barriers, drawbacks, and benefits of collaboration as developed by Burzotta and Noble (2011) and Gaboury et al. (2009). Interviews were conducted via zoom, recorded, and transcribed by zoom. A graduate research assistant "cleaned" the zoom transcripts for analyses.

Data management included the use of ID code numbers on the Demographic and Professional Data Form and zoom transcripts, which were stored on the university Cloud in a password protected site, with access only by the research team.

2.4 Researcher Positionality and Data Analysis

The positionality of the researchers was explored through ongoing group conversations in developing the research proposal, the approach to conducting the research interviews, and in coding and interpretation of the data. All members of the research team are tenured professors with a strong record of research and scholarship at the same State university. They are members of the University's Faculty Senate Interprofessional Cross-disciplinary Committee, who serve on its research subcommittee. Each member has familiarity with the university culture regarding interprofessional collaboration and have direct or indirect knowledge of the interprofessional expertise and leadership of the study participants. Therefore, the authors brought their own understanding of interprofessional collaboration at the university serving as both emic and etic observers.

With regard to data analysis, the Demographic and Professional Data were analyzed using descriptive statistics. Deductive thematic analysis of the interviews were based on Carini's principles (Ely et al., 1991), and included the following steps of qualitative data analysis: 1) developing detailed knowledge of the interviews by reading line by line with the highlighting of specific words or phrases; 2) reviewing the research team's analytic memos and adding

further impressions of the participants' statements; 3) listing tentative headings and reflecting on recurring ideas; 4) analyzing verbatim statements and listing them under the identified headings with the grouping of similar concepts or ideas; 5) summarizing new impressions; 6) comparing the data so that the commonalities and differences in participants' statements can be examined; and 7) establishing themes that describe the patterns and observations found between the interviews of the participants.

To ensure scientific rigor of the data analysis and in searching for confirming evidence, teams of two researchers coded the transcripts of their own interviews and the interviews of their team member and compared their coding and analysis. In addition, the first author read, coded, and analyzed the transcripts of all team members. During zoom meetings with all researchers present, each transcript was discussed and themes were identified from both within and across the interviews. In analyzing the transcripts, the researchers sought out contradictory evidence and competing explanations, in addition to identifying a negative case analysis in which the participant had a negative view of collaboration. Any discrepancies in the coding were resolved through discussion. Beyond the development of consensus regarding the emerging themes related to structure, process and outcomes, agreement was achieved regarding the lessons learned and recommendations related to promoting interprofessional collaboration in higher education. To promote trustworthiness through member checking, selected participants were asked to read the first draft of the report/article to validate the results presented. In addition, the draft of the article was shared with the University President and Provost for their consideration.

3. Results

3.1 Themes Related to Structure

Through the lens of the Donabedian Model (Donabedian, 2005), structure was examined as important aspect of IPC. Structure encompasses both the physical and organizational aspects of an institution, the characteristics of the organization in terms of its administration and community membership, as well as the resources available (Donabedian, 2005). It was decided by the research team to present the study's overarching themes and subthemes with exemplary participants' comments in a table rather than narrative form, to allow for a more succinct and focused identification of themes.

The overarching themes of structure identified in this study were physical structure, characteristics of the organization, external and internal factors related to structure, and group structure. Data analysis also revealed specific subthemes that were closely aligned with exemplary comments of participants (see Table 1).

Table 1. Overarching themes, sub-themes, and participant's exemplary comments related to how structure influences interprofessional collaboration

Physical Structure	Participant's Exemplary Comments
Physical Space/Size: Number of campuses, number of acres, number, and size of buildings	"The larger the university, the harder it is to find others to collaborate with."
Physical structure that promotes spontaneous interactions	"The structural issue is how to find people to collaborate with. The closer you are in proximity to each other the easier to collaborate."
	"The new building was built to physically bring people closer together to collaborate."

