ABSTRACT

John Jason Chaffin, SOCIAL NETWORK DYNAMICS OF QUALITY ENHANCEMENT INITIATIVES IN THE COMMUNITY COLLEGE SETTING: STRATEGIC CHOICE AND EMERGENT CHANGE (Under the direction of Dr. David Siegel). Department of Educational Leadership, April 2015.

This study used social network analysis to examine the strategic and emergent dynamics of externally mandated quality enhancement initiatives in the community college setting. The theoretical context for this study relies on complex adaptive systems theory to anticipate that when institutions confront new demands from their external environment, they will employ emergent and/or strategic approaches to adaptation. Three community colleges in the Southeast were selected as research sites. Each of these colleges was at a different point in implementing a quality enhancement initiative as part of the decennial reaffirmation of accreditation cycle with their regional accrediting agency. Social network analysis was conducted using an own-tie survey instrument. An own-tie survey was generated for each research site based on a roster of individuals who had formal involvement with their college's quality enhancement initiative in the previous year. Data collected from the own-tie surveys were analyzed using the UCINET program (Borgatti, Everett, & Freeman, 2002) for three complete network measures (network density, core-periphery, and external-internal index) and three individual network measures (total connections, eigenvector centrality, and boundary spanner). These measures were then used to identify three informants representing diverse network positions from each research site for semi-structured interviews (Daly & Finnigan, 2010). These interviews asked informants to describe the network dynamics they perceived for their quality enhancement initiatives as well as the extent to which these dynamics were strategic or emergent in nature. This study's findings suggest that quality enhancement initiatives are characterized by primarily strategic dynamics. A likely explanation for this is the data collection and assessment emphasis typical of externally

mandated quality enhancement initiatives. Theoretical, methodological, and practical implications of this study's findings are also discussed.

SOCIAL NETWORK DYNAMICS OF QUALITY ENHANCEMENT INITIATIVES IN THE COMMUNITY COLLEGE SETTING: STRATEGIC CHOICE AND EMERGENT CHANGE

A Dissertation

Presented to

The Faculty of the Department of Educational Leadership

East Carolina University

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Education in Educational Leadership

by

John Jason Chaffin

April, 2015

SOCIAL NETWORK DYNAMICS OF QUALITY ENHANCEMENT INITIATIVES IN THE COMMUNITY COLLEGE SETTING: STRATEGIC CHOICE AND EMERGENT CHANGE

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DEDICATION

This work is dedicated to Patty and Jake. All I do is for you; all I am is because of you.

ACKNOWLEDGEMENTS

A tremendous amount of support, advice, and encouragement made this study possible. First, I would like to thank my dissertation committee members. Dr. Cheryl McFadden provided numerous constructive suggestions and helped me improve important parts of the theoretical context for this study. Dr. Crystal Chambers was a consistent source of insightful inquiry, and her questions helped me clarify my thinking on a number of topics. Dr. Christine Avenarius was instrumental in helping me develop this study's methodological and analytical techniques, and I truly appreciate her agreeing to serve on this committee. Finally, Dr. David Siegel was an invaluable resource for me throughout this entire process. He always provided just the right kind of support and motivation at just the right moments. I could not have completed this study without his leadership.

I would also like to acknowledge my program cohort: Angie, Annette, Devon, Jolee, Jenn, Mike, and our late friend Steve Hunt. I am incredibly fortunate to have been enrolled in this program with such hardworking, talented, and supportive classmates. I also thank Drs. McFadden, Chambers, and Siegel, and Dr. Michael Poock for the excellent instruction they provided to our cohort and the effort they made to drive long distance to teach us. I appreciate your dedication. I would also like to thank Gwen Joyner for all of her help these last few weeks.

Finally, I would like to thank everyone from Longleaf, Cypress, and Seaside Technical Colleges who participated in this study. I hope I have represented fairly and accurately everything you shared with me.

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CHAPTER 1: INTRODUCTION

Institutions of higher education face a variety of environmental variables that can potentially strengthen or weaken their viability and mission. An increasingly prominent environmental variable is the relationship between regional accrediting agencies and the institutions they accredit (Wergin, 2005). As part of the increasing emphasis in this country on accountability and the assessment of student learning at all levels of education, these accrediting agencies have in the last decade and a half begun requiring that their member colleges and universities implement institutional effectiveness practices that demonstrate a commitment to improving student learning (Brittingham, 2009). Prior to this new emphasis on institutional effectiveness regional accrediting agencies required that their member institutions document resources such as library holdings and faculty credentials that facilitate student learning (Brittingham, 2009). With the new emphasis institutions must now also document how they deploy such resources to improve their students' learning outcomes (Brittingham, 2009). As Powell, Gilleland, and Pearson (2012) observe, "Institutions of higher education must be accountable for the resources received and the results achieved" (p. 102). Such accountability expectations for higher education institutions have been present since after the financial calamities of the Great Depression, but have further intensified in the wake of the global economic downturn of the last five years (Powell, Gilleland, & Pearson, 2012). This intensified emphasis on accountability represents a significant change in the environment in which colleges and universities operate.

Because accrediting agencies serve as intermediaries between the federal government and their member institutions, they can affect institutions' eligibility to receive federal funding, particularly via student financial aid sources such as grants and student loan payments (Eaton,

2009; Epstein, 2012). Regional accrediting agencies thus represent an essential source of environmental resources for institutions of higher education.

This study examines how colleges and universities respond to new demands from their regional accrediting agencies to demonstrate institutional commitment to assessing and improving student learning. More specifically, this study focuses on how colleges and universities in the southeastern United States respond to a new requirement by that region's accrediting agency, the Southern Association of Colleges and Schools (SACS), that its member institutions develop and implement a quality enhancement plan (QEP) to improve student learning (Southern Association of Colleges and Schools, Commission on Colleges, 2012). The new QEP component of SACS's accreditation process poses a unique challenge for colleges and universities in that it requires them to engage in a broad-based institutional self-study in order to identify a suitable QEP topic (Katsinas, Kinkead, & Kennamer, 2009). The QEP component also involves considerable reallocations of human and fiscal resources, both during its development and implementation phases. When these factors are considered in conjunction with the power regional accrediting agencies have to affect their member institutions' access to resources, the new QEP requirement represents for colleges and universities both a threat and an opportunity from the external environment (Cruise, 2007). Therefore, it is crucial for leaders of higher education institutions to understand how external factors such as a QEP requirement affect their institutions' internal dynamics and relationship to their external environment.

Purpose

The purpose of this study is to examine how colleges and universities respond to requirements form their regional accrediting agencies that they develop and implement initiatives to measure and improve their students' learning. Developing and implementing such initiatives involves a significant commitment of time and resources for an institution and therefore

necessitates strategic decision making on the part of an institution's leadership. However, because such initiatives also often require, explicitly or as a practical matter, the broad-based involvement of an institution's various constituent groups (Batten, 2010), relying solely on top-down strategic decision making may be an inappropriate and/or ineffective option for institutional leaders. Paradoxically, successfully implementing and sustaining an initiative to improve student learning may rely on just such decision making.

When an institution is compelled by its regional accrediting agency to develop and implement a quality enhancement initiative this presents the institution with an opportunity to engage in a process of organizational change (Batten, 2010). This study will examine to what extent institutions that attempt to develop and implement initiatives to improve student learning utilize a strategic, top-down approach as opposed to an emergent, broad-based approach. A strategic, top-down approach, in this context, refers to the utilization of the internal structures and processes that an institution's administrators have intentionally created or modified to enhance their institution's overall performance, particularly in terms of processing information (Blomme, 2012; Stevenson & Gilly, 1993). To examine this issue, this study utilizes social network analysis to describe the relationships between institutions' internal connections and externally induced organizational change processes. As Moolenaar and Daly (2012) suggest, "the structure of social networks at the outset of a reform affects the success of the reform's implementation, and reform efforts themselves may change existing patterns of social relationships" (p. 26). Consequently, the evolution of how the constituent members of an institution connect to and interact with one another reflects the evolution of the institution itself, and analyzing an institution's internal connections during such a change process may indicate how the institution is adapting itself to the change initiative. Therefore, a social network analysis

of institutions that have developed and implemented a quality enhancement initiative—or are in the process of doing so—will help to clarify the dynamics that drive institutional adaptation.

Significance

This study makes a significant contribution to the fields of organization theory, social network analysis, and complex adaptive systems theory. In its synthesis of social network analysis and complex adaptive systems theory, this study suggests new directions for examining organizational change processes. Additionally, this study offers a number of practical insights for leaders of higher education institutions. First, this study contributes to the significant body of scholarship on how institutions' social networks affect and are affected by change initiatives. Second, this study attempts to describe how emergent network dynamics affect institutional change initiatives. In doing so, this study may provide insight into how change initiatives evolve both through formal and informal networks of social connections within organizations and what strategies can be deployed to maximize the effectiveness of such networks For leaders of higher education instituions such strategies may be particularly useful given the high degree of autonomy and thus emergent potential that the subunits comprising colleges and universities enjoy. Finally, this study provides a number of practical insights regarding how colleges and universities may respond to external stakeholder demands, particularly those of regional accrediting agencies.

Research Questions

This study attempts to address four interrelated research questions. The first two of these questions examine the network dynamics involved in the development and implementation of quality enhancement initiatives:

RQ1: What are the characteristics of the communications networks involved in the development and implementation of quality enhancement initiatives?

RQ2: What are the characteristics of the knowledge transfer networks involved in the development and implementation of quality enhancement initiatives?

These questions focus on institutions' internal communications and knowledge transfer networks because these two types of networks are closely associated with organization-wide change efforts (Daly & Finnigan, 2010). Since the development and implementation of a quality enhancement initiative typically involves a process of organization-wide change and a shift in institutional focus, an analysis of internal communications and knowledge transfer networks is an appropriate approach to understanding this process. This study defines internal communications networks as a frequency measure of communications between an institution's individual members and subunits (Daly & Finnigan, 2010). Likewise, this study defines internal knowledge transfer networks as a frequency measure of how often an institution's individual members and subunits seek out or convey knowledge specific to work-related tasks. Because this study focuses on a specific institutional task, the development and implementation of a quality enhancement initiative, analyses of internal communications and knowledge transfer networks will focus on frequencies of exchange specific to institutions' quality enhancement initiatives and the individuals and subgroups involved with these initiatives.

This study's third and fourth research questions explore an explanatory framework for the causal dynamics addressed by the first two research questions:

RQ3: What are the strategic dynamics that influence the development and implementation of an institution's quality enhancement initiative?

RQ4: What are the emergent dynamics that influence the development and implementation of an institution's quality enhancement initiative?

In the context of this study, ***strategic dynamics*** refer to patterns of communications and knowledge transfer that conform to the paths of an institution's formal hierarchical structure.

For example, the dissemination of a new initiative from an institution's executive council to its constituent subunits would represent a strategic dynamic. Strategic dynamics also refer to official shifts in institutional priorities, such as the creation of new institutional strategic objectives and subunits and the reorientation of institutional mission statements to reinforce emphasis on a quality enhancement initiative. In contrast to strategic dynamics, *emergent dynamics* refer to patterns of communications and knowledge transfer that do not conform to the paths of an institution's formal hierarchical structure. For example, spontaneous collaborations between institutional subunits that are not formally connected by organizational design represent emergent dynamics. Emergent dynamics also describe "bottom-up" initiatives which begin within a lower-level subunit and then are adopted at increasingly higher levels throughout the organization.

Theoretical Framework

This study seeks to contribute to the field of organization theory in general and the study of higher education institutions in particular. To do so this study relies on a synthesis of two related theoretical constructs: complex adaptive systems (CAS) theory and social network analysis (SNA). For the purposes of this study, these two theories complement each other in that CAS theory provides a predictive and explanatory framework for understanding organizational change while SNA provides a methodology for describing organizational change.

CAS theory addresses how complex systems adapt and change based on the dynamics of their internal and external environments (Anderson, 1999). More specifically, CAS theory suggests that dramatic changes within a system can result from relatively minor changes within one or more of the systems subunits, a phenomenon known as emergence (Anderson, 1999; Urry, 2006). Emergence is driven by positive feedback loops in which a change within one or more of a system's subunits forces a change at the whole-system level. Changes at the whole-

system level in turn reinforce and encourage changes at the subunit level; as a result, this reciprocal feedback can create cascading effects throughout the system. According to CAS theory, emergent system-wide changes will correspond to the demands of a system's external environment (Anderson, 1999; Kauffman & Johnsen, 1991). The external environment will impose certain fitness parameters on a system that rewards certain emergent changes while discouraging others (Kauffman & Johnsen, 1991). The more closely connected a system and its external environment, the greater the number of "fit" emergent changes (Kauffman & Johnsen, 1991; Mischen & Jackson, 2008).

Because organizations such as colleges and universities are complex systems with multiple and evolving ties to their external environments, they are appropriate subjects of research using CAS theory. Additionally, as Weick (1976) has observed, the subunits that comprise institutions of higher education tend to operate with considerable independence and thus must be considered loosely coupled systems; because the subunits within loosely coupled systems have more autonomy to initiate their own changes, loosely coupled systems will be more likely to experience emergent changes and therefore may be best understood via the framework that CAS theory provides.

Social network analysis (SNA), like CAS theory, is an offshoot of open-systems thinking (Scott & Davis, 2003). Whereas CAS theory focuses on how systems change in relation to their environments, SNA focuses on how the individuals or subunits within a system are connected to one another. This focus also distinguishes SNA from other methods of analyzing social systems in that its emphasis is on the structure of relationships and exchanges rather than on individuals' attributes (Borgatti, Mehra, Brass, & Labianca, 2009). According to SNA, understanding the connections (or lack thereof) between a system's individual members or subunits helps to explain a variety of social phenomena, including the flow of information, the diffusion of

innovations, and the accumulation of social capital (Borgatti & Foster, 2003). For the study of organizations, SNA provides tools for examining both the internal connections of individual organizations (intraorganizational analysis) and the connections between organizations (interorgranizational analysis). For the purposes of this study, SNA is used primarily to examine the intraorganizational connections of the institutions selected for analysis.

The synthesis of CAS theory and SNA provides a useful theoretical framework for considering how colleges and universities respond to external pressures to develop and implement quality enhancement initiatives. CAS theory predicts that because colleges and universities are complex, loosely-coupled systems operating in dynamic environments, that new environmental demands, such as those imposed by regional accrediting agencies, will compel not only top-down strategic directives within institutions, but also spur emergent orgnaizational changes. SNA provides a framework for understanding both top-down directives and bottom-up emergent changes within institutions by describing internal connectivity and information flow. The essential overalp between these two theories is that each suggests that there are certain organizational designs that are more ideally suited to responding and adapting to new external environmental factors than others. For both theories, such designs will involve the appropriate balance of loose versus tight coupling, directed versus emergent change, and dense versus sparse connectivity. The overarching theme of this study is determing what such organizational designs look like for colleges and universities that attempt to develop and implement a quality enhancement initiative. It should also be noted, however, that when an institution undertakes a change initiative in response to a requirement of an external stakeholder, it still may choose from a variety of organizational responses that range from complete acquiessence to complete resistance (Oliver, 1991).

Methodology

This study utilizes a mixed method approach to analyzing the organizational dynamics of five community colleges at various stages of developing and implementing quality enhancement initiatives in order to comply with the standards of their regional accrediting agency. The quantitative component of this study's methodology involves a series of statistical tests of network dynamics. These tests are applied to questionnaire responses provided by individuals surveyed at the five institutions examined in this study. These statistical tests reveal for each of the institutions examined in this study its network structure, the flow of information within the institution, and the individuals who are most central to developing and implementing the quality enhancement initiative. A qualitative method of focused interviews is used to supplement the quantitative data network analysis. The qualitative method involves a series of interviews with selected individuals at each institution as well as an analysis of institutional documents including meeting minutes and organizational charts. Taken together, the quantitative and qualitative methods used in this study provide a suitable means for addressing this study's central research questions.

The institutions examined in this study are three community colleges in the southeastern region of the country. Each of these community colleges is accredited by SACS. Consequently, each college has either developed or is in the process of developing a QEP to improve student learning. The three colleges chosen for this study were selected based on their relative progression through the QEP process. As QEPs are typically designed to be five-year plans, the QEP process of development and implementation may be thought of as a period of five to seven years, with a year or two allotted for the development of the plan and five years for the plan's implementation. Each of the colleges examined in this study was at a different point in the QEP process. At one end of this process a college was in the development stage of its QEP; at the

other end of this process, a college was completing the fifth year of its plan's implementation. The other college examined in this study fell somewhere between these two points. The rationale for selecting three institutions at different points in the QEP process is that doing so allows for a relative comparison of how the QEP process changes organizational structures and connectivity over time.

Assumptions

There are two important assumptions informing this study. First, this study assumes that a requirement on the part of a regional accrediting agency that its member institutions develop and implement a quality enhancement initiative represents a significant factor in the external environment. The rationale for this assumption is that regional accrediting agencies have the capacity to sanction a member institution in ways that could affect enrollment, the eligibility of an institution's students to receive to federal financial aid, and the public perception of an institution's legitimacy (Eaton, 2009; Epstein, 2012). Second, this study assumes that an institution's internal social network both indicates and influences important institutional functions such as communication, knowledge sharing, and resource allocation. This assumption is based on the broad consensus in social network and organizational scholarship that organizations conduct their activities through the exploitation of their internal and external networks, and that important organizational dynamics can be effectively understood through the analysis of these networks (Carpenter, Li, & Jiang, 2012).

Limitations and Delimitations

It should be noted that this study and its findings are subject to limitations and delimitations. First among the limitations is the impossibility of constructing a complete and wholly accurate depiction of an institution's internal network. Despite the multiple methods used to obtain information about the internal networks of the colleges examined in this study, the

network analyses presented here must be considered incomplete. Undoubtedly there were important network connections and dynamics in each of the colleges discussed here that were not revealed through the analytical tools this study employed. A related limitation is the accuracy with which members of an organization can describe their social networks. Every organization has a unique internal network structure, and while this study attempts to draw reasonable conclusions based on its research questions and data analysis, the patterns and themes discussed here cannot be seamlessly applied for other organizations. The findings of this study present intriguing suggestions for how institutions can utilize network structures to respond to external environmental demands, but these suggestions must be considered within the context of each institution's structure, history, and mission.

The delimitations of this study involve its sample population. First, this population is limited to higher education institutions and, more specifically, institutions within the purview of one specific accrediting agency, SACS. This delimitation to institutions within a single accrediting agency is necessary so that the colleges examined here are each responding to the same external requirement for developing and implementing a quality enhancement initiative to improve student learning. Second, because the mission, organization, and culture of community colleges and four-year institutions differ considerably, it is appropriate that this study focus on one or the other of these groups. This study focuses on community colleges, but a similarly designed study could examine four-year institutions. Finally, this study examines five community colleges at various stages in the QEP process rather than examining a single institution longitudinally throughout the QEP process.

Definition of Terms

Accreditation- The status awarded institutions of higher education by regional or professional accrediting agencies certifying that those institutions have demonstrated compliance with certain standards of quality and good practices.