Characteristics of the Organization	Participant's Exemplary Comments
Size of the university in Human Capital: Administrators, faculty, staff, students (undergraduate, graduate, and doctoral (pre- and post-docs)	"Bureaucratic oversight and red tape slow things down. Too many people to sign off."
Demographic characteristics of the academic community: age, gender, ethnicity, years at the institution, rank, stage in career development and skill set	"In faculty searches, you need to search not only for good teachers or researchers, but to hire good collaborators who help others succeed."
Type of Leadership: Top down, Democratic, Autocratic etc.	"Collaboration starts with university administrators who incentivize collaboration."
Levels of bureaucracy: Vetting and red tape	"Administrators need to evaluate the promotion and tenure process and value more interprofessional collaboration."
Valuing IPC in tenure and review process	"Organizational structure affects collaboration as when

those who have a history of working together have greater success in future collaborations."

"IP collaboration depends on the type of institution. Research Universities have higher levels of collaboration."

External Factors Related to Structure	**Participant's Exemplary Comments**
State mandates, budget, financial resources, and funding sources	"Available funding from external or university sources are important in supporting collaborative efforts."
Interactions with other academic institutions and companies	"It's always a fight for the in-directs from grants involving multiple institutions which can create a cutthroat environment."
Identifying experts internal and external to the institution depending on the grant focus	"Grant opportunities require working across disciplines, and even other academic institutions to tackle challenging issues and social problems."
	"The PI assembles the team that should include internal and external collaborators."

Internal Factors Related to Structure	**Participant's Exemplary Comments**
Differences in the academic calendar across varying colleges and departments.	"Given that there are different credit hours and different charges for each college, there is a negative impact of developing interprofessional courses."
Purpose of team formation: proactive, reactive response to a mandate (State, Local, Accrediting agencies, funding agencies)	"The biggest barrier is competing for resources and competing for credit in their unit."
Team formation: Organic or mandated by Dean or Chair; disciplines represented, expertise of members and skill set, rank, team size	"Chairs want to know how much your work is your own or with others. It sends the message that to stay in your college and work on your own."
Competition for funding, resources, and intellectual credit	"Administration needs provide incentives and other strategies to increase collaboration."
Clear matrix of accountability	"The institution has a responsibility to reward collaboration. We need to change the award system for collaborative work and what we consider as scholarship."
Available technology resources	
Incentives/rewards to collaborate by administrators	
Sharing directs and in-directs on collaborative grants	"There are platforms that help individuals to find collaborators, so this technology is advantageous."
Influence of promotion and tenure criteria	

Group Structure	**Participant's Exemplary Comments**
Nature of the discipline: independent versus collaborative	"The leader has to get the right people in the right place at the right time and be accountable for the deliverables."
Self-selection to participate in IPC	"The only way you can really do big collaborative stuff is to let people self-select and self-identify as some people are good at it and some are not."
Emphasis and encouragement of collaborative work versus working in silos	
Prior history of working together	"Units that have a history of collaboration are more successful."
Large groups need to divide into subgroups	
PI needs to get the right people in the right place at the right time	"Groups of seven or eight from different disciplines is a good starting number for teamwork as it is easy for people to communicate and connect the dots."

3.2 Themes Related to Process

According to the Donabedian (2005) model, process involves understanding the cultural aspects and nature of interactions that subsequently lead to the outcomes of collaboration. Through analysis of the data related to process (see Table 2), several themes were identified. First, it was recognized that foundational to interactions are intrapersonal processes, including key personality traits and intrapersonal facilitators or barriers to collaboration. Also relevant were interpersonal processes, which facilitate IPC, including relationships (characteristics and dynamics), as well as shared interest, responsibility, and equality. Conversely, there are also interpersonal processes that are barriers to collaboration. Interpersonal processes are also evident in the theme of lessons learned from prior collaborative processes. A final theme related to process is institutional processes, which may serve as facilitators or barriers to collaboration.

Table 2. Overarching themes, sub-themes, and participant's exemplary comments related to how process influences interprofessional collaboration

Intrapersonal Processes of Collaboration	Participant's Exemplary Comments
Key Personality Traits	"You need to know your own limitations and roles of colleagues. Personalities can blow up teams."
Inquisitive, curiosity, extraverted, conscientious, humble, small ego, emotional intelligence, looking from multiple angles, always learning, adaptable, flexible, accountable, responsible, truthful, respectful	"You need to express your truth clearly and quickly."
	"You need to see things from multiple angles."
	"You need to be humble, kind and thoughtful."
Intrapersonal Facilitators	"Individuals need to feel a sense of ownership of the team project."
Knowing one's own limitation	
Willing to share success	"Women are more inclined to do interprofessional work but it is risker for them."
Lives not by words but by deeds	
Believes in equitable distribution of work and effort	"Characteristics of good collaborators are those who are focused on helping others succeed."
Able to manage different personalities	"Successful collaborators work hard, are skilled, humble, take responsibility, find solutions, and are generous with their time, while having high standards for the quality of their work."
Open communication style	
Gives and receives constructive feedback	
Adapt your personality to the group	
Willing to take blame	"Group leaders must be good at interacting with people, assigning tasks, setting expectations, and integrating them."
Generous with one's time	
Has high standards	
Values belonging	"Group leaders need to make tough decisions."
Big thinker	"On teams, you need to trust others and realize different people have different strengths."
Fosters risk taking	
"Just Do It" approach	
Democratic approach	
Believes collaboration leads to new ideas and learning	

Interprofessional Processes of Collaboration	Participant's Exemplary Comments
Intrapersonal Barriers	"There is a problem when you do not value different professional roles."
Entrenched in own field	
Problem if have "own" versus a "team" agenda	"If people have personalities who are afraid that others will steal their work, then they are less likely to work together."
Cultural and gender issues	
If early in a career, IPC may distract from career or interfere with career development	"Teamwork cannot happen if someone has an axe to grind."
Not right personality –too rigid	"It is harder for women to express their weaknesses and express their ideas."
Focused on bringing in money	
Focused on meeting tenure criteria	"If you are set in your ways but want to be a part of a

When actions do not align with words

Guilt when you are not focused on your job

Not experienced as a team player

Has negative past experiences with teamwork

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team you may actually harm the project because you pretend you are listening but then you do exactly what you want."

"There may be a problem with egos, when one person wants to be top dog rather than sharing the credit."

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Interprofessional Facilitators

Relationships: Characteristics and Dynamics

Shared values and enthusiasm

Shared language with other disciplines

Active and reflective listening

Openness to other perspectives

Affirms others

Knows, likes, and understands each other

Compromises with each other

Works on building trust

Communicates in a way that does not result in negative reactions

Agrees on goals

Team leader establishes, builds, and manages relationships

Laughs and has fun together

Realizes what you say and how you say it matters

Recognizes each other's roles because no one can do it all

Stimulates other's creativity and innovation

Shared Interest, Responsibility, and Equality

Prompt response and delivery

Discusses options

Shift from what's in it for me to shared interest

Sense of equality—no one is better than another

Engages multiple times in multiple ways (in-person, calls, emails)

Collective and distributive decision making

Transparency—communicates and has no hidden agendas

Attempts to resolve conflicts

Works to achieve buy-in

Distribution of responsibility

Complementary expertise

Achieves consensus

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Participant's Exemplary Comments

"You need to feel valued as a team member."

"You need to allow others to shine and contribute."

"It's important to call on people for their opinion."

"You need to figure out the roles needed in teamwork."

"Good teamwork requires continuous dialogue and communication."

"Leaders of a team need to personalize their approach to different people and different challenges."

"You need to have someone stay on track of all the information."

"Some people only want to collaborate with people they like to work with who have similar values and can trust."

"Collaboration works when you can state your differences and clear the air."

"In teamwork, it is important when you can laugh and have fun together. Humor is important."

"Teams are most successful if there is camaraderie, willingness to work together, willingness to listen and compromise and keep the goal of the project in mind."

"Collaborations are most successful when no one is better than the other and there is a sense of equality."

"People need to see where they fit."

"You need to bring people together who have common interests."

"You need to set up a team with people who have complementary expertise that is cohesive."

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Interpersonal Barriers to Collaboration

Male privilege- egos-narcissistic—must be their way

Culture and ethnicity

Participant's Exemplary Comments

"If a person is difficult to work with it affects team dynamics."