Complete network analysis- Analysis of all the social network ties of all the individuals (nodes) within a specified system.

Complex adaptive systems theory- Deriving from open-systems theory, complex adaptive systems theory (CAS) describes how the constituent components of a system evolve in tandem with, and somewhat independently from, the system as a whole in order to meet the fitness requirements of the external environment (Anderson, 1999).

Dyad- The state of two individuals/units that have or have had some type of exchange of resources, data, or any other transferable elements.

Embeddedness- How a system's network of exchanges and processes determines the individual attributes of the system's nodes (Kilduff & Brass, 2010).

Emergence- A tendency within complex adaptive systems for significant system-wide changes to begin with minor changes in peripheral constituent units (Urry, 2006). Emergence happens as a result of positive feedback loops in which information is exchanged between constituent units and the larger system. Although emergent changes may begin with peripheral units, these changes will often evolve significantly when absorbed into system-wide dynamics (Blomme, 2012).

Fitness landscape- A description of all the possible adaptations that emerge from the interactions between a system's agents and subunits and external environmental factors (Kauffman & Johnsen, 1991).

Individual network analysis- Analysis of all the social network ties an individual (node) has with other individuals (nodes) within a specified system.

Loosely coupled systems- A descriptive term developed by Weick (1976) to describe institutions in which the hierarchical control and monitoring of institutional subunits is difficult or impossible, and in many cases undesirable. Weick asserted that institutions of higher education tend to be loosely coupled due to the relative autonomy with which academic subunits operate.

Network centrality- A network measure determined by calculating the percentage of all possible connections in a network that a node possesses with the other nodes in its network.

Network density- A measure of the proportion of all the possible links within a given network that are actualized links; the higher the percentage of all possible links that are links in reality, the higher a network's density (Haythornthwaite, 1996).

Network position- A description of how an individual is connected with all the other individuals in a given network (Burt, 1976).

NK model- In this model, *N* describes the number of agents or subunits within a system and *K* describes the degree of interdependency between a system's agents or subunits (Kauffman & Johnsen, 1991).

Node- The most basic unit of analysis on social network analysis, a node may, depending on the scope of the study, refer to an individual within a larger network of other individuals or to a group or organization within a larger network of groups or organizations.

Organizational fitness- The extent to which an organization has adapted to the demands of its external environment. The greater an organization's fitness, the more able it will be to meet environmental threats and exploit environmental opportunities.

Social capital- The real and potential utility a node derives from its network position and relationships with other nodes (Adler & Kwon, 2002; Katz, Lazer, Arrow, & Contractor, 2004; Tsai, 2000).

Social network analysis (SNA)- A method of systems analysis which examines the structure, direction, and frequency of the interactions (ties) between a system's constituent agents.

Structural equivalence- A state when in a specified network two or more individuals occupy similar network positions and may therefore share certain characteristics (Burt, 1976; Burt, 1987; Doreian, 1988).

Structural holes- An area absent of connections between the nodes of a given network (Burt, 2004).

Structuration- A process whereby individuals within an organization change their perceptions and behaviors based on the new logics of institutional change

Organization of the Study

This study is organized in five chapters. The first chapter provides an overview of the study and discusses its purpose, limitations, and delimitations. The second chapter provides a review of the literature relevant to the theoretical framework that informs this study. This literature review includes a discussion of CAS and SNA theories and prior organizational studies that have used these theoretical lenses. This discussion then takes up the possibility of synthesizing these two theories and using this synthesis to analyze how institutions of higher education respond to external environmental demands such as those imposed by regional accrediting agencies. The second chapter also discusses the role regional accrediting agencies play in the external environment in which colleges and universities operate. The third chapter provides an explanation of the research methods used in this study. This chapter addresses both

quantitative and qualitative methods as well as the selection of the sample population. The fourth chapter presents a discussion of the findings that resulted from these research methods. This discussion uses the theoretical synthesis established in the second chapter to interpret the collected data. The final chapter considers the implications of this study's findings for higher education administrators and suggests directions for future research.

CHAPTER 2: REVIEW OF LITERATURE

Chapter Two first reviews the literature and prior research that contribute to the theoretical framework for this study and then examines how this framework has been applied in educational contexts. The theoretical framework discussed in this chapter involves a synthesis of approaches to understanding how organizations in general and higher education institutions in particular respond to their external environments by adapting their internal functions and structure. The theoretical synthesis that grounds this study utilizes social network theory in combination with theories of environmental adaptation and complex adaptive systems. Two central assumptions form the basis for this theoretical synthesis. First, as an organization attempts to respond to the demands of its external environment, it engages in a combination of strategic and emergent search processes in order to select suitable adaptations (Burgelman, 1991; Lazer & Friedman, 2007; Lovas & Ghoshal, 2000). Second, the dynamics of these organizational processes can be analyzed and understood using social network theory (Bandelj & Purg, 2006; Borgatti & Foster, 2003). Taken together, these two assumptions represent an attempt to understand institutions of higher education as dynamic systems in which both the individual agency of an institution's constituents and the patterns of interactions between these constituents are influenced by the external environment (Goldspink & Kay, 2010). In the specific context of this study, these two assumptions provide starting points for explaining how institutions of higher education respond to the demands of their external environments, particularly those environmental demands that encourage institutions to alter their internal structures and processes.

The following discussion begins by considering the external environmental demands that affect institutions of higher education with a specific focus on the demands imposed by regional accrediting agencies. Following this discussion is a review of the literature concerning organizational ecologies and complex adaptive systems. Finally, this discussion turns to social

network theory. This section of the literature review will establish the theoretical grounds for using social network theory to analyze how higher education institutions alter their internal dynamics in response to the external demands exerted by accrediting agencies. In doing so, this section of the literature review will also explain the connection between the theoretical framework of this study, its research questions, and methodology.

Accreditation and Higher Education

Considered as organizations operating within an open-systems framework, colleges and universities are both shaped by and shapers of a number of internal and external environmental factors (Schmidtlein, 1999). For public universities and open-admissions community colleges pressures from the external environment are particularly significant (Shults, 2008). Because these institutions must interact with and derive resources from a number of external stakeholders, the external environment can exert considerable influence on institutions' internal dynamics (Dill, 1999). As Lawrence and Lorsch (1967) predicted with contingency theory, institutions and their constituent subunits may reconfigure in order to more effectively respond to their external environments. The results of such reconfigurations can include the creation of new positions and subunits, rearrangement of existing subunits, reallocation of institutional resources, and revision of mission and institutional priorities (Dill, 1999; Lueddeke, 1999). For institutional leaders, implementing and administering changes that result from external pressures can affect the fitness and public perception of their institutions (Dill, 1999; Lueddeke, 1999).

Among the more influential external stakeholders interacting with colleges and universities are regional accrediting agencies (Eaton, 2009). According to Eaton (2009), accreditation serves higher education institutions in four ways: vouching for quality; facilitating federal and state funding; reinforcing public confidence; and encouraging avenues of student transfer. In the US there are six regional accrediting agencies that serve specified geographical

areas and the states therein: the Middle States Commission on Higher Education; the New England Association of Schools and Colleges; the North Central Association of Colleges and Schools; the Northwest Commission on Colleges and Universities; the Southern Association of Colleges and Schools; and the Western Association of Schools and Colleges; California also has two separate agencies for its two-year and four-year institutions (Lubinescu, Ratcliff, & Gaffney, 2001; Wergin, 2005). These regional accrediting agencies receive recognition and support from two national bodies, the Council on Higher Education Accreditation (a privately funded organization) and the Department of Education (a branch of the federal government) (Eaton, 2006; 2009). Regional accrediting agencies serve as a go-between for higher education institutions and the federal government, implementing peer-review accountability processes for the former and assuring institutional compliance with Department of Education standards for the latter (Epstein, 2012; Wolff, 1993).

Regional accrediting agencies operate through their dual abilities to evaluate the quality of higher education institutions and interpret governmental regulations, and are subject themselves to a variety of external environmental factors (Eaton, 2009; Lubinescu et al., 2001; Wolff, 1993). Central to the function of regional accrediting agencies is the ability to levy sanctions when institutions do not comply with federal regulations and/or the general framework of quality that the U.S. Department of Education promotes (Eaton, 2009; Epstein, 2012). These sanctions typically involve graduated levels of severity that may eventually lead to the revocation of accredited status and ineligibility to receive federal funds, including tuition payments from student financial aid (Eaton, 2009; Epstein, 2012). Because of the potential severity of these sanctions, higher education institutions have a compelling interest to comply with the standards of their regional accrediting agencies in order to avoid negative ramifications. The integrity of the accrediting review process typically relies on a peer-review approach in

which every institution that seeks accreditation is in turn given the opportunity to participate in a review capacity so that any untoward reviewing practices are discouraged (Eaton, 2009; Epstein, 2012).

Major areas of emphasis for regional accrediting agencies the past two decades are the assessment of student learning, the documentation of institutional effectiveness activities, and the demonstration of accountability for quality educational programs (Lubinescu et al., 2001; Morest, 2009). This emphasis both reflects and partly explains the tremendous growth of scholarship in the areas of assessment and institutional effectiveness. No longer content with assurances of quality based on anecdotes and academic reputation, regional accrediting agencies, prodded by lawmakers at the federal and state levels, have begun requiring institutions to implement more transparent and standardized processes for evaluating the extent to which they meet their educational mission and serve the needs of their students (Cruise, 2007; Lubinescu et al., 2001; Malandra, 2008). These requirements are manifested in a number of specific accrediting standards, including the assessment of general education programs, reviews of faculty credentials, and documentation of student complaint procedures. In response to these external requirements, higher education institutions are adopting a "culture of evidence" that emphasizes the development, implementation, and assessment of initiatives to improve institutional outcomes (Morest, 2009, p. 18).

However, the role accrediting agencies is not limited to auditing the quality and operations of higher education institutions. In the last two decades in particular, accrediting agencies have shifted their focus from analyzing institutions' inputs (resource acquisition and allocation) to analyzing institutions' processes and outputs (institutional effectiveness) (Lubinescu et al., 2001; Wergin, 2005). Along with this shifting focus has come a new emphasis from regional accrediting agencies on requiring institutions to develop and implement plans to

improve and assess the learning outcomes of their student populations (Malandra, 2008). This emphasis has encouraged institutions to place more focus on assessing their students' learning outcomes in order to determine the effectiveness of their core processes (Hutchings, 2009). As a result, the regional accrediting process has begun shifting from backwards-looking audits of institutional resources to a forward-looking emphasis on improved institutional processes (Areen, 2011; Brittingham, 2009). Consequently, the environmental demands exercised by regional accrediting agencies now include both the threats represented by potential sanctions and the opportunities represented by potential institutional improvements.

The most significant representation of accrediting agencies' shift to a more forward-looking emphasis on institutional improvement is a requirement that colleges and universities develop and implement a plan to improve the core processes of teaching, learning, and student support (Areen, 2011; Brittingham, 2009). Each of the six major regional accrediting agencies in the US has developed over that last decade and a half components of the peer review process that encourage institutions to develop quality improvement plans or identify areas for growth (Brittingham, 2009). A specific example of such a component is provided by the Sothern Association of Colleges and Schools (SACS), the regional agency that accredits colleges and universities in the southeastern US (Brittingham, 2009; Loughman, Hickson, Sheeks, & Hortman, 2008). As part of its accreditation review process SACS requires that institutions develop a quality enhancement plan (QEP) that focuses on improving a specific feature of student learning (Brittingham, 2009; Loughman et al., 2008). SACS requires that its member institutions develop and identify their QEP topics through a process of institutional self-study that utilizes input from a broad base of the institutional constituents, including faculty, staff, community stakeholders, and students (Southern Association of Colleges and Schools, 2012). Additionally, SACS requires that institutions develop specific criteria for assessing the proposed

outcomes of their QEPs and that they commit the fiscal and human resources necessary for implementing their QEPs (Southern Association of Colleges and Schools, 2012).

The new requirements of regional accrediting agencies that colleges and universities develop initiatives to enhance institutional quality and learning outcomes represent a shift in the environmental landscape of higher education, particularly in terms of external resource allocation (Smart, 2003; Volkwein, 2009). Whereas the previous focus by regional accrediting agencies on auditing the quality and integrity of higher education institutions' resources and processes encouraged institutions to assess their extant organizational missions and outputs, the new focus on institutional improvement encourages innovation and a reconfiguration of core teaching and learning processes in order to achieve specific institutional goals (Andrade, 2011; Volkwein, 2009). The benefit of this shift is that the external environments in which higher education institutions operate now reward a different type of fitness. This new environmental fitness is characterized by institutional flexibility and adaptability based on sound institutional effectiveness principles (Smart, 2003). Consequently, an institution is rewarded by the external environment for its ability to alter its internal organizational dynamics in order to achieve the institutional improvement goals it establishes for itself (Volkwein, 2009).

Environmental Adaptation and Complex Adaptive Systems

As Dill (1999) has observed, the increased demands from external stakeholders for institutional accountability and effectiveness have altered the environments in which colleges and universities operate. These environmental changes have significant implications for the internal dynamics of colleges and universities (Dill, 1999). In light of this changed environment, it is useful to consider how institutions of higher education attempt to alter their internal structures and processes to adapt to the new environmental demands (Dill, 1999). Dill (1999) asserts that colleges and universities can adapt to the new demands of their accountability-driven

external environments by transforming themselves into learning organizations and reconfiguring their internal structures to improve the creation, sharing, and processing of knowledge. The trend of increased accountability demands from the external environment thus highlights the interdependency of an institution's internal dynamics and the environment in which the institution operates. More specifically, the accountability trend suggests that the adaptive flexibility of internal structures and processes will contribute to an institution's overall fitness for its operational environment (Dill, 1999).

However, such institutional adaptability involves, especially for higher education institutions, the tremendous challenge of coordinating knowledge processing among institutional subunits that may not be coordinating knowledge processing at the level necessary to meet the demands of external stakeholders. Weick (1976) observed how the subunits that comprise colleges and universities tend to operate with a high degree of autonomy and independence from the influence of other institutional constituents. Weick (1976) described these subunits as "loosely coupled systems" that cause unpredictable outcomes in higher education institutions; consequently, an analysis of loosely coupled systems requires new methodologies and modes of inquiry. More specifically, loosely coupled systems tend to resist both the linearity and causality emphases of traditional modes of organizational analysis (Birnbuam, 1988; Weick, 1976). Loosely coupled systems are nonlinearly dynamic in the sense that their relationships to core organizational functions such as task, authority, and technology can change from one time or context to the next (Weick, 1976). In a broader environmental context, institutions that are comprised of loosely coupled systems may adapt to new environmental demands in unpredictable ways because top-down strategic directives will tend to be less effective for such institutions than for more-tightly coupled systems (Birnbaum, 1988).

Loosely-coupled institutions are not, however, necessarily at a disadvantage in adapting to environmental changes as compared to more tightly-coupled systems (Cameron, 1984). As Cameron (1984) has argued, truly successful adaptations will likely require a combination of both loose and tight coupling between an institution's subsystems. Successfully managing adaptations to new environmental demands will thus require that administrators foster the appropriate couplings between their various subsystems (Birnbaum, 1988; Cameron, 1984). Similarly, as Hrebiniak and Joyce (1985) explain, there is a fluid relationship between the demands of an institution's external environment and the adaptive choices an institution may draw upon in response. Hrebiniak and Joyce (1985) establish four quadrants of organizational adaptation along one axis of greater and lesser environmental determinism and another axis of greater and lesser strategic choice. These quadrants represent the broad scope of choices organizations enjoy when confronted with environmental change (Hrebiniak & Joyce, 1985).

The dynamic interaction between an organization and its environment and the unpredictability arising from loosely-coupled systems suggest that analyses of organizational adaptations must rely on non-linear modes of inquiry (Weick, 1976). An increasingly popular mode of non-linear inquiry into organizational adaptations draws upon complex adaptive systems theory (CAS) (Anderson, 1999; Carroll & Burton, 2000). CAS theory is the product of several decades of theoretical research on complexity in a variety of disciplines, most notably the physical sciences (Lansing, 2003), and is part of a larger emphasis on applying a dynamical systems approach to understanding natural and simulated environments (Anderson, 1999; Lansing, 2003). The contemporary tenets of CAS were first established through the collaborative work of the natural and social scientists of the Santa Fe Institute (Schneider & Somers, 2006; see Waldrop, 1992, for a narrative history of the Santa Fe Institute's work).

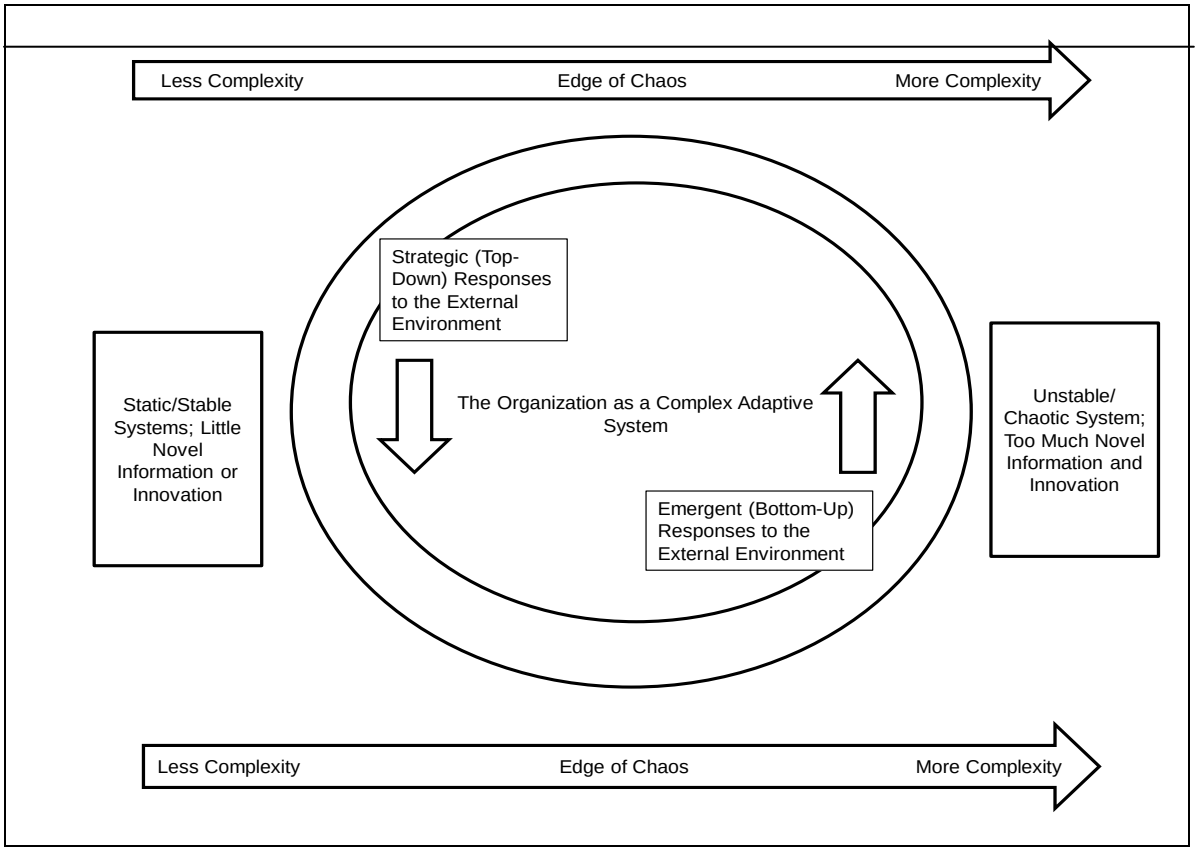
According to Anderson (1999), CAS relies on four entwined assumptions about complex systems. First, agents, which may be conceived of as the individuals or subunits within a system, respond to information and operate based on schemata that determine decision making and choice (Anderson, 1999). Second, agents operating within complex systems react and are connected to the actions and information imported from other agents within the system via positive feedback loops (Anderson, 1999). Third, in complex systems the agents that comprise a system and the system as a whole evolve in tandem; changes in the connections or schemata of a system's agents drive system-level changes and changes at the system level in turn drive changes in agents' connections and schemata (Anderson, 1999). Fourth, a complex system evolves over time as agents come and go or reconfigure their connections within the system (Anderson, 1999). The overarching theme shared in these four assumptions is that complex systems are most effectively understood when both the whole system and its constituent components are analyzed as interdependent variables (Carroll & Burton, 2000); in this sense, CAS rejects the reductionist tendencies of traditional modes of inquiry in the natural and social sciences (Carroll & Burton, 2000).

In addition to a basic concern for the interdependent internal dynamics of complex systems, CAS also addresses the role of external environmental pressures on systems' adaptations (Anderson, 1999). CAS considers system-level change and adaptation to be the result of a series of small and large modifications to the relationships between a system's subunits and the fitness of these modifications relative to the selective pressures exerted by a system's external environment (Anderson, 1999). In this sense, CAS dispenses with the idea of system inertia, favoring instead a punctuated equilibrium model in which systems balance precariously between too much order (small, infrequent modifications) and too much chaos (large, frequent modifications) (Anderson, 1999). The ideal balance between order and chaos for

a system is dictated by the evolving fitness landscape of its environment (Anderson, 1999; Levinthal, 1991). This model of system adaptation therefore emphasizes interdependencies both between a system's internal subunits and between a system and its external environment (Anderson, 1999; Levinthal, 1991). Figure 1 illustrates this continuum of less to more complex system dynamics within the relative external dynamics.

Burgelman (1991) provides a useful synthesis of these two levels of adaptive interdependency for organizational theory. One part of this synthesis involves organizational leaders scanning their external environment and its fitness landscape in order to select optimal strategic choices that will increase their organization's fitness (Burgelman, 1991). The other part involves the tendency for organizational subunits to independently initiate changes to strengthen their internal viability in anticipation of external environmental changes (Burgelman, 1991). Burgelman's (1991) synthesis suggests that in order to effectively adapt to external environmental changes, organizations must pursue a balanced approach that uses top-down strategic directives to drive change while also encouraging the bottom-up exploration and innovation that organizational subunits initiate. In this model, leaders ensure successful adaptation by creating within their organizations selection mechanisms that parallel those imposed by the external environment (Burgelman, 1991). Similarly, Lovas and Ghoshal (2000) and Siggelkow and Levinthal (2003) suggest that organizational leaders should encourage a balance of tightly and loosely coupled interdependencies between subunits in order to optimize innovation at the subunit level and consistent, long-term adaptation at the system level.

The importance of balancing top-down, tightly-coupled strategies with bottom-up, loosely coupled innovations follows from CAS theory's concept of *emergence*. Emergence refers to the tendency for complex systems to develop major system-wide changes as a result of small and sometimes unintentional changes between or within a system's subunits (Anderson,



Adapted from "Dispersed Knowledge Centres – A New Paradigm For The Pharmaceutical Industry" by N. L. Sharma and S. Goswami, 2009, *Business Strategy Series*, *10*(4) p. 213.

Figure 1. Complex Adaptive Systems Theory: Relationship between environmental complexity and system dynamics.

1999; Urry, 2006). An important feature of emergent properties is that they are not reducible to any particular properties of a system's agents or subunits; that is, even while emergence is driven by the interactions between a system's constituents, the system-level changes that result from emergence will have properties that are distinct from any one constituent (Morin, 2006; Urry, 2006). Mischen and Jackson (2008) provide an explanation for how emergence works within organizations. They describe how an organization's day-to-day activities will encourage the emergence of certain accepted practices among its subunits which may eventually become the official policies of the organization, absent any intentional policy development from its leaders (Mischen & Jackson, 2008). Similarly, Blomme (2012) discusses the implications of emergence for organizational change. In Blomme's (1984) analysis, emergence takes place in an organization through the process of what Giddens (2012) termed "structuration," a process whereby individuals within an organization change their perceptions and behaviors based on the new logics of institutional change. These changes in individuals' perceptions and behaviors in turn affect the logics of the change initiative, thus creating a positive feedback loop of influence (Blomme, 2012). Blomme (2012) suggests that managers should approach organizational change initiatives as opportunities to enable the emergent capacities of the connections between their organizations' constituent members.

The underlying mechanisms of emergence in complex systems are described by Kauffman and Johnsen's (1991) *NK* model of rugged fitness landscapes. In this model, *N* describes the number of agents or subunits within a system and *K* describes the degree of interdependency between a system's agents or subunits (Kauffman & Johnsen, 1991). A fitness landscape is a description of all the possible adaptations that emerge from the interactions between a system's agents and subunits and external environmental factors (Kauffman & Johnsen, 1991). The ruggedness of a fitness landscape increases relative to the degree of

interdependency between agents and subunits and their external environments (Kauffman & Johnsen, 1991). The greater the interdependency within a system, the more fitness "peaks" are created as the interactions between agents and subunits become more complex and produce a greater number of adaptations (Kauffman & Johnsen, 1991). For organization theory, Kauffman and Johnsen's *NK* model of rugged fitness landscapes suggests that as both organizations and the environments in which organizations function become more complex, the number of environmental adaptations—fitness peaks—that emerge will increase (Mischen & Jackson, 2008). Additionally, as Mischen and Jackson (2008) assert, the specific fitness peaks that emerge for an organization are likely determined by how similar the peaks are to the existing processes and behaviors of the organization. In other words, the emergence of certain fitness peaks in an organization will follow the most familiar paths of organizational behavior (Mischen & Jackson, 2008).

In a broader sense, CAS theory and its attendant concepts offer organizational researchers both explanatory and predictive tools. For explaining why organizations adapt in certain ways to changes in their external environments, CAS theory provide the framework of emergent organizational behaviors. The emergence framework discourages a reductionist approach to organizational behavior where the changes an organization undergoes are understood simply in terms of how an organization's agents and subunits relate to one another. Instead, emergence explains how new and unique organizational behaviors develop from the interdependencies between agents/subunits and the external fitness landscape (Kauffman & Johnsen, 1991; Mischen & Jackson, 2008). These interdependencies are in turn subject to the schemata that are used by an organization's agents or subunits to process and react to the information they receive from other agents/subunits and the external environment (Anderson, 1999). By bringing together the system-level analytical tools of emergence and the concept of agent-level schemata, CAS

theory attempts to predict the emergence of holistic system dynamics without completely ignoring individual agency (Anderson, 1999; Child & Rodrigues, 2011).

CAS theory also attempts to predict which strategies will best ensure that organizations successfully adapt to changes in the external environment. Lovas and Ghoshal's (2000) model of guided organizational evolution, which builds on Burgelman's (1991) model of organizational ecology, suggests that organizational leaders will be most effective when they develop integrated strategies for selecting the most fit innovations that emerge from the natural, bottom-up processes of their organizations. Likewise, the need for organizations to balance their top-down strategic initiatives with emerging bottom-up innovations can also be understood in terms of balancing what March (1991) termed the dynamics of exploitation and exploration. As Gupta, Smith, and Shalley (2006) explain, an organization's exploitative activities involve improving on and learning from its existing processes and services. In contrast, exploratory activities involve developing and experimenting with new processes and knowledge (Gupta et al., 2006). Effective organizations will balance their exploitative and exploratory activities based on the demands of their external environments; stable and predictable environments will reward more emphasis on exploitation activities that incrementally improve and adapt an organization's functions, whereas unstable and unpredictable environments will reward the adaptive flexibility that results from exploratory activities (Gupta et al., 2006; March, 1991). CAS theory thus suggests that an organization's leaders must consider the extent to which their organization balances the related dichotomies of loose vs. tight coupling (Weick, 1976), induced vs. autonomous change (Burgelman, 1991), and exploitative vs. exploratory activities (Gupta et al., 2006) relative to the demands of the external environment.

Social Network Theory

Whereas CAS theory attempts to explain how and why organizations adapt to their external environments, social network theory attempts to understand how the structures of connectivity within and between organizations encourage and restrict adaptation (Mischen & Jackson, 2008). CAS theory and social network theory share a common lineage of open systems thinking, and from the open systems perspective both theories derive an emphasis on the connections and interdependencies between a system's components and the information and resources that flow between these components (Scott & Davis, 2003). As Benham-Hutchins and Clancy (2010) explain, there is a natural overlap between the conceptual core of CAS theory and the methodologies associated with social network theory. Fundamentally, both theories emphasize how the components of complex systems influence and are subject to the influence of the internal and external components to which they are connected (Benham-Hutchins & Clancy, 2010; Mischen & Jackson, 2008). Notably, Carroll and Burton (2000) have applied social network analysis to study complexity and performance in organizations, demonstrating the utility of using social network theory's analytical tools to understand the emergent properties of organizational adaptation.

The increasing popularity of social network theory is perhaps not surprising given its potential to synthesize the research traditions of a range of disciplines that includes sociology, organization science, mathematics, communications, and computer science (Watts, 2004). In addition to the promise of creating a truly multidisciplinary research agenda, social network theory also offers an intriguing framework for explaining a variety of phenomena at both micro and macro levels of analysis (Salancik, 1995). At the foundation of social network theory lies the assumption that the structure, direction, and frequency of interactions between agents in a system is at least as important as agents' individual characteristics for understanding a system's

dynamics (Brass, Galaskiewicz, Greve, & Tsai 2004). Moreover, this assumption holds that patterns of interactions have the capacity to influence both whole system performance and the performance of individual agents (Brass et al., 2004). Put another way, social network theory is concerned with a meta-structure analysis of system dynamics that examines both individual agents as functions of their position within a system and systems as functions of the interaction patterns of individual agents (Raab & Kenis, 2009). That social network theory seeks to unify this whole-versus-parts dichotomy explains the enthusiasm with which researchers have embraced the theory as well as the challenges that continue to confront applying the theory to real-world observations.

The capacity of social network theory to explain complex system dynamics has become more relevant to researchers as the relative connectivity of individuals and populations has increased with advances in information technologies such as social media and mobile communication devices (Watts, 2009). The pace at which a single message or video posted online can be viewed, forwarded, and imitated by millions of individuals seems to illustrate the power that networks exert in the lifecycles of ideas and trends. Likewise, the increasing connectivity of economic and social systems provides a valid pretext for applying social network theory to the study of systems and populations (Easley & Kleinberg, 2010). As the ability to embed connectivity in daily routines and communications becomes easier via new technologies, the applicability of social network analysis to the analysis of social dynamics also becomes more apparent.

The notion that understanding the ways in which a system's constituents are connected is as important as understanding the constituents themselves can be traced back to the earliest practitioners of social science in the 19th century (Borgatti, Mehra, Brass, & Labianca, 2009). However, the foundations of modern social network theory are attributable to the work of

psychiatrist Jacob Moreno who conducted a study of runaway girls in the 1930s using a method called sociometry (Borgatti et al., 2009; Newman, 2010). Through his sociometric analysis Moreno found that whether a girl would decide to run away was directly related to that girl's social network and the influence that network exerted on the her behavior. Moreno proposed using the models and taxonomy of physics to describe social relations, with individuals represented as atoms subject to the gravitational influences of their proximate peers (Borgatti et al., 2009). The structures through which these influences flow, for Moreno, illustrated how individuals' actions and attributes are embedded in a social network (Borgatti et al., 2009).

In the decades following Moreno's sociometry studies a growing awareness and refinement of social network theory developed in variety academic disciplines. Mathematics contributed graph theory and matrix algebra as methods for creating visual, quantifiable representations of network structures and functions (Borgatti et al., 2009). In the social sciences network theory was applied extensively by sociologists, psychologists, anthropologists, and political scientists (Borgatti et al., 2009). Building on Bavelas's (1950) study on group structure, Leavitt's (1951) groundbreaking work investigated the relationship between network structure and the efficiency with which groups communicate. Leavitt (1951) found that more centralized networks reproduced communicated messages more efficiently and accurately than decentralized networks. Leavitt's emphasis on examining the outcomes, particularly those relating to efficiency, of different network structures is typical of the social network studies conducted in the second half of the last century. One example of the efficiency emphasis is the study of a social phenomenon known as the "small world problem" (Borgatti et al., 2009). Originally investigated by Milgram (1967) and Pool and Kochen (1978), the small world problem describes how even in large populations randomly selected individuals are likely to have mutual connections of a relatively small number of "degrees" (Milgram's experiments provided the

basis for the popular meme, “six-degrees of separation”). The findings of the small world studies suggested that network connectivity has tremendous potential for enabling the rapid dissemination of information, material, and resources within a population. The recognition of this potential spurred investigations of emerging social network concepts such as social capital, contagion, and convergence (Borgatti & Foster, 2003).

A notable contribution to social network theory during this time is Granovetter’s work on the strength of weak ties which established a cohesive explanation for the limitations and opportunities associated with certain network structures. According to Granovetter (1973), the strength of a tie between two actors (nodes) is determined by a “combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie” (p. 1,361). The relative strength of a tie between two individuals is one obvious way to describe the nature of those individuals’ relationship, but Granovetter’s (1973) contribution was to show that the strength of a tie between individuals is also predictive of the mutual acquaintances they share. At a basic level, this insight seems self-evident as it is not surprising that two closely linked individuals would share more mutual acquaintances than two unlinked individuals. However, when considered in the context of how networks channel the flow and content of information and resources, Granovetter’s insight becomes more significant. He observed that while strong ties were central to many social phenomena, weak ties in an individual’s network increased the likelihood of that individual receiving novel information, having access to unique resources, and enjoying greater social mobility (Granovetter, 1973). Granovetter’s work thus established the theoretical position that overall network performance was not solely determined by the density of network connections.

Social network theory continued to gain in popularity with researchers in a variety of fields throughout the 1970s and 1980s, and the number of scholarly journal articles referencing

social network theory increased dramatically in the 1990s (Borgatti & Foster, 2003). The introduction of more powerful computing systems as well as the rapid expansion of the internet enabled researchers to both gather and analyze complex network data more effectively (Van Duijn & Vermunt, 2006; Watts, 2009). As a field, the study of social networks had by the 1980s all the trappings of a traditional social science, including a scholarly journal and a professional organization (Borgatti et al., 2009). Since the 1990s the techniques, terminology, and core concepts of social network theory have been appropriated by researchers in diverse fields such as criminology, national security, management, and literary theory (Borgatti et al., 2009). Regardless of their academic area, however, researchers who utilize social network theory seek to understand social dynamics as functions of how a system's patterned parts and the individual constituents that comprise those parts influence each other.

As social network theory has evolved into an established means of analysis for a wide variety of social, physical, and virtual dynamics, researchers have identified a number of core concepts that distinguish the theory from other explanatory and descriptive paradigms. Fundamental to these core concepts is the identification of the discrete units that comprise a larger system. The most basic level of network identification involves labeling individuals/units as nodes, egos, actors, or vertices, terms that are interchangeable but vary in their use depending on the specific academic focus of the researcher. For the sake of clarity, this study will use exclusively the popular term "node" to describe the individual units subject to social network analysis.

Defining what counts as a node depends to a great extent on what phenomena a researcher wishes to investigate (Borgatti & Halgin, 2011; Butts, 2009). For instance, an anthropologist who wishes to learn how a new hunting technique spreads throughout a village would likely define individual hunters as nodes because the transmission of ideas in this case

presumably happens between individuals. On the other hand, a management scholar who wishes to learn how corporations share marketing innovations might define each corporation as a node, the corporation being the most basic level of analysis of interest. However a researcher chooses to define a node will in turn affect the scope and characteristics of the network under examination (Borgatti & Halgin, 2011).

From this level proceeds an effort to understand how the nodes of a network are most immediately connected to each other, beginning with the basic connection between two nodes, the dyad (Burt, 1980). A dyad exists when there are two individuals/units that have or have had some type of exchange of resources, data, or any other transferable elements. The exchanges between the nodes that comprise a dyad described in terms of variables that include frequency, intensity, and direction (Daly & Finnigan, 2011). Understanding first whether and then how two nodes form a dyad is a fundamental first step for social network analysis.

After dyads, the next level of analysis for social network theory typically focuses on describing all of the connections a single node has with any other nodes within a particular network (Van Duijn & Vermunt, 2006). For instance, a researcher may attempt to determine the connections between employee *A* and all the other employees of a particular company (*B, C, D,* and so on). In this example the researcher would create a representation of a network that consists of a single node (*A*) at the center (hub) of the network with separate connections branching off to other individual nodes. Once this initial representation is established, the connectivity between the primary node's satellite nodes may be considered with an aim toward determining the existence and relative strength of these connections. This level of analysis will facilitate a full description of how an individual node influences and is subject to the influence of its immediate network (Van Duijn & Vermunt, 2006). This type of analysis is typically referred to as *individual network analysis* (Van Duijn & Vermunt, 2006).

Social network theory can also provide a broader description of the connections between multiple nodes in a particular system by compiling all of the individual networks that can be identified in a particular system (Burt, 1980). Such a compilation is the basis of a *complete network analysis* (Van Duijn & Vermunt, 2006). Depending on the complexity and size of a given system, a complete network system analysis may involve several layers of multiple of nested clusters of individual networks (Burt, 1980). For example, a complete network analysis of an organization with multiple divisions and subunits will require a highly complex representation of all the organization's individual networks, the subunit networks to which these individuals belong, the divisional networks to which these subunit networks belong, and all the connections between networks of individuals, subunits, and divisions within the organization. Due to such complexity, social network theorists must often limit their analysis to those individual and subunit networks that are of most interest given the research focus (Newman, 2010). As Doreian and Woodward (1994) note, expanding the defined boundaries of a complete network analysis increases the likelihood of omitting important network components, particularly when statistical methods are involved.

The levels at which a researcher examines a network (individual to complete) also determine the characteristics that will be of most interest. At the level of an individual network important characteristics include *network position*, *structural equivalence*, and *network centrality* (Burt, 1976; Ibarra & Andrews 1993). An individual's network position is a description of how he or she is connected with all the other individuals in a given network (Burt, 1976). This relative connectivity is a function both of an individual's direct dyadic connections with other individuals as well as the connections between an individual's dyads (Burt, 1976). Taken together, these descriptions of connectivity determine the position of an individual and his or her personal network within a larger social network (Burt, 1976).