Sabotage the group

Mismatch or extreme personalities

Academic jealousy and resentment

Need more time to communicate

No training as graduate students in collaboration

Too much power of the PI may limit collaboration

Forced by the Chair or Dean to participate

Challenges in identifying partners

Decisions regarding who gets credit

Fear and insecurity

Misunderstandings

Lack of experts in a specific area needed

"Social loafing is when people on a team don't do their jobs; they are really not engaged. It can destroy the team."

"Powerplays can happen, but the group has allowed it to. You should have a sidebar conversation about what is happening or take it outside the group."

"Teams break down if people don't have the right temperament or personality."

"There is a problem when you invite people with name recognition to join a team, but they don't contribute."

Institutional Processes of Collaboration

Institutional Facilitators

Administrative structure—point person, first and second in charge

Presence of oversight committee

Administrative support from President, Provost, and Deans

Institutional culture—make collaboration part of our work and align with the university mission

Collaboration is supported when data is centralized and there is data analytics

Collaboration is facilitated by transparent policies and communication

Graduate mentoring in collaboration

Participant's Exemplary Comments

"The university needs to provide informal and formal training regarding the benefits of collaboration."

"University leadership needs to go beyond talking about collaboration to take actions which support collaborative efforts."

"Collaboration is learned when Deans and Department Chairs teach graduate students the value of collaboration and involve them in collaborative projects."

Institutional Barriers to Collaboration

Negative influences of administrators

Internal politics

Administrative budget—how money flows, percent of effort for each faculty

Need better information management regarding start-up of collaborative projects

No standardization regarding who gets credit for collaborative efforts

Inequitable sharing of funds and in-directs

Culture shift takes time

Top-down approach from Dean to respond to collaborative opportunities

Need resources from the university

Not transparent process

Power struggles

Champions sidelined

Participant's Exemplary Comments

"The university needs to remove roadblocks and barriers to collaboration, providing resources and rewards."

"In the tenure and promotion process, collaboration should be expected, and its importance reinforced."

"Unsuccessful teams are often top-town enforced and last minute."

"Administrators need more of a carrot than a stick model, emphasizing the benefit of being a part of a larger collaborative.'

"Before hiring, a university should place value on an individuals' ability to collaborate and make it a criterion."

3.3 Themes Related to Outcomes of Collaboration

According to Donabedian (2005), outcomes result from the interface of structure and process and indicate goal achievement and competence development. The study data revealed themes related to outcomes of collaboration, specifically intrapersonal, interpersonal, and institutional outcomes, with a greater focus on the benefits rather than the drawbacks of collaboration (see Table 3).

Table 3. Overarching themes, sub-themes, and participant's exemplary comments related to outcomes of interprofessional collaboration

Intrapersonal Outcomes of Collaboration	Participant's Exemplary Comments
Drawbacks of Collaboration	"Interprofessional collaboration in your early career may jeopardize your tenure status."
Affecting tenure status	
Frustration in working in teams with others who have differing perspectives	"There may be political consequences within your department or institution if you let someone else take the lead."
Political consequences depending on departmental or institutional culture	"Assistant professors need to give a little piece of their time so they can credibly put their name on grants and papers, but it has to help them. So, it is dependent on your career stage."
	"There is harm by administrators who want you to stay within your college and keep you siloed."

Benefits of Collaboration	Participant's Exemplary Comments
Promotes creativity	"The benefits of meeting new people and thinking differently."
Knowledge and skill acquisition	
Broadens perspective	"You learn new things, new techniques and a new language."
Creates a network	"You gain a new perspective."
Improves one's communication	"Collaboration is an opportunity to grow."
Increases grant and publication submissions	"Collaboration may assist you get tenure and promotion depending on the culture of your department."
Increases recognition from administration	
Interpersonal Outcomes of Collaboration	Participant's Exemplary Comments
Benefits of Collaboration	"Through collaboration, you create a network, get to know others, and develop relationships."
Getting and sharing credit	
Effective role modeling	"Collaboration creates a certain amount of synergy among individuals."
Opportunity to network	
Getting to meet others and know them on a different level	"If people have a history of working together in terms of grant writing and publishing, they usually have future success in developing other collaborations."
Building relationships	"When you collaborate, you get to know people on a different level."
Success carriers over to other initiatives setting stage for the next successful project	"When graduate students learn the value and are mentored with regard to collaboration, you provide them with important team skills and model team science."