In a given network two or more individuals who occupy similar network positions (that is, have several similar dyadic connections) are said to have *structural equivalence* (Burt, 1976; Burt, 1987; Doreian, 1988). Structural equivalence may be limited to a description of how two individuals or nodes are connected to a third individual or node in identical ways. For example, two siblings are considered to be structurally equivalent in terms of their common relationship with a parent (Doreian, 1988). Individuals in a network may also be considered structurally equivalent if they occupy formal positions that involve or require highly similar connectivity with other individuals in the network (Doreian, 1988; Fiskel, 1980). Two vice presidents of a business who have similar responsibilities and manage similarly organized subunits may in this sense be considered structurally equivalent. The concept of structural equivalence enables researchers to reduce the overall complexity of a network by using a *blockmodel* method where the observed attributes of one node can be assumed for any other structurally equivalent node (Butts, 2001).

Another essential feature of an individual's network position is its *network centrality*. Notably investigated and described by Bavelas (1950) and associates in the 1940s and 1950s as part of the Group Networks Laboratory at M.I.T., centrality is defined as the extent to which a node is directly connected to the other nodes in its network (Freeman, 1979). A node's centrality is determined by calculating the percentage of all possible connections in a network that a node possesses with the other nodes in its network (de Pozo, Manuela, González-Arangüenaa, & Owen, 2011; Freeman, 1979). In a network with five nodes, the maximum number of direct connections a single node can have is four (one direct connection with each of the other four nodes). If a given node is directly connected to two other nodes, its centrality measure could be described as .50 (Freeman, 1979). Centrality measures may also be used to describe a node's *betweeness* and *closeness* (Freeman, 1979). Betweeness describes the frequency at which a

particular node is the only link between two or more other nodes. This property has significance for a node's ability to pass on, control, and manipulate communications and exchanges between its neighboring nodes (Freeman, 1979). A node's closeness is simply a description of the average distance in links between it and all the other nodes in a network (Freeman, 1979). Both betweeness and closeness measures for a particular node are described relative to the average of those measures for all other nodes. Therefore, a node can be said to have higher or lower betweeness and closeness measures as compared to its network's averages (Freeman, 1979). Alternatively, betweeness and closeness are sometimes referred to as bridge and hub features, respectively (Tam, 1989). Additional analytical factors related to centrality are whether a node's centrality is the result of that node's intentional positioning or whether is simply the result of the node's default position in its network (Everett & Borgatti, 2010; Tam, 1989).

Network centrality's primary contribution to the larger theoretical and methodological composition of social network analysis is its capacity to establish corollaries between a node's position in a network and the expected attributes of that node (Kilduff & Brass, 2010). Centrality measures are thus helpful in determining how a node's observed or reported attributes and cognitions are the result of the node's network position. This type of analysis involves describing the ways in which a node's attributes are *embedded* in the larger functions of its network (Kilduff & Brass, 2010). *Embeddedness* refers to how a system's network of exchanges and processes determines the individual attributes of the system's nodes (Kilduff & Brass, 2010). For example, an individual's social and economic preferences may be predicted by the individual's network position and the types of network exchanges and processes that position entails (Kilduff & Brass, 2010). In tying together theoretical models of analyzing individual nodes and the larger network in which those nodes function, the concept of network centrality

bridges the system-level emphasis of social network theory with the individual-level concerns of more traditional social science.

At its macro levels, social network analysis involves describing the characteristics of all or part of a system's network structure and dynamics. In terms of network structure such macro analysis tends to focus on *network density*. For network dynamics, macro-level analysis tends to focus on *network flows*, *network evolution*, and *network equilibrium*. Network density is a measure of the proportion of all the possible links within a given network that are actualized links; the higher the percentage of all possible links that are links in reality, the higher a network's density (Haythornthwaite, 1996). A network's density implicates the ways and speed with which information and resources flow through a network (Haythornthwaite 1996). A more dense network will diffuse information and resources more quickly than a less dense network, because higher levels of density mean shorter average links between a network's nodes (Haythornthwaite 1996).

Although many macro-level network analyses focus on characteristics of complete or limited networks that are considered fixed over time, increasingly there is interest in the field as to how to incorporate the changing configurations of networks over time (Snijders, Bunt, & Steglich, 2010). Such a focus on the evolution of networks assumes that the nodes within a network will change their connectivity as new system level dynamics change (Fiskel, 1980; Takacs, Janky, & Flache, 2008). Such changes are best understood in terms of the adaptive preferences of individual (Fiskel, 1980; Takacs, Janky, & Flache, 2008). Takacs et al. (2008), for instance, assert that a dynamic as opposed to static network environment allows for the strategic decisions that individual actors within a network may choose in reaction to new social pressures. Similarly, Anderson (1999) suggests that the system complexity of a network must be understood in terms of the changing interactions between the network's constituent elements.

Observing the evolution of networks typically involves conducting longitudinal studies that utilize analysis techniques such as those described by Snijders, Bunt, and Steglich (2010).

One of the key concerns for the study of network evolution is how and when networks achieve an equilibrium in which a network's nodes (actors) achieve an optimal balance of connectivity with the other nodes within the network (Hojman & Szeidl, 2008). Such equilibrium is dependent upon the information and or resources that are available to a node in its immediate social network (Acemoglu, Dahleh, Lobel, & Ozdaglar, 2011). When external (exogenous) factors disrupt a network's state of equilibrium, individual nodes will attempt to adapt to the new reality by either observing or accessing information from their immediate social network (Acemoglu et al., 2011). Nodal adaptation to new equilibrium may involve behavioral and preference modifications as well as the formation of new and deletion of existing network ties. Houy (2008) suggests that nodal adaptations indicate strategic choices and when all of a network's nodes have achieved ideal strategic modification, the network can be considered in equilibrium. Similarly, Hojman and Szeidl (2008) assert that nodal adaptation involves strategic modifications that maximize the costs and benefits of a node's local connections. Such modifications enable researchers to connect macro level analysis of network equilibrium to the analysis of individual networks. For example, Takacs et al. (2008) developed a methodology of predicting tie formation and deletion based on exogenous variables.

At both macro and micro levels of analysis an essential object of description is the nature of the ties between a network's nodes. As discussed above, Granovetter (1973) established the key distinction for describing dyadic ties as either strong or weak. Strong ties describe a regular and valued exchange of information or resources between two nodes (Granovetter, 1973). Such ties may result from proximity, kin relationships, or resource dependence. Strong ties confer benefits of familiarity, reinforcement, and clarification that are particularly beneficial in

environments that are knowledge-intensive (Carpenter, Esterling, & Lazer, 2003). Weak ties are those of more casual acquaintance that lack regularity and emotional intensity (Granovetter, 1973). The nature of an individual network's ties has, according to Granovetter (1973), significant consequences for how that network performs within a larger network due to how information and resources diffuse. An individual network with mainly strong ties will experience significant redundancy in the flow of information or resources that an individual node encounters, because the other nodes within the network will presumably share the same information and resources with one another as they will with the primary node (Borgatti & Halgin, 2011; Granovetter, 1973). In contrast, an individual network with several weak ties will likely experience greater diffusion of novel information and resources because its constituent nodes will experience fewer redundant exchanges (Borgatti & Halgin, 2011; Granovetter, 1973). Because there are potential benefits to be had with both, the conceptual distinctions between strong and weak ties expand the range of system dynamics that are available for analysis via social network theory.

Complementary to the theorized potential benefits of weak ties is Burt's (2004) concept of *structural holes*. A structural hole at its most basic is simply an area absent of connections between the nodes of a given network (Burt, 2004). The significance of structural holes for understanding both individual and system level network dynamics is how they can be exploited for the gain of a particular node. If a node can occupy and bridge a structural hole, functioning as a connection between two previously unconnected nodes, that node will likely receive benefits from its access to and control over the information and resources that flow between the two newly connected nodes and their individual networks (Burt, 2004; Goyal & Vega-Redondo, 2007). Nodes may exploit the structural holes they occupy as a result of their formal position within a network or may take actions to create structural holes from the potential connections

that exist in their network (Burt, 2004; Buskens & van de Rijt, 2008). Creating and then exploiting structural holes is an interdependent process in that a node must have the cooperation of the proximate other nodes in order to become a bridge between them (Buskens & van de Rijt, 2008). In fact, as Houy (2008) suggests, it is sometimes the negotiation between nodes for exploiting structural holes that contributes to network equilibrium. However, the benefits of bridging structural holes may also be determined by the types of information and resources that flow through a network and how the various nodes within a network make use of these (Ahuja, 2000). Ahuja's (2008) study of innovations in an interorganizational network of firms indicates that the usefulness of a network's structural holes is contingent upon the way the network processes and profits from the knowledge its connections create. Thus although both Granovetter's (1973) strength of weak ties concept and Burt's (2004) structural holes concept provide for the possibility that less density can be beneficial to a network and its constituent nodes, the realization of these benefits will depend on the content of the network's flow.

Network Flows and Knowledge Processing

As Daly and Finnigan (2011) observe, the function and purpose of social networks are determined largely by what flows through them. At a more fundamental level, social network theory's emphasis on system connectivity assumes that the linkages between a network's nodes serve some purpose of transmission. To fully understand the nodes' connections there must be a consideration of how information and resources are transmitted between the nodes, even if such transmissions are limited to mere imitation (imitation becomes a significant factor, however, when there is structural equivalence between the nodes) (Burt, 1987; Chang & Harrington, 2005). For instance, in an early study of the distributions and probabilities of individuals' awareness of others, de Sola Pool and Kochen (1978) couch their investigation in terms of understanding how influence could be transmitted through acquaintances.

One exception to social network theory's emphasis on transmission and flow is the concept of networks as prisms through which the quality and status of individual nodes are determined by their connections with other nodes of status (Ibarra, Kilduff, & Tsai, 2005; Podolny, 2001; Zaheer, Gozubuyuk, & Milanov, 2010). This concept suggests that a node may benefit from its connections if it is linked to other nodes that are perceived favorably in the network (Podolny, 2001). Likewise, if a node is perceived favorably it will likely benefit from lower transaction costs with the other nodes in the network, because positive reputations are often associated with lower exchange risks (Podolny, 1993; Podolny, 2001; Zaheer et al., 2010). Even though the concept of networks as prisms does not address transmission explicitly, implied in this concept is the degree to which the status and reputation a node gains through its connections influences the acquisition of information and resources. Similarly, while Ibarra et al. (2005) discuss how an awareness of one's social network connections is a function of one's network position, this awareness becomes meaningful only in reaction to the stimulus of changes that flow through the network. To return to the concepts of weak ties and structural holes, a node's awareness of these dynamics is predicated on the observed flow or lack thereof of information and resources between proximate nodes; moreover, the potential uses of such dynamics are restricted by the ways in which networks use information and resources to create knowledge (Ahuja, 2008). Not surprisingly, a large area of scholarship in social network theory concerns knowledge processing in networks.

As Chang and Harrington (2005) point out, one useful way of discussing knowledge processing in a network is to distinguish between imitation and innovation. Imitation and innovation within a network can be thought of as two related dynamics that will diverge and converge depending on the specific attributes and strategic choices of the nodes and individual networks (Chang & Harrington, 2005). Both concepts presume a transmission of data from a

specific network area to its outlying neighbors. This transmission may be intentional and explicit, as in a mandated change of policy in an organization, or may be inadvertent and implicit, as in a social fad (Chang & Harrington, 2005). Where the concepts diverge involves how individual nodes and their networks respond to a transmission and to what extent the underlying network dynamics promote or suppress of responses (Chang & Harrington, 2005). If an individual node and its immediate network comply with a new policy and are rewarded for their compliance, the transmission of the new policy through the network has an imitative dynamic. If an individual node and its immediate network respond to a new social fad by adapting it to their particular interests and this adaptation is rewarded by positive feedback from other nodes, the transmission of the new fad through its larger social network has an innovative dynamic.

In addition to distinguishing whether network transmissions have imitative or innovative tendencies, social network theory is also concerned with how network structure influences the transmission of information and resources. These structural elements may involve the presence or absence of structural holes (Buskens & Rijt, 2008), degrees of hierarchy (Friesl, Sackman, & Kremser, 2011; Huang & Cummings, 2011), clique formations (Haythornthwaite, 1996), and the embedded culture of newly formed nodes (Friesl et al., 2011). Uniting these various approaches is their focus on how a given network makes sense of and processes the information made available in its internal and external environments (Cross, Parker, Prusak, & Borgatti, 2001). The most often cited correlation between structure and knowledge processing is the relationship between a network's relative density and the types and rates of information that flow through the network (Tenkasi & Chesmore, 2003). Similar to the dynamics of imitative versus innovative transmissions, the strength and density of the ties within a network will determine what kinds of information flows through the network as well as how that information is used by individual

nodes (Hansen, 1999; Tenkasi & Chesmore, 2003). High density networks tend to be associated with the capacity for transmitting complex and detailed information (Hansen, 1999; Tenkasi & Chesmore, 2003). Conversely, lower density networks tend to be associated with facilitating new knowledge creation and information diversity (Carpenter, Li, & Jiang, 2012; Hansen, 1999; Tenkasi & Chesmore, 2003). Considered in isolation, neither high density nor low density networks demonstrate competitive advantages; optimal density for overall system performance is determined by what kinds of information a network must process and the problems to which such information is applied (Lazer & Friedman, 2007).

Social Capital

Social network theory's focus on how and what information and resources are transmitted through a network is foundational to the concept of *social capital*. Borgatti and Foster (2003) assert that social capital is an umbrella theory that draws on research traditions in areas such as social resource theory, leadership, and power. That the concept of social capital should draw from several areas of social science is not surprising in that it represents an ambitious attempt to link the analysis of a network's structure to measurable outcomes for the individuals who occupy that network (Coleman, 1988; Tsai, 2000). Notably developed by Bourdieu (1980) and Coleman (1988) as a framework for explaining individuals' behaviors based on their social embeddedness, social capital describes the real and potential utility a node derives from its network position and relationships with other nodes (Adler & Kwon, 2002; Katz, Lazer, Arrow, & Contractor, 2004; Tsai, 2000). Adler and Kwon (2002) distinguish three types of network connections that can generate social capital for a node: Market, Hierarchical, and Social Relations. The amount of social capital a node enjoys depends upon how effectively that node can exploit the connections within its network in order procure and distribute information and resources (Katz et al., 2004). Increases in a node's social capital should increase the node's overall effectiveness in its network

(Agneessens & Wittek, 2012). The effects of social capital on individual performance have been studied in several contexts, including academic performance (Lomi, Snijders, Steglich, & Torlo, 2011), career advancement (Bozioneleos, 2008), and workplace performance (Mehra, Kilduff, & Brass, 2001). Hansen (1999) and Tsai (2000) have also examined how social capital affects team performances.

In their study of intraorganizational advice networks, Agneessens and Wittek (2012) use the concept of social capital to analyze what motivates individuals to give to and seek advice from others in an organization. The authors conclude that two fundamental dynamics of social capital explain how advice networks form. First, individuals tend to attempt to meet the normative expectations of reciprocity and equity in their exchanges with others (Agneessens & Wittek, 2012). This tendency suggests that individuals will want to repay those from whom they seek advice or receive valuable information, usually by offering advice and information themselves in the future (Agneessens & Wittek, 2012). The broader implication of this tendency for social capital is that the ties between individuals who exchange information and/or resources will usually be bidirectional rather than unidirectional (Agneessens & Wittek, 2012). The second dynamic that Agneessens and Wittek (2012) identify is the utility of exchanging information and resources. This utility is the result of an individual accumulating what Coleman (1988) termed "credit slips" through providing advice, information, or resources to others in the present and then calling on those others for repayment in kind in the future (Agneessens & Wittek, 2012). This dynamic helps explain how social capital accumulates as a store of potential returns on social investment for individual nodes in a network (Agneessens & Wittek, 2012; Coleman, 1988). Viewing social capital as the accumulation of actionable resources suggests that individuals within a network will strive to build up their possession of social capital and will

spend their surplus social capital strategically in order to boost their status and performance within the network (Flap, Bulder, & Volker, 1998).

Another important variable involved in the analysis of social capital is the accuracy of an individual's perception of his or her level of social capital in relation to the other individuals in the network (Simpson, Markovsky, & Steketee, 2011). The accumulation of social capital confers to an individual the power to acquire and accomplish things within his or her network (Simpson et al., 2011). Therefore, having an accurate perception of social capital means having an accurate perception of what one can accomplish and with whom one should collaborate (Simpson et al., 2011). Ibarra and Andrews (1993) have examined network perceptions along parallel lines of individuals' network position and the attitudes of the proximate others in their individual networks. The authors concluded that individuals' perceptions of their network often fail to account for the various ways in which the individual members of the network interact and exchange information (Ibarra & Andrews, 1993). Similarly, Simpson et al. (2011) examined how individuals' formal power within an organization affected the accuracy of their perception of their organization's network. They found that higher levels of power correlated with less accurate network perceptions, due largely to higher power individuals assuming universality of influence for those individuals they deemed to be well connected within the network (Simpson et al., 2011). In contrast, lower power individuals had more accurate perceptions of their networks due to their more systematic exploration of how their networks actually function (Simpson et al., 2011). Taken together these studies suggest that while the accumulation of social capital in a network is a powerful dynamic of social network theory, the capacity for individuals within a network to fully understand and exploit their social capital is bounded by the accuracy with which they perceive their network's structure. Nonetheless, social capital remains the most apparent model for describing the outcomes of social networks (Carpenter, Li, & Jiang, 2012).

Social Network Theory and Organizational Studies

Because social network theory offers compelling tools for examining the relationships between systems and their constituent parts, it has provided a popular approach to the study of organizations in the last three decades (Carpenter et al., 2012; Kilduff & Brass, 2010). Researchers have recognized the opportunities inherent in social network theory for analyzing organizations beyond the traditional methods of economics and sociology, particularly in the theory's promise of connecting system-wide structural dynamics with the motivations and choices of individual actors (Podolny & Page, 1998). Carpenter et al. (2012) suggest that studies of organizations that use social network theory are typically concerned with either the measurable outcomes of a network's structure (which they refer to as the social capital research) or with how the network's dynamics and structure change (referred to as network development research). Similarly, Podolny and Page (1998) explain that social network theory provides for understanding how organizations work through analyzing their network structures as well as for understanding why certain organizations come into being as a result of their underlying network dynamics. The dual functionality that Carpenter et al. (2012) and Podolny and Page discuss represents both the rationale for and the directions in which researchers have used social network theory to study organizational behavior.

Examples of the application of social network theory to organizational behavior fall into two broadly related categories at two basic levels of analysis. In the first category are those studies that use social network theory to study organizational performance (see for example Flap, Bulder, & Volker, 1998; Floyd & Wooldridge, 1997; Wischnevsky & Damanpour, 2006). In the second category are those studies that use social network theory to study how organizations change and innovate (see for example Chang & Harrington, 2005; Dhanaraj & Parkhe, 2006; Nespor, 2002). These two categories may also overlap when an organization's performance is

tied to its ability to change and innovate (Wischnevsky & Damanpour, 2006). Whether they examine organizational performance and/or organizational change and innovation, studies that apply social network theory to organizational analysis will tend to focus on either *interorganizational* networks or *intraorganizational* networks.

Interorganizational studies analyze how a group of organizations such as business firms are connected with one another. Interorganizational networks may form in a number of circumstances, including through stakeholder relationships (Rowley, 1997), participation in policy interest groups (Carpenter, Esterling, & Lazer, 2003), and collaborations between public sector, non-profit, and private sector entities (Siegel, 2008). The formation of an organization's external network may be based on strategic choices or on the functional connections that are required of the organization's operations. In general, interorganizational networks are viewed as outcomes of organizations' resource dependence and interdependence (Gulati & Gargiulo, 1999; Pfeffer & Salancik, 1978). In this view, organizations form and maintain relationships with other organizations in order to meet the changing demands of the external environment (Gulati & Gargiulo, 1999; Kraatz, 1998). Studies of interorganizational networks may focus on a number of dynamics, including the performance of each organization in a network (Gulati, Lavie, & Madhavan, 2011), the performance of an entire network in terms of achieving shared objectives (Daly & Finnigan, 201; Siegel, 2008), the effects of geographic proximity (Bell & Zaheer, 2007), and the ability of organizations to use their network connections to innovate their operations (Ahuja, 2000; Dhanaraj & Parkhe, 2006). Analyses of interorganizational networks focus on explaining how the organizations comprising a network derive benefits from their connections with other organizations. For instance, Gulati et al. (2011) use the constructs of reach, richness, and receptivity to analyze how organizations access resources from their network environment.

Whereas interorganizational network analysis concerns the connections between organizations operating in an external network environment, intraorganizational network analysis concerns how the individuals and subunits that comprise an organization are connected in their exchanges of information and resources (Tsai, 2001). Intraorganizational network studies have focused on a number of variables, including the connection between network position and individual member performance (Bozioneleos, 2008), the role of formal teams in network dynamics (Katz & Lazer, 2003), and the tensions between cooperation and collaboration between organizational subunits (Tsai, 2002). Studies such as those conducted by Floyd and Woodridge (1997) and Mehra, Dixon, Brass, and Robertson (2006) combine inter- and intra- levels of analysis by examining both the internal and external network ties of an organization's members.

As with interorganizational network analysis, intraorganizational studies tend to be concerned with how network dynamics relate to organizational and individual performance, change, and innovation. Srivastava's (2012) study of three organizations provides a useful example. This study focuses on how intraorganizational network connections change during times of uncertainty and the extent to which organizational members exploit their potential social capital in response to uncertainty. Srivastava finds that exchanges between members of different subunits increases during times of organizational uncertainty, and that these exchanges represent attempts to activate the social capital latent in the structural holes of cross-subunit connections (Srivastava, 2012). Studies such as Srivastava's (2012) suggest the efficacy of using social network theory to analyze organizational change processes.

Synthesizing CAS and Social Network Theories

Because this study focuses on how colleges and universities respond to the external demands of accrediting agencies to implement self-study and quality enhancement initiatives, it is naturally concerned with the dynamics of organizational change. In order to understand

organizational change, particularly in complex, loosely-coupled organizations such as colleges and universities, a synthesis of CAS and social network theories provides a comprehensive framework for both predicting and analyzing the effects of change initiatives. Burnes (2005) offers a succinct explanation of three significant implications CAS theory has for understanding organizational change. First, change initiatives in complex organizations will be more successful when they encourage the broad-based participation of all constituents (Burnes, 2005). Second, organizations should promote ongoing change and improvement processes that self-generate at the lower levels of institutional hierarchy (Burnes, 2005). Third, the utilization of emergent changes—those generated at lower levels—will have the potential to overcome many of the problems associated with top-down change directives (Burnes, 2005). Because these implications involve the connectivity and communication flows within organizations, social network theory offers a methodology for analyzing to what extent these implications manifest themselves in change initiatives. For example, Garcia (2007) suggests using social network analysis to study how large-group interventions affect human resource development initiatives; this suggestion thus synthesizes Burnes' notion of broad-based participation with the methodological tools of social networks analysis.

As discussed above, CAS theory and social network theory both evolved from the open systems approach to analyzing the behavior of systems in general and organizations in particular (Scott & Davis, 2003). Although CAS theory and social network theory have their unique constructs, they also have a number of complementary concepts that suggest the possibility of a fruitful synthesis for analyzing how organizations interact with and adapt to their environments. Such complementary concepts include: agency/schemata (CAS theory—Anderson, 1999) and network cognition (social network theory—Barney, 1985; Ibarra & Andrews, 1993; Simpson, Markovsky, & Steketee, 2011); positive feedback loops (CAS theory—Anderson, 1999; Urry,

2006) and knowledge processing and information flow (social network theory—Bell & Zaheer, 2007; Daly & Finnigan, 2011; Haythornthwaite, 1996); and loose versus tight coupling (CAS theory—Marion & Uhl-Bien, 2001) and network density (social network theory—Deng, Abell, Li, & Wu, 2012). In a broader sense, both CAS and social network theories attempt to explain four levels of interdependent influence in complex systems: (1) how individual agents/subsystems/nodes influence and are influenced by their system/network/organization; (2) how individual agents/subsystems/nodes influence and are influenced by their external environment; (3) how a system/network/organization influences and is influenced by its constituent agents/subsystems/nodes; and (4) how a system/network/organization influences and is influenced by its external environment.

Several studies have attempted to apply a synthesis of CAS and social network theories, either implicitly or explicitly, to the study of organizational change. One example of an implicit synthesis is Daly and Finnigan's (2010) analysis of the network dynamics between and within a public school system office and one of its schools as they faced federal sanctions for poor student performance. The authors found that organizational inertia and perceived threats in the external environment encouraged a calcification of communication and knowledge processing networks (Daly & Finnigan, 2010). This calcification stunted the organizational adaptation process by discouraging meaningful collaboration between administrators from the system office and the school's administrators (Daly & Finnigan, 2010). Although Daly and Finnigan (2010) do not invoke CAS theory explicitly, their findings describe how network structures affect organizational adaption in complex environments and vice versa. Similarly, Kahn, Cross, and Parker (2003) illustrate how social networks within organizations are themselves often the products of emergent (which is to say unplanned) organizational properties and therefore must be assessed on multiple interpretive levels. This idea is echoed in Monge, Heiss, and Margolin's

(2008) assertion that organizations' communication networks co-evolve with the evolutionary dynamics of their external dynamics.

Another example of an implicit synthesis of CAS and social network theory is McGrath and Krackhardt's (2003) simulation experiments that tested three models of network structure for facilitating organizational change. The authors found that the optimal network structure for facilitating change is contingent upon the type of change an organization pursues (positive, negative, or controversial) as well as where the change initiates (externally, at the core, or on the periphery) (McGrath & Krackhardt, 2003). More specifically, McGrath and Krackhardt's (2003) findings suggest that controversial changes—changes that are not clearly positive or negative—are best facilitated by initiating the change within one of an organization's peripheral subunits, allowing this subunit to establish and demonstrate the efficacy of the change. This finding reinforces CAS theory's concept of emergence (Anderson, 1999; Mischen & Jackson, 2008; Urry, 2006) in that it suggests that a change initially adopted at the level of an individual agent or subunit can lead to a broader, organization-level change.

In a more explicit synthesis of CAS and social network theories, Morcol and Wachhaus (2009) provide a detailed analysis of how the two theories might be applied to the study of public policy implementation and governing structures. The authors suggest that the tendency for studies of organizations' social networks to depict networks as static structures can be corrected by injecting CAS theory's emphasis on dynamic change (Morcol &Wachhaus, 2009). This correction would provide researchers with a more effective theoretical lens through which to view organizational change in terms of network adaptations (Morcol &Wachhaus, 2009). Similarly, Mischen and Jackson (2008) suggest using social network analysis as a descriptive methodology for understanding how organizations adapt to complex environments. In their synthesis model, social network analysis provides a language for describing the co-evolution of

an organization, its subunits, and its external environment (Mischen & Jackson, 2008). Because organizational change involves the creation and processing of new knowledge and these activities rely on exchanges between an organization's constituent parts (Kezar & Eckel, 2002), Mischen and Jackson (2008) argue that social network analysis can reveal how a change initiative diffuses within an organization. Such a revelation in turn clarifies how an organization attempts to adapt to the demands of its external environment (Mischen & Jackson, 2008). Mischen and Jackson's endorsement of social network analysis as a methodology for using CAS theory to study organizations is reinforced by Haggis's (2010) critique that CAS theory lacks a coherent methodology of its own.

Studies such as that conducted by Choi, Dooley, and Rungtusanatham (2001) extend the synthesis of CAS and social network theories to more specific areas of organizational study. In their study the authors analyze the network connections of supply chain networks as emergent properties (Choi et al., 2001). Similarly, Shetler's (2002) study of two organizations attempting to implement top-down change initiatives also considers communication network structures as mechanisms for organizational transformation. While her findings suggest the utility of studying organizations as complex emergent networks, they also offer a caveat for organizational leaders hoping to exploit CAS and social network theories (Shetler, 2002). Shetler's (2002) work highlights the difficulties of using top-down directives to generate emergent organizational change; because the power of emergent change comes from its organic diffusion within organizational networks, attempts to fabricate emergence through administrative directives are likely to be ineffective. The work of Hannah, Lord, and Pearce (2011) focuses on the implications CAS and social network theories have for public school administrators. According to the authors, administrators can make use of positive feedback loops within their organizations' networks to more effectively manage change and increased environmental complexity (Hannah

et al., 2011). In contrast to Hannah et al.'s work, Morrison (2010) warns that organizational leaders should be cautious in their application of CAS and social network theories to practical organizational problems due to the ambiguities of these theories regarding ethical leadership and the exercise of power. Feldman (2004) addresses similar organizational issues in her longitudinal study of how a change initiative within a university's student housing department resulted in reconfigurations of network structures, reallocations of resources, and the development of resistance to change.

Empirical Studies in K-12 Education

In recent years education scholars have begun applying SNA to the study of organizational change in schools. The following discussion analyzes four examples of SNA scholarship in educational settings that are pertinent to the present study. These examples provide a conceptual and methodological background for this study as well as indicate potential avenues for subsequent research in this area.

In their 2013 study Penuel, Frank, Sun, Kim, and Singleton examined the implementation of skills-based reading instruction in 11 elementary and middle schools in California. These 11 schools began implementing a skills-based approach to reading instruction in response to the federally mandated No Child Left Behind Act (NCLB). Penuel et al. (2013) hypothesized that the degree to which teachers implemented a skills-based approach would be affected by a number of factors, notably exposure to external professional development activities and the normative practices of their immediate subgroups of colleagues. Furthermore, the authors hypothesized that over time the ways in which schools implemented skills-based instruction would become more diverse and that subgroups of instructors within schools would likewise become more diverse in their implementation of skills-based instruction as the close social interactions within these groups encouraged instructional norms independent of school-wide

initiatives (Penuel et al., 2013). To test their hypotheses the authors conducted a longitudinal study of the 11 schools between 2004 and 2008, with the level of emphasis on skills-based instruction as the dependent variable. The authors used a social interaction survey to identify teacher subgroups and then calculated the divergence of these subgroups' level of adoption of skills-based instruction from their schools' mean level of adoption between 2007 and 2008 (Penuel et al., 2013). Based on this calculation Penuel et al. (2013) found evidence to support their prediction that the social interactions and normative processes within teachers' subgroups would contribute to greater variance over time from the intended effects of the implemented policy. The significance of Penuel et al.'s findings for the present study is the suggestion that an institution's subunits can respond to external pressures (in this example the NCLB skills-based approach to reading instruction) in ways that are independent from the institution-wide adoption of a change initiative. Similar to the Penuel et al. (2013) study, Stevenson, Bartunek, and Borgatti (2003) analyzed the relationship between a school-wide change effort and social network dynamics. The authors examined the implementation of a change effort in a private K-12 school over a nine month period. The focus of their examination was on how certain network characteristics such as structural holes, structural autonomy, and organizational influence (frequency of participation in organizational decision making) changed between time one (the beginning of the implemented change) and time two (nine months into implementation) (Stevenson, Bartunek, & Borgatti, 2003). The authors hypothesized that during the implementation of the change effort, which involved the creation of a new administrative position to coordinate collaboration between academic departments, individuals would attempt to increase their structural autonomy by increasing the number of structural holes in their social network and thereby positioning themselves as "brokers" between other individuals and subunits (Stevenson et al., 2003). More specifically, the authors anticipated that this type of individual

network positioning would actually run counter to and even undermine the intended effects of the change effort, which was to increase connections and decrease the number of structural holes (Stevenson et al., 2003).

The authors used a mixed-methods approach that included a survey that asked respondents (all school faculty and staff, n=64) to report on their interactions with other at times one and two, as well as a series of semi-structured interviews with selected administrators (Stevenson et al., 2003). In their results the authors found evidence for increased connectivity between individuals in the school as a result of the change initiative (what the authors term "front-stage" or formal processes) as well as the creation by some administrators of more structural holes in their personal networks in spite of the intended effects of the change initiative (what the authors term "backstage" or informal processes) (Stevenson et al., 2003). The most significant conclusion reached by Stevenson et al. (2003), as pertains to the present study is that

> [O]rganization change attempts occur within an already established set of rhythms and routines within an organization that typically are backstage, taken for granted, and not even noticed. . . . Network analysis approaches, especially those that focus on such structural phenomena as structural holes and structural autonomy, enable the exploration of these dynamics that go beyond what is typically noticeable. (p. 256)

This conclusion presents a cogent framework in which both the strategic (front-stage, formal) and emergent (backstage, informal) processes of organizational change may be discerned through the application of SNA.

In addition to the studies discussed above, recent research conducted by Daly and Finnigan (2010) explore the social network dynamics of organizational change efforts in educational institutions. In their 2010 study Daly and Finnigan examined the network structure of a public school district in California that was identified as "in need of improvement" (INI)

based on NCLB criteria. The authors were interested in the relationships between administrators in the district's central office and the principals of the district's member schools and how these relationships affected the district's efforts to respond to the INI designation. More specifically, Daly and Finnigan attempted to address three broad research questions. First, they wanted to describe the "underlying social network structure" of the district and determine to what extent this structure constrained or supported district-wide improvement efforts (Daly & Finnigan, 2010, p. 113). Second, the authors wanted to learn how district administrators and school principals perceived the district's network and the flow of communications and knowledge throughout the network. Third, the authors were interested in how an individual's position within the district network affected his or her perception of the network and its communications and knowledge flows.

Daly and Finnigan (2010) utilized a case study method that involved the administration of an online survey to respondents in the district office and principals in the strict schools (*n*=58). The survey instrument consisted of questions that asked respondents to quantify their network ties with other administrators and principals throughout the district on a 1 to 5 scale, with "1" indicating no interaction or tie and "5" indicating interactions of one to two times a week or more; the instrument included a complete roster of all the district administrators and principals (Daly & Finnigan, 2010, p. 118). The authors framed their network survey questions specifically to address their respondents' communications and knowledge transfer networks because they considered these two types of networks to be most relevant for analyzing organizational change efforts (Daly & Finnigan, 2010). Daly and Finnigan analyzed their survey response data using the UCINET social network analysis program developed by Borgatti, Everett, and Freeman. The authors used UCINET to calculate a number of the district's communications and knowledge transfer network dynamics, including: overall network density (the ratio of actual network ties to

all possible network ties); E-I index (the ratio of ties within subunits to ties between subunits); core periphery structure (the degree to which a network is characterized by a densely connected core); and the network centrality of each respondent (a measure of whether an individual is located at the core of the network or on the periphery). In addition to these quantitative measures the authors selected eight respondents, four district office administrators and four school principals, for semi-structured interviews, (Daly & Finnigan, 2010). These individuals were selected based on their network centrality, with half coming from the most-central quarter of respondents and four coming from the least-central quarter of respondents. Daly and Finnigan (2010) reasoned that this sampling process for interview respondents would provide an optimal range of perspectives on the district network. The semi-structured interviews focused on the respondents' perceptions of the flows of communications and knowledge between the district's leaders (Daly & Finnigan, 2010).

Based on a synthesis of their quantitative and qualitative data, Daly and Finnigan (2010) found that the district's communications and knowledge sharing networks were characterized by dense connectivity within the district office and sparse connectivity both between the district office and the district schools and between individual schools. As a result, there seemed to be little collaboration across the district's various subunits (Daly & Finnigan, 2010). Daly and Finnigan speculated that their findings indicated instances of institutional inertia and threat-rigid institutional response. Referencing the work of Mellahi, Jackson, and Sparks (2002), they proposed that because the district was experiencing external pressure to address its INI status, its network structures were becoming more rigid and autocratic (top-down) in response; the authors speculate that "organizations under threat from sanction may, in fact, calcify centralized network structures and become more internally focused both of which may undermine change strategies" (Daly & Finnigan, 2010, p. 130). Daly and Finnigan (2010) conclude with some irony that

> the current network structure in Dos Mundos [the school district] will likely inhibit the type of complex system-wide collaborative change strategies this district must undertake to exit INI given the bulk of communication and knowledge sharing occurs primarily *within* the district office. In order to address the limiting features of the underlying networks that currently exist in Dos Mundos and increase the potential to move off INI, the district must work to include site administrators, who are the closest to where teaching and learning occurs and thus are able to diffuse successful practices across the district's schools. (p. 130)

Daly and Finnigan's findings thus suggest that while increased connectivity within an organization's social networks may be essential to successful change efforts, the external pressures that often prompt such efforts may in fact discourage increased network connectivity. Additionally, the Daly and Finnigan study provides a useful template for applying SNA to educational institutions that are attempting to respond to external mandates for improvement.

Conclusion

When colleges and universities respond to demands from regional accrediting agencies for self-study and quality enhancement initiatives, they face a unique environmental challenge. First, because the ability of regional accrediting agencies to withdraw or deny accreditation can adversely affect an institution's viability, the demands of these agencies represent external environmental threats and thus cause internal environmental uncertainty. Second, because self-study and quality enhancement initiatives explicitly require that an institution evaluate its internal processes and services, such initiatives are inherently reflective; that is, they require that an institution consider how its internal structures (i.e., its networks) can be improved in order to satisfy the requirements of the external environment (Lubinescu, Ratcliff, & Gaffney, 2001; Wergin, 2005). It is this combination of uncertainty and reflection that justifies the application

of a synthesis of CAS and social network theories for understanding how colleges and universities respond to the self-study and quality enhancement requirements of their regional accrediting agencies. Administrators who are responsible for addressing such requirements must consider to what degree their institutional responses will involve top-down directives versus bottom-up emergence; these considerations will in turn be based on both the existing and potential social network structures within their institutions.