Institutional Outcomes of Collaboration	Participant's Exemplary Comments
Culture shift to inclusivity	"Collaboration makes a university more competitive for larger funding."
Provides graduate students and opportunity to increase their skills	"Collaboration increases the university's reputation and name recognition."
Increase in PhD students and Post Docs	
Increased institutional reputation	"Collaborations increase the number of PhD and Post-Docs."
Generates research funding	"Collaboration fosters an institutions resilience and sustainability."

4. Discussion

The study, guided by the Donabedian model, explored the structure, process, and outcomes of IPC from a University-wide perspective, which informs a strategic approach to promote a culture of IPC in higher education. Kunkel et al. (2007), in their study of quality systems, found that structure was strongly correlated with process (0.72), and process was correlated with outcomes (0.60). Evidence of these relationships are important in creating a culture of IPC in higher education and maintaining momentum.

Through the lens of structure and process, the study reported on factors related to IPC, including facilitators and barriers, and their balance which influences IPC outcomes. The study also recognized that outcomes of IPC can be categorized either as drawbacks or benefits within intrapersonal, interpersonal, and institutional contexts and outcomes may inform structure and process.

Structure related to collaboration included physical structure, characteristics of the organization, external factors, internal factors, and group structure as the principal components of structural facilitators or barriers to IPC. Physical structure can promote collaboration by virtue of faculty being physically closer in proximity, which can trigger spontaneous discussions and provide more time-efficient in-person meetings. It was noted that in larger institutions there is often increased physical space between colleagues and research labs which may frustrate efforts to find like-minded faculty interested in IPC.

Characteristics of the organization exert influence in terms of the size of the institution and expertise of "human capital" to build and support an IPC team e.g., administrators, faculty, staff, and students (undergraduate, graduate, and doctoral). In addition, a democratic type of leadership and the extent of bureaucracy,with less red tape to get approvals, are facilitators of IPC.   It was also cited that the value placed on IPC in tenure and promotion processes was a facilitator in creating an IPC culture within the organization, or it could be a barrier if independent scholarship is expected.

Influential external factors included lack of funding sources that encourage IPC grant applications, and often budget restrictions, which limit the funding of several investigators on a project. In addition, financial concerns exist due to the risk of limited or no indirect cost return to the university and department with an IPC grant. Yet, a facilitating variable noted by several participants and validated by Selden et al. (2006) was the importance of university and departmental policies that support the complexity of research projects involving IPC.

Internal factors speak to ways that the university at macro- and micro-levels facilitate or serve as a barrier to IPC. For example, not only at the university level but at the college/school levels, do administrators or chairs encourage faculty to "stay within the college," or rather offer incentives or rewards to collaborate with those outside of the college? Is support offered for IPC, such as providing relief from teaching in a course, if participating in IPC? Or is support offered by ensuring adequate credit allocation for teaching a course in IPC, or even whether some indirect funds can be steered directly to a faculty's research lab?

Issues pertaining to group structure may overlap with intrapersonal and interpersonal variables, given the dynamic relationship of a person's characteristics and how a group is initiated and event group composition (Kunkel et al., 2007). Previously established groups with a history of rapport can promote IPC success. On the other hand, a new group created with top-down approach and mandated characteristics, such as a group initiated by administration, and absent of self-selection, do not favor collaborative success. Yet, when a group's composition avoids top-down features and encourages a culture of collaborative work versus working in silos, success is more likely. Other group structural factors that were cited as facilitators of IPC were ensuring that those on the team have expertise in IPC; there is democratic leadership of the team; the establishment of decision-making rules, as well as the value of dividing a large IPC team into smaller workgroups to promote communication and efficiency.