Moreover, because self-study and quality enhancement initiatives often involve reallocations of resources and power, it seems reasonable to assume that an institution's agents and subunits will view these initiatives as opportunities to preserve and potentially enhance their position within the institution. Individual agents and subunits may therefore develop and pursue their involvement in such initiatives independent of other subunits. This tendency suggests that such change initiatives will involve emergent organizational behaviors that evolve at the subunit level and then diffuse via formal and informal social networks throughout the larger organization. However, because most self-study and change initiatives require coordination and collaboration between institutional subunits, there is also a tendency for such initiatives to be directed from higher to lower levels of organization. Such top-down direction will also diffuse via formal and informal social networks. This study thus uses the paradigmatic framework of CAS theory and the methodological tools of social network analysis to further the understanding how colleges and universities respond to external demands for self-study and quality enhancement.

CHAPTER 3: METHODOLOGY

This chapter describes the methodology that will be used to collect and analyze data pertinent to this study's research questions. This chapter addresses the following methodological components: an overview of this study's research design and research questions; an identification of potential threats to validity; a description of this study's participants; a description of the instruments used to collect data and these instruments' validity and reliability; an explanation of this study's data preparation and analysis; and a discussion of this study's methodological assumptions. These components provide a detailed rationale for the methodological design utilized in this study and an explanation of how this design fits with the theoretical underpinnings of this study.

The conceptual framework of this study involves a synthesis of complex adaptive systems theory (CAS) and social network analysis (SNA). In the broadest sense this synthesis consists of using CAS as a mechanism for predicting how organizations respond to external change pressures while using SNA as a means for measuring such organizational responses in terms of changes to the internal connectivity between an organization's individual members and subunits. In terms of methodology this synthesis consists of utilizing SNA's established quantitative and qualitative measures to gather data regarding organizations' connectivity while using CAS as a grounded theory through which to interpret this data. The rationale for this study's synthesis of CAS and SNA theories is that each theory complements the other in attempting to understand how organizations change their internal processes in response to external pressures. Because SNA provides a useful way for understanding how knowledge and communication flow within the formal and informal network structures of organizations, it is capable of providing evidence of the extent to which organizational changes are emergent or strategic in their origins. CAS in turn provides a broader theoretical grounding for making sense

of how organizations' social networks affect change initiatives. This theoretical synthesis also contributes to the practical significance of this study in that it provides to organizational leaders both a means of understanding how knowledge and communications flow through their organizations and what types of network structures—emergent or strategic—are most effective for implementing change initiatives.

Research Questions

This study addresses four interrelated research questions. The first two of these questions address the network dynamics that accompany the development and implementation of quality enhancement initiatives. More specifically, the first two research questions address the institutional communications and knowledge transfer networks that are associated with quality enhancement initiatives:

> *RQ1:* What are the characteristics of the communications networks involved in the development and implementation of quality enhancement initiatives?
>
> *RQ2:* What are the characteristics of the knowledge transfer networks involved in the development and implementation of quality enhancement initiatives?

As Daly and Finnigan (2010) observe, communications and knowledge transfer networks are instrumental in organization-wide initiatives, particularly those initiatives that attempt to effect significant change throughout the organization.

This study's third and fourth research questions attempt to expand upon the focus of the first two by considering the strategic and emergent dynamics involved in the development and implementation of institutions' quality enhancement initiatives:

> *RQ3:* What are the strategic dynamics that influence the development and implementation of an institution's quality enhancement initiative?

Strategic dynamics are those patterns of communications and knowledge transfer that happen within and between an organization's formal subunits and hierarchy. Such dynamics tend to conform to the intentional patterns of communication and knowledge sharing that an organization's leaders have put into place (Stevenson & Gilly, 1993).

RQ4: What are the emergent dynamics that influence the development and implementation of an institution's quality enhancement initiative?

In contrast to strategic dynamics, *emergent dynamics* are patterns of communication and knowledge sharing that develop in complex systems along paths other than those designated as formal channels within an organization's hierarchy. Emergent dynamics tend to be initially chaotic and unpredictable, but over time may develop into more stable and perhaps even formal dynamics (Grobman, 2005).

Research Design

This study is concerned with how higher education institutions in the United State respond to the relatively new mandate imposed by some regional accrediting agencies for the development and implementation of plans to improve student learning. More specifically, this study focuses on the requirement of the SACS that its member institutions develop a QEP to improve specific student learning outcomes (SACS, 2012). This requirement has been in effect since 2004 and is part of a comprehensive decennial process whereby member institutions seek a reaffirmation of their accredited status (Batten, 2010). Member institutions' reaffirmation reporting requirements and proposed QEPs are evaluated by committees of on and off-site peers from other member institutions (Batten, 2010).

Although the time frames in which institutions develop and implement QEPs are not constant, typically the development process takes one to three years and the implementation process takes three to five years. As part of the QEP requirement each SACS-accredited

institution must submit to SACS an impact report five years after beginning the implementation of its QEP (Southern Association of Colleges and Schools, 2012). This study focuses on three institutions at different stages of the QEP development and implementation process. The rationale for this focus is that because this study is concerned with the emergent and strategic network dynamics associated with QEPs, it is appropriate to compare institutions at different stages of the QEP process in order to detect through comparative analysis how these network dynamics may evolve over the lifespan of QEPs.

The research design of this study utilizes a mixed-methods framework that combines both quantitative and qualitative approaches to gathering data. These methods will be utilized to study a select group of individuals from each institution examined in this study. These groups consist of the individuals who were or are directly involved with their institutions' QEPs. For the purposes of this study, direct involvement in a QEP includes those individuals who served on any of the teams or committees that contributed to the development and implementation of their institution's QEP. Although the structure and composition of such committees and teams can vary widely from one institution to another, they typically involve individuals from a variety of institutional subunits who have expertise or interest in the QEP topic and include administrators, faculty, and support staff (Batten, 2010). In order to accurately ascertain all the individuals directly involved with their institutions' QEPs, the author will consult with each institution's QEP director and SACS liaison. The author will request from each research site's QEP director and SACS liaison a roster of all the individuals directly involved in the development and implementation of their institution's QEP. The author will then cross-reference these rosters with documentation from each research site, specifically each institution's QEP document; QEPs provide, usually as appendices, lists of all the individuals involved.

Additionally, the author will offer to conduct a workshop at each research site in order to explain to study participants the nature and procedure of the data collection process. These workshops will provide to participants an introduction to the study's theoretical basis and an explanation of how collected data will be analyzed. Finally, the author will offer to share the study's findings with each research site. This will be an opportunity for stakeholders at each research site to reflect upon how their QEP development and implementation processes have affected their intraorganizational networks and to what extent changes in these network structures are strategic or emergent in origin.

An important consideration for analyzing organizations' internal networks is the network level at which analysis will be conducted (Van Duijn & Vermunt, 2006). This study analyzes the internal networks of the participating institutions at two levels. First, this study analyzes the complete network of the individuals directly involved with developing and implementing their institutions' QEPs, henceforth referred to as QEP complete network (QEP-CN). Second, this study analyzes the characteristics of individuals' relative positions within complete QEP networks, henceforth referred to as QEP individual network (QEP-IN). At each of these levels of analysis, this study focuses on networks of interaction. Networks of interaction are comprised of specific exchanges between the individuals and/or subunits in a network (Borgatti, 2007). Examples of exchanges in an interaction network include interpersonal communications in general as well as more specific acts of communication such as advice seeking, advice giving, and collaboration (Blaschke, Schoeneborn, & Seidl, 2012).

This study focuses on two kinds of interaction networks, *communications* and *knowledge transfer*. This choice acknowledges Daly and Finnigan's (2010) assertion that communications and knowledge transfer networks are those most associated with organizational change efforts. For the purposes of this study *communications networks* are defined in terms of the frequency

with which individuals within a QEP-CN communicate with one another. *Knowledge transfer networks* are defined in this study as the frequency with which an individual goes to or is approached by another member of the network for knowledge specific to a work-related task (Bell & Zaheer, 2007). Because of the focus of this study, descriptions of knowledge transfer networks are limited to those work-related tasks that are associated with the development and implementation of an institution's QEP.

A quantitative survey instrument will be used to assess pertinent characteristics of QEP-CN communications and knowledge transfer network structures at each participating institution. These characteristics include overall network structure, network density, network flows, and internal and external connectivity of institutional subunits. This quantitative instrument will also be used to assess the network characteristics of individuals' QEP-IN at each institution. These characteristics include individuals' network position, network centrality, boundary spanning, and structural equivalence. The composition of the quantitative survey instrument that will be used to collect QEP-CN and QEP-IN network data is discussed in detail below. Data gathered by the deployment of this survey instrument will be entered into the UCINET (Version 6) network analysis program developed by Borgatti, Everett, and Freeman (2002). The UCINET program will then calculate quantified measures for the network characteristics discussed above.

Based on this initial analysis of the QEP-CN and QEP-IN of each participating institution, individuals will be selected for semi-structured interviews in order to provide complementary qualitative data for the quantitative data generated via the UCINET program. Following the sampling procedure used by Daly and Finnigan (2010), individuals at each participating institution will be selected based on their degree of centrality in the communication and knowledge networks of their QEP-CN. As suggested by Daly and Finnigan's procedure, the centrality scores for the individuals in each participating institution's QEP-CN will be divided

into quartiles. Based on this division individuals will be randomly selected from the first (least central) and fourth (most central) quartiles for both the knowledge and communications networks of their QEP-CN. According to Daly and Finnigan (2010), this method ensures that selected respondents will represent a full range of perspectives within a given network.

Because this study is interested in comparing the emergent and strategic qualities of QEP-related changes in an institution's internal networks, interviewing individuals at either end of their QEP-CN's centrality continuum is appropriate. Individuals who are relatively central to the communications or knowledge network of their QEP-CN will presumably be more sensitive to the emergent dynamics of these networks because their connectivity makes it more likely that they will observe new ideas and collaborations emerging from individuals and subunits at various levels. Conversely, less central individuals may be aware primarily of the strategic dynamics of their QEP-CN as a result of having fewer informal connections by which to observe emergent dynamics at various levels. Interviewing individuals with these contrasting network perspectives increases the likelihood that this study will capture a full description of the network dynamics associated with the QEP development and implementation processes of the institutions examined.

Quantitative Methods and Data Analysis

An own-tie report, a common quantitative instrument for social network analysis (Butts, 2008), will be used to describe characteristics of interest for the QEP-CN and QEP-INs of the participating institutions (see Appendix A). This same instrument will be used to identify informants for semi-structured interviews. An own-tie report is a survey that asks respondents to quantify their linkages with all other individuals in a given network (Butts, 2008). Own-tie reporting instruments may consist of the following elements: one-way descriptions of linkages, i.e. existence/non-existence; frequency measures, such as how often the respondent interacts with

another individual; and directional descriptions in which respondents are asked to specify whether they or another individual initiated an interaction (Butts, 2008).

The own-tie survey used in this study is composed of a combination of these elements. One survey item asks respondents to indicate the existence of communications links relevant to their institution's QEP and the frequency of these communications: *"Please indicate the frequency with which you have communicated with the following individuals (via face-to-face, telephone, email, or other medium) regarding your QEP during the last year.* For this item respondents will select a specific frequency from a numbered scale in which *5* indicates the maximum degree of communications and *0* indicates a complete absence of communications (refer to Appendix A for specific frequency descriptions). The data generated from this survey item will be analyzed using UCINET to estimate network centrality, density, overall network structure, and which individuals in the communications networks occupy boundary spanning positions.

Three additional items on the own-tie survey ask respondents to provide information about their QEP-CN knowledge transfer networks. First, respondents will be asked to identify the individuals within their QEP-CN to whom they have turned for ideas, collaboration, or advice on QEP-related matters in the last year: *"From the list provided, please indicate how often you have contacted these individuals for ideas or advice on any matter related to your school's QEP in the last year."* Second, respondents will be asked the converse of the previous question: *"From the list provided, please indicate how often you have been contacted by these individuals for ideas or advice on any matter related to your school's QEP in the last year."* The third item relating to knowledge transfer networks asks respondents to identify their ideas and advice-seeking preferences: *"From the list provided, please select the individuals you would be most likely to contact for ideas or advice on any matter related to your school's QEP."* As

with the communications networks data, the data generated from these survey items will be analyzed using UCINET to estimate network centrality, density, overall network structure, and which individuals in the knowledge transfer networks occupy boundary spanning positions.

Along with the five network estimation items described above, the own-tie survey will include demographics questions in order to analyze the role of individuals' personal characteristics as they relate to their position in their institutions' communications and knowledge transfer networks. These demographics items will ask respondents to indicate the following personal information: gender, age, job title, institutional role (i.e., faculty, administrator, or support staff), QEP-CN subunit, institutional subunit, time in current position, and time with institution.

Complete network measures. The data generated from the own-tie survey instrument will be input into the UCINET program in order to calculate three specific network measures for the three QEP-CNs examined in this study. The first of these measures is *network density* (*ND*). Network density describes the extent to which the individuals (nodes) within a given network are directly connected to one another (Daly & Finnigan, 2010). The higher the degree of overall direct connectivity within a network, the higher that network's density measure. Network density is calculated as the total number of actual connections between the nodes in a network divided by the total number of possible connections between nodes in a network (Daly & Finnigan, 2010). Density measures will be calculated for the communications and knowledge transfer networks of each institution's QEP-CN.

The second network measure to be calculated is a *core periphery* (*CP*) measure. The CP measure describes the degree to which a network consists of a core of highly-connected nodes surrounded by less connected peripheral nodes (Daly & Finnigan, 2010). Put another way, a CP measure indicates whether a network's density is relatively uniform throughout the entire

network, or if instead certain areas or nodes within the network possess inordinately more connections than others. A CP measure will be calculated for each QEP-CN's communications and knowledge transfer networks.

The third network measure is an *External/Internal index* (*E-I*). The E-I measure is based on a relative comparison between the connectivity levels within subunits and the connectivity between these subunits (Daly & Finnigan, 2010; Krackhardt & Stern, 1988). A high E-I index for a particular subunit indicates that its member individuals (nodes) have a high number of connections with individuals in other subunits. Consequently, this subunit is more externally focused and more likely to collaborate with other subunits in general (Daly & Finnigan, 2010). In contrast, a subunit with a low E-I index consists of individuals with fewer connections to other subunits; individuals in such subunits are more likely to communicate and collaborate with other individuals within their subunit rather than individuals in other subunits (Daly & Finnigan, 2010). For the purposes of this study, E-I indices for the subunits of each QEP-CN will be based on individuals' membership in their self-reported QEP-CN subunit (for example, QEP Steering Committee), as well as their institutional subunit (for example, Humanities and Fine Arts Department) and institutional role (i.e., faculty, administrator, or support staff). An E-I index will be calculated for each subunit for which sufficient data is available. For example, where there are multiple connections between members of a QEP-CN subunit, the number of these connections will be compared to the number of connections these subunit members share with individuals in other QEP-CN subunits. The E-I indices are calculated with the following function: $EI = E - 1/E + 1'$ where *E* refers to ties between subunits and *I* refers to ties within subunits (McGrath & Krackhardt, 2003).

Individual network measures. For individuals' networks (QEP-IN), the collected survey data will be analyzed for the following measures. First, the *total number of connections*

(*TC*) an individual has within the communications and knowledge transfer networks of his or her QEP-IN will be tallied.

Second, the related measure of an *eigenvector centrality* (*EC*) measure will reflect the overall centrality of each individual in a QEP-CN. This centrality is defined as the number of connections an individual has with other highly-connected individuals (Butts, 2008). In essence, the EC measure reflects not only the total number of connections an individual has within his or her network, but the relative quality of these connections in terms of their subsequent connections with other individuals. The EC measure may also be considered a measure of how individuals are located within the larger core periphery structure of their network (Butts, 2008).

Lastly, individuals who function as *boundary spanners* (*BS*) in a QEP-CN will be identified. The BS measure reflects the extent to which an individual possesses bridging connections to otherwise unconnected clusters within a network. These disconnected areas within a network are referred to as *structural holes* (Burt, 2004). Structural holes and the boundary spanners who bridge them represent opportunities for the sharing and brokering of information and resources between disconnected network clusters (Burt, 2004). Consequently, determining which individuals play a boundary-spanning role in a QEP-CN provides useful data for understanding how the communications and knowledge transfer networks of the QEP-CN function.

Use of complete and individual network measures. This study will use the complete and individual network measures discussed above for two basic research purposes. First, the complete network measures (*ND*, *CP*, and *E-I*) will provide for a comparative analysis of the communications and knowledge transfer networks of each institution's QEP-CN. This analysis will involve comparing the relative density, core-periphery structure, and E-I index of each network in order to describe notable differences and similarities. The rationale for this

comparison is that the observable similarities and differences between these basic measures will provide an empirical basis for describing communications and knowledge transfer network dynamics involved with the development and implementation of a QEP.

Second, the individual network measures (*TC*, *EC*, and *BS*) will be used to select respondents for semi-structured interviews. Building on Daly and Finnigan's (2010) respondent selection process, the *TC*, *EC*, and *BS* scores for the individuals in a QEP-CN will be distributed into quartiles based on their aggregate centrality in their QEP-CN's communications and knowledge transfer networks. Based on this distribution an individual occupying the highest scoring quartile for centrality in his or her QEP-CN communications network will be selected for interviewing. Likewise, another individual occupying the highest scoring quartile for centrality in his or her QEP-CN knowledge transfer network will be selected for interviewing. In order to capture a fuller perspective on each QEP-CN's communications and knowledge transfer networks, an individual occupying the lowest scoring centrality quartile for each kind of network will be selected for interviewing (Daly & Finnigan, 2010). Thus, four individuals from each institution will be interviewed based on their aggregate centrality scores according to the following sampling technique: 1- an individual occupying the fourth/most central quartile for his or her communications network; 2- an individual occupying the fourth/most central quartile for his or her knowledge transfer network; 3- an individual occupying the first/least central quartile for his or her communications network; 4- an individual occupying the first/least central quartile for his or her knowledge transfer network. The rationale for this sampling method is that because individuals with high centrality scores are in positions of receiving and sending communications and knowledge transfer links to and from a variety of nodes within their networks, they will have relatively greater opportunities to observe macro patterns of network flows and can describe these flows as emergent (bottom-up) or strategic (top-down) in nature. In

contrast, individuals with relatively lower network centrality can provide peripheral perspectives on their networks' dynamics to complement those of more central individuals.

Qualitative Methods and Data Analysis

The qualitative methods used in this study include gathering and analyzing data from personal, semi-structured interviews and archival documents. As discussed above, informants from each of the institutions examined in this study will be selected based on a distribution of quantitative individual network characteristics. This approach is an example of the theoretical sampling method described by Creswell (2007). Theoretical sampling involves selecting informants based on an expectation that their unique characteristics—in the case of this study, their network characteristics—will enable them to provide information that will help the researcher begin constructing explanatory theories (Creswell, 2007). For this study respondents will be selected based on their contrasting positions in their QEP-CN's communications and knowledge transfer networks. It is expected that these contrasting vantage points will facilitate a more complete description of the network dynamics examined in this study.