Process related to IPC involves intrapersonal, interpersonal, and institutional facilitators and barriers. Intrapersonal processes include personality traits, such as inquisitive, conscientious, desire to learn, seeking multiple viewpoints, extraverted, humble, emotionally intelligent, responsible, accountable, and flexible, as reflected in the participants' exemplary comments. Personality serves as a facilitator when members of the group are effective communicators who can engage in such a way that allows everyone to contribute based on their strengths, and are risk takers, value belonging, are thick skinned, know their limitations, accept constructive feedback, and are willing to share success. Perhaps these personality traits lead an individual to enjoy collaborative work and seek collaborative opportunities, which can then play a positive role in facilitating interpersonal processes and dynamics.

Intrapersonal barriers to collaboration may occur if members have strong, over-bearing personalities, a rigid inter-personal style, or are more interested in personal gain rather than team success, each leading to a frustrating IPC

experience for team members. Intrapersonal barriers to IPC may also be related to culture, in which individualism is valued over group think and consensus building, or in terms of gender, when women may feel less heard and valued and thus are reluctant to share their ideas. Bell et al. (2014) concur that gender plays a role in the process of establishing and maintaining interprofessional collegiality. They purport that stereotypical ideas exist related to the roles of women in academia, such as that women are less confident than their male counterparts in sharing ideas when working on collaborative projects. Intrapersonal barriers may also be related to differences of individuals in terms of the point they are in their careers. Earlier in a person's career they may be more concerned about the "I" rather than the "we" in terms of their need for individual recognition, and beliefs about how individual versus teamwork may influence their success in the promotion or tenure process.

Interpersonal processes that facilitate IPC are shared values, shared enthusiasm, liking each other, agreeing on goals, knowing each other's roles, active listening, and feeling that time together is enjoyable and even fun. Beyond a shared interest, when members of the group have open discussion, collective decision making, work to achieve buy-in from all group members, attempt to resolve conflicts, and experience equity and equality in terms of group responsibilities, the process of IPC is usually successful. In contrast, interpersonal barriers to collaboration occurs when individuals have large egos and are narcissistic in their interactions with others, feel misunderstood by others, are jealous, resentful, or mistrusting of others, or at the extreme, attempt to sabotage the work of the group.

In support of the processes of interprofessional collaboration, institutional processes also play an important role. Institutions that promote a culture of collaboration: have the support of the President, Provost, and Deans; have administrative processes that identify those in charge to assist in overcoming barriers to collaboration; provide resources; have transparent communication and policies; identify collaboration within their vision and mission statements; and highlight the value of collaboration in their strategic plan.

As noted by WHO (2010), "leadership can ensure that traditional barriers to collaborative practice... are reconsidered through efforts to evaluate and change the tenor of the political environment" (p.39). Institutional barriers to IPC were noted when there is no standardization of how funds and credit are distributed equitably, top-down approaches are taken by Deans or Department Chairs in response to collaborative opportunities; when there are power struggles and internal politics at the institutional level; IPC champions are side-lined; or roadblocks to collaborative efforts are placed at multiple levels.

Outcomes related to IPC were identified as intrapersonal, interpersonal, and institutional drawbacks or benefits to collaboration, which are consistent with the literature (Rogers & Weber, 2010; Scott, 2015; Selden et al., 2006; Sherman et al., 2019). In relation to intrapersonal drawbacks to IPC, it was noted that IPC can be frustrating for those not adept at teamwork. IPC skills may not come naturally to some, producing a frustrating and unrewarding experience for the faculty member. The negative experience may trigger a state of helplessness as the individual is learning more about one's shortcomings for IPC as opposed to what assets one can bring to the team. This problem is compounded by limited, if any, wide-spread formal training in IPC for existing faculty or in graduate programs. As discussed under process, one of the most salient issues identified as a drawback was that IPC may jeopardize promotion and tenure status. As departmental and university policies continue to favor first-author publications, submitting grants as a sole PI, and pursuing a career path as an independent researcher, the incentives for collaboration are ambiguous for faculty, particularly junior faculty, to join an IPC team and commit heavily to a team approach to research. Cox et al. (2016) noted that the onus was on funders and administrators to help foster purposeful alignment and strengthen collaborative partnerships through IPC and supporting faculty who engage in collaborative efforts. In this study, outcomes related to interpersonal or institutional drawbacks to IPC were closely aligned with participants discussions of processes in which interpersonal or institutional barriers result in negative outcomes related to IPC.