The respondents who are selected for semi-structured interviews will be contacted by the author and asked to participate in the interview process. The interviews will be conducted at the respondents' home institutions and will take place over a two-month period in the spring of 2014. A protocol that addresses the following topics will be used for the basic structure of the interviews (see Appendix B). First, respondents will be asked to discuss their role in the development and implementation of their institutions' QEP (Interview Protocol 1, or *IP-1*). This will help to provide a historical context for respondents' subsequent reflections on their position in the communications and knowledge transfer networks of their QEP-CN. The second part of the interview protocol will ask respondents to describe their patterns of communication pertaining to their institutions' QEPs (*IP-2*). Respondents will also be asked follow-up questions

about the modes (email, face-to-face, telephone) and content of their QEP-related communications. The third part of the interview protocol will ask respondents about their perception of the knowledge transfer networks of their QEP-CN. These questions will ask respondents to describe who they turn to for information about QEP-related topics as well as who turn to them for such information (*IP-3)*. Additionally, respondents will be asked who they perceive as the most widely turned to individuals in their QEP-CN (*IP-3A)*. It is important to note here that while the respondents selected for interviewing are chosen based on their relative centrality scores (highest or lowest quartile) for either their QEP-CN's communications or knowledge transfer network , each respondent will be asked about both the communications and knowledge transfer networks of his or her QEP-CN because it is possible that a respondent who scored in the lowest quartile for communications could score quite highly for knowledge transfer, and vice-versa. Therefore, respondents' perceptions of their QEP-CNs' communications and knowledge transfer networks could vary considerably and such a variance could provide useful data.

The fourth part of the interview protocol will ask respondents to discuss their perceptions of to what extent their QEP-CN is characterized by emergent or strategic dynamics (*IP-4)*. Because respondents may not be familiar with how the terms "emergent" and "strategic" are distinguished in the context of this study, this section of the protocol will instead utilize the more familiar terms of "bottom-up" and "top-down" to encourage respondents to reflect on these dynamics. Additionally, respondents will be asked to describe where new ideas and processes originate in their QEP-CN networks. This section of the protocol will also include follow-up questions that ask respondents to provide examples illustrating what they consider to be the bottom-up and/or top-down dynamics of their QEP-CN.

The fifth part of the interview protocol will ask respondents to reflect on the overall success of their institutions' QEPs. This line of questioning will encourage respondents to describe how they feel their QEP has improved student learning, encouraged collaboration, and enhanced institutional processes. This part of the protocol will conclude by asking respondents to describe what about the QEP process they would like to change for the next reaffirmation process. All 12 interviews will be recorded and transcribed for subsequent analysis. The author will also take field notes for each interview session as a supplemental data source.

In addition to the semi-structured interviews, the author will request access to each institution's QEP-related documentation. Examples of such documentation include the QEP document itself, committee membership rosters, committee meeting minutes, and organizational charts. The author will request access to documents that reflect each institution's entire QEP process, from earliest meetings to the present. Collecting these documents will provide artifacts of the formal structures and processes that were involved with each institution's QEP.

The institutional documentation, interview transcripts, and field notes will then be analyzed using the data analysis spiral approach described by Creswell (2007). In this process, research data are collected and coded for emerging themes, then reread, categorized, and interpreted (Creswell, 2007). The coding for this analysis will be used to categorize data in terms of their indication of emergent and strategic network dynamics. More specifically, the author will utilize a theory-driven model of code creation as described by DeCuir-Gunby, Marshall, and McCulloch (2010). In this model, relevant themes and concepts from the literature review serve as initial code sources. These codes are then reconsidered and revised as needed during the data analysis process (DeCuir-Gunby, Marshall, & McCulloch, 2010).

Synthesis of Quantitative and Qualitative Data Analysis

The quantitative and qualitative data analyzed in this study will then be synthesized in order to construct a detailed description of the network dynamics associated with each institution's QEP. This synthesis will also facilitate a comparative analysis of these dynamics. The quantitative measures derived from the own-tie survey will be compared to the interview protocol responses and the coded analysis of these responses as well as the coded analysis for institutional documents analyzed. Table 1 illustrates the triangulation of these data sources. Note that the triangulation process illustrated in Table 1 involves both using the quantitative network measures to validate the qualitative analysis and using the qualitative analysis to validate the quantitative measures.

Sample Population

This study focuses on three community colleges accredited by SACS that are in various stages of developing and implementing QEPs as part of their reaffirmation process. Because this study utilizes a comparative approach to identify organizational trends that accompany the QEP development and implementation process, focusing solely on community colleges allows this study to compare institutions with similar formal and informal structures, thus making the comparative process more tenable. However, comparing a variety of higher education institutions that share accreditation requirements is certainly a viable topic for future research. The three institutions that will be examined in this study are part of a large state-wide system of community colleges in the southeastern United States. All the colleges within this system are SACS-accredited institutions. A brief description of each institution examined in this study follows; each institution has been assigned a fictitious name to ensure the anonymity of this study's research subjects.

Table 1

Conceptual Matrix for Synthesis of Research Data

Quantitative Data	Analysis for Triangulation	Qualitative Data (Interview Protocol Codes)
Network Density (ND)	Verification of low/high density	IP-1; IP-2
Core-Periphery (CP)	Verification of description of network structure	IP-1; IP-2; IP-3A; IP-4
External/Internal (E-I)	Verification of instances of between-unit collaboration	IP-1; IP-2;IP-3; IP-3A
Total Connections (TC)	Verification of number of connections	IP-1; IP-2;IP-4
Eigenvector Centrality (EC)	Verification of quality of connections	IP-1; IP-3A
Boundary Spanner (BS)	Verification of boundary spanning individuals	IP-1;IP-3;IP-3A; IP-4

Longleaf Technical College is on the 2010-2020 SACS reaffirmation track. This means that the college is approximately midway through the implementation of its QEP, which focuses on reading comprehension. Longleaf is located in a small city and had a 2013-2014 FTE of just over 3,000 students. Longleaf offers a variety of associate degree programs.

Cypress Technical College is on the 2012-2022 SACS reaffirmation track. This means that the college is just beginning the implementation of its QEP. Cypress's QEP seeks to improve student learning in developmental math courses. Cypress is the smallest of the three institutions in this study, although it is still relatively medium sized compared to other institutions in its system; its 2013-2014 FTE was just over 2,000 students. It also offers a curriculum that is comparable to those offered at Seaside and Longleaf.

Seaside Technical College is on the 2004-2014 SACS reaffirmation track, meaning that the college had its accreditation reaffirmed in 2004 and was reviewed by SACS again in 2014. Thi Seaside is a medium-sized college by its system's standards, with a full-time equivalent (FTE) enrollment of just under 4,000 for the 2013-2014 reporting year. Seaside offers a variety of associate in arts and associate in applied science degrees programs as well as professional certificate and diploma programs. The focus of Seaside's QEP is improving student outcomes in online classes.

As discussed earlier, the author will contact the QEP director and the SACS liaison of each of these institutions prior to beginning the investigation. The author will ask the QEP director and SACS liaison of each institution to assist in generating a QEP-CN roster for the own-tie survey. The author will facilitate roster generation by conducting a preliminary review of each institution's QEP-related documentation online. The author will confer with each institution's QEP director and SACS liaison to verify that the individuals identified during this preliminary review should be included in the QEP-CN roster. The author will also ask each

institution's QEP director and SACS liaison to identify any other individuals who should be included in the QEP-CN roster. Once a QEP-CN roster has been generated for each institution, the own-tie survey instrument will be emailed to each individual on the roster.

Validity and Reliability

As Creswell (2007) notes, qualitative and mixed-methods research present unique challenges to the establishment of validity and reliability, and there are divergent perspectives on how to address these challenges. Creswell describes eight specific strategies that qualitative researchers may use to ensure the validity and reliability of their findings (2007). This study employs two of these strategies, triangulation and member checking (Creswell, 2007). Triangulation is a synthesis of multiple sources of data and a comparison of the themes that these sources suggest (Creswell, 2007). The triangulation process requires that a researcher gather data that describe phenomena of interest through diverse frames of reference, thus the goal of triangulation must inform the initial research design. This study's research design facilitates triangulation in a number of ways. First, as discussed above, the own-tie survey will generate data that describe important network characteristics of each QEP-CN as well as specific network characteristics of the individuals who comprise each QEP-CN. Second, the individuals selected for semi-structured interviews occupy positions within their QEP-CN that vary significantly in their centrality and overall connectivity. Therefore, it is reasonable to assume that these individuals will provide fundamentally different perspectives on the network dynamics of their QEP-CN. Third, the analysis of pertinent institutional artifacts will provide important evidence of the formalized network structures involved in each institution's QEP. Taken together, these three sources of data will provide for a robust triangulation throughout this study's data analysis process.

The second strategy this study employs to ensure the validity and reliability of its data analysis and findings is member checking. This process involves a researcher sharing with his or her research informants the analysis and findings of the study (Creswell, 2007). The informants are asked to review the study's data analysis and the interpretations the researcher has reached and then provide feedback to improve the accuracy of the study's findings (Creswell, 2007). The member check process is thus a method for research informants to validate the researcher's interpretations of the data they provided. This study will utilize a member check approach with the 12 individuals selected for semi-structured interviews. Once the author has transcribed, analyzed, and coded an interview and compared this information to the own-tie survey results, field notes, and institutional artifacts, he will compose a narrative representing his interpretation of these findings. The author will then email this narrative to the interview respondent and ask that he or she evaluate the accuracy of its interpretations and themes and provide suggestions for improving its accuracy. The author will then revise the narrative based on the respondent's suggestions. This process will be used with each of the 12 interview respondents. Additionally, the author will ask the QEP director and SACS liaison at each participating institution to review his analysis and interpretation of their QEP-CN's network dynamics. Because these individuals have a broad understanding of and involvement with their institution's QEP, they will be able to provide valuable input on the accuracy of the author's interpretations.

Summary

This chapter describes the research methods that will be used to address this study's four core research questions. These research questions address the communications and knowledge transfer networks involved in the development and implementation of QEPs as well as the emergent and strategic dynamics of these networks. This study examines three community colleges in a southeastern state that are at different points in their QEP process (one beginning

implementation, one midway through implementation, and one concluding implementation). The individuals who were or are directly involved with their institution's QEP process are the sample population for this study. These individuals will be asked to complete a quantitative own-tie survey. This survey will generate data describing the dynamics of the communications and knowledge transfer networks involved with each institution's QEP. This data will be input into a network analysis software program which will then produce specific measures for a battery of network measures at both the complete and individual network levels. Based on this initial analysis, four individuals from each institution will be selected for semi-structured interviews based on their contrasting degrees of relative network centrality. The qualitative data gathered from these interviews will be used to complement and confirm the quantitative data analysis. The author will further supplement these data by analyzing QEP-related artifacts from each institution. Finally, the validity and reliability of this study's data analysis and findings will be promoted through triangulation and member checking.

CHAPTER 4: FINDINGS

This chapter discusses the results of this study. The first section of Chapter 4 is organized by research site, beginning with the site in the least recent cycle of reaffirmation of accreditation with the Southern Association of Colleges and Schools, Commission on Colleges (SACSCOC). For each site the institutional context for the development of the QEP is presented. Following this discussion of institutional context, quantitative results for the complete and individual measures of the communications and knowledge transfer networks associated with the development and implementation of the site's quality enhancement plan (QEP) are presented. These results are followed by a qualitative analysis of the descriptions provided by informants at the research site of the communications and knowledge transfer networks of the institution's QEP. A discussion and summary of these network measures and informant responses are then provided for each research site.

The second section of Chapter 4 applies the quantitative and qualitative findings from each research site to the study's four primary research questions. First, findings from each site are applied to this study's first and second research questions, which address the network characteristics of quality enhancement initiatives. A discussion follows of what observations about the dynamics of communications and knowledge transfer networks in the context of quality enhancement initiatives are suggested by the findings from each site. Next, these findings are applied to this study's third and fourth research questions, which address the strategic and emergent dynamics of communications and knowledge transfer networks associated with quality enhancement initiatives. A cross-site comparison is presented where the observed differences between the sites' network dynamics are considered in relationship to the sites' reaffirmation tracks. Chapter 4 concludes with a comparative overview of the network dynamics observed at each research site.

Data Collection and Analysis

For each of the three research sites examined for this study, I contacted the individual who had primary responsibility for his or her institution's QEP. I requested that these individuals provide me with a list of names of all the individuals who had formal involvement with their institutions' QEPs in the last year. I then used these lists to build an own-tie survey instrument for each research site. The own-tie survey included items about respondents' perceptions of the frequency of their interactions with the other individuals involved with their QEPs' communications and knowledge transfer network (see Appendix A). More specifically, the own-tie survey asked respondents to describe four specific network structures related to their institutions' QEP: (1) the frequency of their communications with others involved with the QEP; (2) the frequency with which they seek advice from others involved with the QEP; (3) the frequency with which they are sought out for advice from others involved with the QEP; and (4) the likelihood that they would seek advice from others involved with the QEP in the future. These own-tie surveys were then emailed to the individuals on the lists for each research site. Over the course of several weeks, I contacted the non-respondents at each site via email with follow-up requests for survey completion.

In order to address the own-tie network data gaps left by non-respondents, a reconstruction process was conducted following the method described by Stork and Richards (1992) in which a tie indicated by a respondent in dyadic relation to a non-respondent is also assigned to the non-respondent. For example, if individual A indicates a regularly occurring pattern of communication with individual B and individual B is a non-respondent, individual B is assigned a complementary communication link with individual A. This reconstruction process was appropriate for the communications and knowledge transfer (seeker and sought after) data collected at each site because of the symmetrical nature of these data. However, reconstruction

was not applied to the "advice likely" responses from the own-tie survey because this survey item did not produce symmetrical data. The data collected from the own-tie survey results were then entered into the UCINET program (Borgatti, Everett, & Freeman, 2002) for analysis.

Three complete network measures were calculated for the communications network at each site using the reconstructed own-tie data: (1) network density; (2) core-periphery; and (3) external/internal. Network density, which is a description of the actual number of ties within a network as a percentage of the number of potential ties within that network, indicates a network's relative level of connectivity. The core-periphery measure describes the extent to which a network is characterized as having a densely connected core of members within a more loosely connected periphery. The external/internal measure describes whether individuals belonging to a group within a network tend to be more connected with other members of their group or instead are more connected to members belonging to other groups. For the purposes of this study, institutional role was used to determine group membership; respondents to the own-tie survey indicated that they considered their institutional role to be that of faculty, staff, or administration.

In addition to the complete network measures described above, three individual network measures were derived from the own-tie survey results. The UCINET program was used to calculate the total number of connections, eigenvector centrality, and boundary spanner position for each individual with formal involvement with the QEP at each of the research sites. The total connections measure describes an individual's overall centrality within a network, with more connections indicating more general centrality. The eigenvector centrality measure refines the total connections measure by factoring in the centrality of those an individual is connected to in order to more accurately qualify an individual's true centrality within a network. The boundary spanner measure describes the extent to which an individual occupies spanning/brokering

connections with members of a network who are otherwise not connected to each other. The occupying of such spanning/brokering positions has been shown to provide situational advantages to individuals in those positions by increasing their power to control the flow and sharing of information (Burt, 2004).

In order to triangulate the complete and individual network data generated through the analysis of the own-tie survey results, informants from each research site were contacted for follow-up interviews using a structured protocol (see Appendix B). The contents of these interviews were compared to the own-tie survey results in order to confirm or contradict the conclusions drawn from the own-tie survey data. Informants were selected based on their centrality scores, with at least one informant in the most central quartile and one informant in the least central quartile interviewed from each research site.

Longleaf Technical College

Longleaf Technical College serves a semi-rural county in the Southeast, and its campus is located in a small city that is also the county seat. Longleaf is of medium size relative to the other community colleges in its state's system, with a 2013-2014 full-time equivalent (FTE) enrollment of just under over 3,000 students. Longleaf is on the 2010-2020 SACS reaffirmation track and is nearing the conclusion of the implementation of its QEP, which focuses on reading comprehension. Like most of the other institutions in its system, Longleaf offers a variety of associate degree programs in both college transfer and technical-vocational tracks, as well as occupational certificate and diploma programs.

I contacted Longleaf's QEP director in the spring of 2014 (this person was identified in the executive summary Longleaf submitted to SACSCOC for its QEP during its reaffirmation process). Longleaf's QEP director provided to me a roster of all those individuals who had been formally involved with the QEP in the last year (n=11). Using this roster, the own-tie survey

instrument was developed and distributed via email to the individuals listed on the roster. Of the 11 individuals who received the own-tie survey, 8 completed the survey (73% response rate). Non-respondent data gaps were reconstructed using the methods discussed above for the QEP communications, advice seeker, and advice sought after networks. The reconstructed network datasets for Longleaf were then organized in a Microsoft Excel workbook. Individual names were replaced with a code based on institutional role and alphabetical order, so that the first faculty member by alphabetical order became FA1, the first staff member became ST1, and the first administrator became AD1. Once coded, the datasets were then loaded into the UCINET program for analysis.

Complete Network Measures: Communications Network

Longleaf's QEP communications network consisted of 11 individuals. Figure 2 provides a graph of Longleaf's QEP communications network with indicators for centrality and direction of communications. Figure 3 presents a summary of the complete network measures for this network.

Longleaf's density measure for its QEP communications network was calculated as 0.409, or 40.9%. The core-periphery calculation for Longleaf's communications network suggests that the network consists of a core of three individuals (AD1, FA4, and FA8) and a periphery of eight individuals, yielding a coreness measure of 27%. The external/internal measure based on institutional role for Longleaf's QEP communications network was -0.083. The external/internal index is based on a scale of +1 to -1, where +1 indicates all individuals' ties are to members of other, external groups and -1 indicates that all individuals' ties are to members of their own groups. Longleaf's measure therefore suggests that individuals in this network were more likely to be connected with members with the same institutional role than to be connected with members with a different institutional role. (It should be noted that Longleaf's QEP

Network Density *(ND)*	Core-Periphery (CP)	External/Internal (E-I) (Institutional Role)
0.409	Core-1 (n=3); Periphery-2 (n=8) Ratio=27% Coreness Density matrix 1 2 ----- ---- 1 3.333 1.125 2 1.042 0.232	-0.083

Figure 2. Longleaf Technical College's communications network, complete measures (n=11).

networks were comprised of only individuals who identified as faculty or as administrators; no respondents selected staff for institutional role.)