With greater emphasis, numerous and widespread benefits of IPC were recounted by participants. From an intrapersonal career-building point of view, it was frequently cited that the IPC experience supports and accelerates the pursuit of new skills, knowledge, and perspectives, supports one's career aspirations, and adds creativity and innovation to one's research, supporting previous IPC results (Brandt et al., 2014; Sherman et al., 2019). From an interprofessional perspective, IPC affords the opportunity to enrich the collegiality of academic life as it facilitates networking and building relationships with other faculty. Success from IPC can carry-over to other projects and set the stage for one's next successful project. Many faculty noted that their careers would not have been as productive and rewarding if not for engaging in and benefiting from the synergy elicited through IPC. It was also reported that IPC provides the vehicle for learning from others' experiences and strengths, including improving the quality of grant applications and publications. Success in obtaining IPC grants and publications may result in increased faculty recognition from departmental and university administrators.

From an institutional perspective, IPC upgrades the university's competitiveness for external funding, particularly large federal grants. A culture of collaboration contributes to a culture of inclusivity and enhancing the institution's general reputation as a leader in higher education, research, and practice. When IPC is commonly practiced by faculty, IPC skills are enhanced among graduate students and post-docs, contributing to future generations of IPC researchers. Selden et al. (2006) remind us that collaborative outcomes may lead to second and third order consequences consisting of new norms of interaction, new relationships, and new practices. The administration of an organization can reap the benefits of IPC and of its members by enhancing programmatic effectiveness, and building new systematic collaborative capacity aided by technological development.

Given the dearth of research studies regarding interprofessional collaboration at the University level, this study addresses this significant gap in knowledge and has substantially contributed to expanding existing knowledge in the field. Guided by the Donabedian model, the results of this study, regarding structure, process, outcomes of interprofessional collaboration, provides evidence to build the case for University support and resources, and the importance of faculty engagement in collaborative efforts to address a myriad of problems of our complex world. Furthermore, the results increase awareness of the facilitators and barriers to successful interprofessional collaboration across all professions and disciplines in a University setting. The information presented in this study may be used by all professionals, currently engaged in or planning interprofessional initiatives, as they develop or expand their teams, as well as implement and evaluate interprofessional projects, disseminate their findings, and strive to achieve formidable goals across all sectors of society. The Donabedian model, as a quality improvement model, has provided knowledge and future direction in terms of interprofessional collaboration. The factors associated with structure, process, and outcomes may be leverage points in creating a University-wide culture of collaboration. Further evaluation of the study data also provides an opportunity to conceptually analyze the relationships of structure, process, and outcomes, beyond a linear framework to a relational and possibly multi-dimensional framework relevant to all professions and disciplines represented in a University setting.

5. Implications for Higher Education

The results of this study have informed a multi-level strategic approach to create a thriving culture of interprofessional collaboration in higher education. On the individual level, IPC is successful when the temperament of the individual is considered, and individuals are given the ability to self-select regarding participation in an IP project. Scholars perform at their highest capacity when their talents and expertise match the project in which they are invited to participate, and they feel appreciated and valued for their contributions. Success of an interprofessional project is also facilitated when individuals are taught and mentored on the processes of collaboration, watching, and learning from others, including mentors, of how to be effective team members and how to maximize their collective efforts while reducing conflict.

On the University administrative level and in collaboration with the University Board of Directors, future capital investments may take into account campus design, including the physical location of colleges and departments to optimize opportunities for faculty, staff and students of various professions and disciplines to share common space. Shared spaces may involve building shared classrooms and auditoriums, both large and small, as well as shared simulation labs. Informal meeting spaces, such as shared lounges, can create a sense of belonging and connectedness which can lead to interesting conversations and the identification of mutual interests and academic opportunities.

To further create a culture of collaboration, university administrators and departmental leaders must also seriously consider the diversity of demographic characteristics and expertise of all academic members, ranging from administrators to faculty, staff, and students. The organization must articulate a philosophy of interprofessional collaboration which emphasizes inclusiveness, respect, and the excitement that comes with sharing knowledge, encouraging creativity and innovation, and promoting out-of-the box thinking to solve the complex problems of our society and world. The tone is set by the administration as they thoughtfully plan short and long-term interprofessional goals and serve as key champions of collaboration in higher education. This happens when administrators speak about the value of collaboration and include expertise in IPC as a criterion for hiring faculty, with strategic hiring practices that provide a "deep bench" of IPC researchers, educators, and practitioners. Scott (2015) further emphasized that it is an organization's ability to create policies, procedures, and guidelines related to IPC that enhances trust and carries greater legitimacy as team members implement collaborative projects.

Across all levels of the University, including Colleges, Schools, Departments, and Units, a culture of interprofessional collaboration is supported when resources are made available for collaborative projects, such as space and equipment; seed money for developing IPC teams and conducting pilot work; staff are available to assist with grant applications, and red tape is limited in the signing off on projects. There is also great value in investment

by the university in advanced discovery platforms that help identify collaborators across the university, based on their scholarship, including grant submissions, publications, and presentations. Furthermore, Offices of Grants and Research can play a key role in identifying interprofessional funding opportunities and helping to identify principal investigators and co-investigators within the internal academic community, as well as potential collaborators from other institutions. At this level, there is also an opportunity to develop fair and equitable guidelines for the distribution of funds from IPC projects.

In addition, a culture of IPC is supported across all levels of the university when there is funding of IPC initiatives, workshops, seminars, and campus-wide events that highlight IPC work, such as hosting IPC Research Day. Another exceptional initiative is university funding for the development of a micro-credential regarding Interprofessional Collaboration, which addresses topics, such as the principles of teamwork, effective communication, ethics and values, and roles and responsibilities. This badge can be available for interested faculty, staff, and students, and included on one's CV, resume, or LinkedIn page, to attest to their acquisition of knowledge, attitudes and skills needed for successful collaboration. College or departmental support can also be given in the planning of interprofessional courses involving various disciplines. These courses may be officially co-taught by different professionals, or members of other professions may be invited to share their perspectives on a topic that requires interprofessional expertise. Bringing together students from various disciplines can also occur through structured events involving the brainstorming of challenging issues, and provides an opportunity to recognize shared and discipline-specific competencies.

Lastly, administrators, deans, and chairs can create a culture of collaboration by identifying and rewarding IPC champions through formal recognition and monetary incentives related to their collaborative efforts. One example would be an IPC Faculty Scholars Program, developed through a competitive process, in which selected interprofessional scholars would be funded to attend a national or international interprofessional conference, with the expectation that lessons learned are shared at the university, college, and departmental levels through presentations, and the mentoring of junior faculty and graduate students. As a last recommendation, a culture of interprofessional collaboration can be reinforced when there is as an expectation of IPC, reflected in the criteria of annual merit evaluations and promotion and tenure.

6. Conclusion

Successful interprofessional collaboration requires a simultaneous top-down and bottom-up approach in higher education with university administrators joining hands with faculty, staff, and students. Interprofessional collaborative initiatives must illustrate a commitment to the advancement of all involved disciplines/professions and support transformative change in the culture of the organization across all levels. IPC-related mottos are that all must "Talk the Talk and Walk the Walk" and "We Are Stronger Together." Rogers and Weber (2010) conclude the "teams that collaborate create links through space and time between many specialized interdependent activities of various professionals, thereby maximizing convergence of various types of contributions and minimizing process interference and breakdowns. Even small differences in the intensity of interprofessional collaboration can have real effects with observable results" (p. 19). In higher education, all members of an academic community have an important role in solving the world's complex and challenging problems~ Through the best thinking of collaborative minds, anything is possible.

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