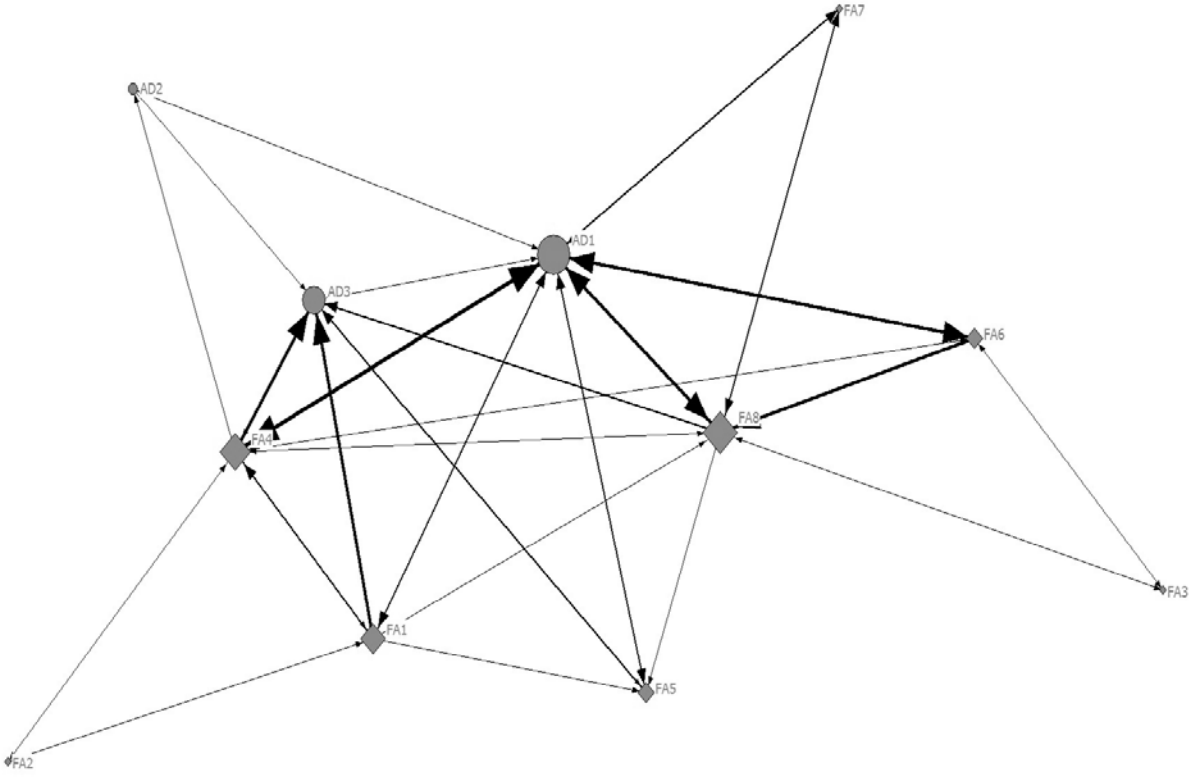
As Figure 3 illustrates, three faculty (FA1, FA4, FA8) and two administartors (AD1, AD3) occupy positions of relative centrality in the communications network. Figure 3 also illustrates the core-periphery structure of Longleaf's QEP communications network; nodes FA4, FA8, and AD1 comprise the suggested core group for this measure and are the most central nodes within the network.

Individual Network Measures: Communications Network

The individual measures for Longleaf's QEP communications network seem to confirm the results of the complete network measures. Table 2 summarizes the individual measures for Longleaf's communications network. As Table 2 illustrates, three individuals (FA4, FA8, and AD1, highlighted) occupy the most highly connected positions within the network. These individuals' ego networks are characterized by a high number of connections. Additionally, these individuals have the highest eigenvector centrality scores, meaning their ego networks tend to include individuals who also have a high number of connections relative to this network. FA4, FA8, and AD1 also register strong boundary spanning scores, indicating that they have connections to individuals within the network who are otherwise not connected to each other. FA1 and AD3 also had relatively high boundary spanning scores. Taken together, these three individual measures suggest that Longleaf's QEP communications network is characterized by a small core of highly connected individuals that includes both faculty and administrators.

Complete Network Measures: Knowledge Transfer Network

Longleaf's QEP knowledge transfer network consisted of the same 11 individuals included in the communications network. As discussed above, the knowledge transfer network consists of a composite of three directional advice networks: "advice seeker," "advice sought



Note. Faculty nodes are represented as diamonds; administrator nodes are represented as circles. Arrows indicate direction of ties. Node size indicates relative centrality.

Figure 3. Graph of Longleaf Technical College's QEP communications network.

Table 2

Longleaf Technical College's Communications Network, Individual Measures

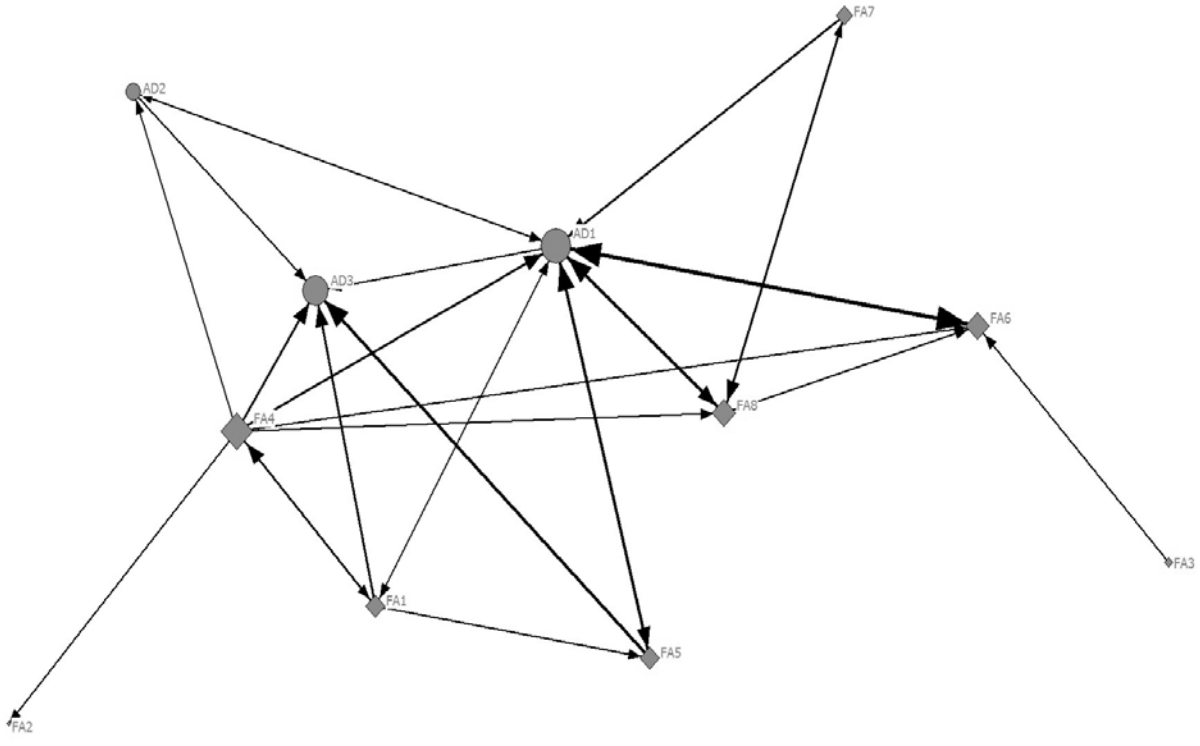
Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA1	6	0.3030	3.78
AD1	8	0.5146	6.23
FA2	2	0.0554	1.00
FA3	2	0.0554	1.00
FA4	7	0.4207	4.24
FA5	4	0.1881	2.01
FA6	4	0.3183	2.29
AD2	3	0.0991	1.63
AD3	6	0.3595	4.09
FA7	2	0.1409	1.00
FA8	8	0.4057	5.23
Average	4.73	0.2601	2.95

Note. (n=11).

out," and "advice likely." Results for each of these advice networks are presented, followed by an aggregation of these results for the complete knowledge transfer network. Figure 4 provides a graph of the advice seeker network with indicators for centrality and direction of communications. As Figure 4 illustrates, the advice seeker network has a structure similar to that of the communications network, with administrators AD1 and AD3 occupying central positions along with faculty members FA4, FA6, and FA8. Figure 5 presents a summary of the complete network measures for Longleaf's advice seeker network. The density measure for Longleaf's advice seeker network was calculated as 0.264, or 26.4%. The core-periphery calculation for Longleaf's advice seeker network suggests that the network consists of a core of two individuals (AD1 and FA6) and a periphery of nine individuals, yielding a coreness measure of 18%.

The external/internal measure based on institutional role for the advice seeker network is -0.048, indicating that individuals in this network were slightly more likely to be connected with members with the same institutional role than to be connected with members with a different institutional role. (As noted above, Longleaf's QEP networks were comprised of only individuals who identified as faculty or as administrators; no respondents selected staff for institutional role.)

Figure 6 provides a graph of the advice sought out network (indicating how often an individual had been contacted for QEP-related advice) with indicators for centrality and direction of communications. A summary of the complete network measures for Longleaf's advice sought out network is provided in Figure 7. Although the advice sought out network structure is quite similar to the advice seeker network, administrator AD1 occupies an even more central positon within the sought out network relative to her colleagues. The density measure for Longleaf's advice sought out network was calculated as 0.264, or 26.4%, the same as for the advice seeker network. The core-periphery calculation for Longleaf's advice sought out network indicates that the network consists of a core of three individuals (AD1, FA6, and FA8) and a periphery of eight



Note. Faculty nodes are represented as diamonds; administrator nodes are represented as circles. Arrows indicate direction of ties. Node size indicates relative centrality.

Figure 4. Graph of Longleaf Technical College's QEP advice seeker network.

Network Density (ND)	Core-Periphery (CP)	External/Internal (E-I) (Institutional Role)
0.264	Core-1 (n=2); Periphery-2 (n=9) Ratio=18% Coreness Density matrix 1 2 ----- ---- 1 4.000 0.444 2 0.833 0.250	-0.048

Note. Faculty nodes are represented as diamonds; administrator nodes are represented as circles. Arrows indicate direction of ties. Node size indicates relative centrality.

Figure 5. Longleaf Technical College's advice seeker network, complete measures.

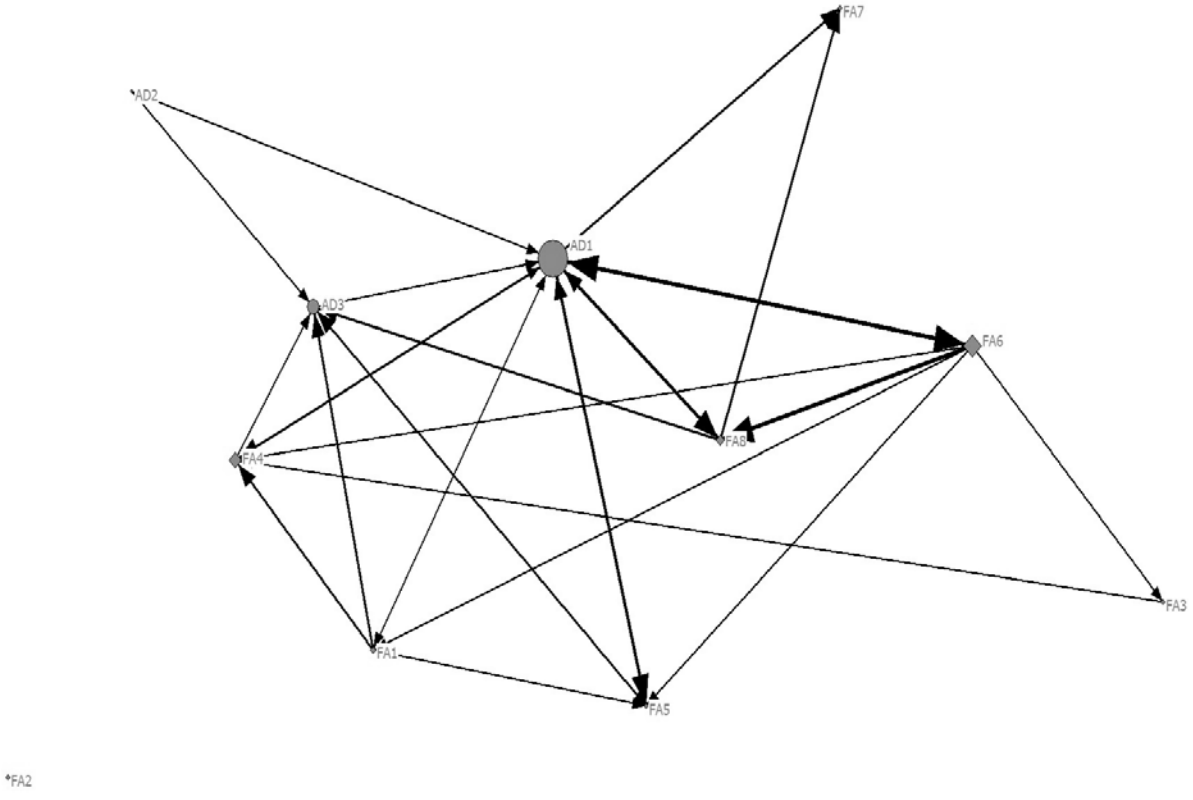


Figure 6. Graph of Longleaf Technical College's QEP advice sought out network.

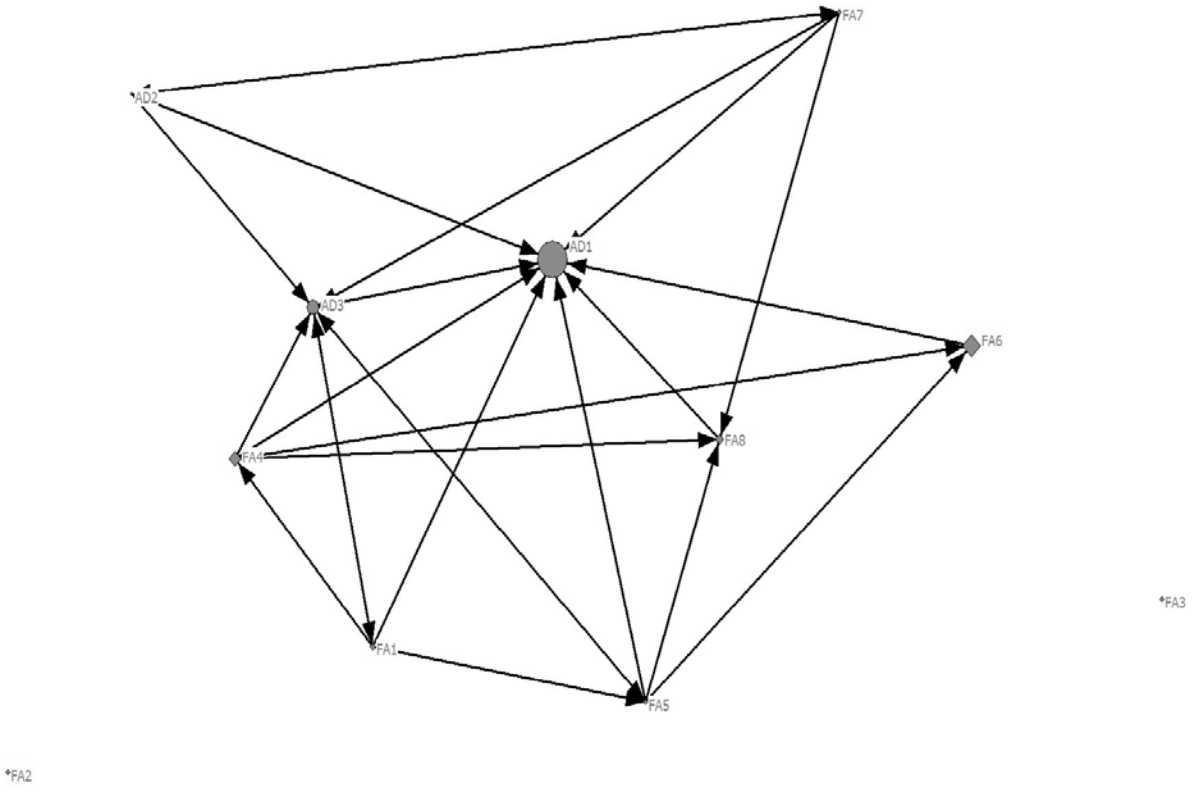
Network Density (ND)	Core-Periphery (CP)	External/Internal (E-I) (Institutional Role)
0.264	Core-1 (n=3); Periphery-2 (n=8) Ratio=27% Coreness Density matrix 1 2 ----- ---- 1 2.833 0.708 2 0.250 0.196	-0.127

Figure 7. Longleaf Technical College's advice sought out network, complete measures.

individuals, yielding a coreness measure of 27%. The external/internal measure based on institutional role for the advice sought out network is -0.127, indicating that individuals in this network were more likely to be sought for advice by colleagues with the same intuitional role.

The third directed component of Longleaf's knowledge transfer network derives from the "advice likely" item of the own-tie instrument. This item asked respondents to indicate who they would be most likely to contact for advice relating to a QEP topic. This item did not include a frequency or strength measure; respondents simply selected the individuals they would be most likely to contact without providing ranking or potential frequency of these contacts. Also, as noted earlier, the reconstruction method used to correct for nonresponse data in the "advice seeker" and "advice sought out" networks was not used for the "advice likely" network data due to this network's nonreciprocal dynamic. Figure 8 provides a graph of the advice likely network. A summary of the complete network measures for Longleaf's advice likely network is provided in Figure 9.

As Figure 8 illustrates, AD1 occupies the most central position in the advice seeking network, having been selected by eight of her colleagues as someone to whom they would turn for advice on QEP-related issues. The density measure for Longleaf's advice likely network was calculated as 0.218, or 21.8%. The core-periphery calculation for Longleaf's advice likely network indicates that the network consists of a core of four individuals (AD1, AD3, FA1, and FA5) and a periphery of seven individuals, yielding a coreness measure of 36%, the highest coreness measure of Longleaf's four networks. The external/internal measure based on institutional role for the advice sought out network is 0.048, indicating that individuals in this network were slightly more likely to seek out advice from colleagues with a different intuitional role.



Note. Faculty nodes are represented as diamonds; administrator nodes are represented as circles. Arrows indicate direction of ties. Node size indicates relative centrality.

Figure 8. Graph of Longleaf Technical College's QEP advice likely network.

Network Density (ND)	Core-Periphery (CP)	External/Internal (E-I) (Institutional Role)
0.218	Core-1 (n=4); Periphery-2 (n=7) Ratio=36% Coreness Density matrix 1 2 ----- ---- 1 0.667 0.107 2 0.286 0.119	0.048

Figure 9. Longleaf Technical College's advice likely network, complete measures.

Individual Network Measures: Knowledge Transfer Network

Individual network measures were calculated for all three components of Longleaf's knowledge transfer network (advice seeker, advice sought out, and advice likely). The results of these calculations are presented below in Tables 3, 4, and 5. Table 3 provides individual network calculations for Longleaf's advice seeker network. These calculations confirm the central role that AD1 occupies in this network. AD1 registers the highest scores of the group for all three individual measures (total connections, eigenvector centrality, and boundary spanner). The next most central individual in the advice seeker network based on these individual measures is FA4, who possesses a total of seven total connections.

AD1's (6.77) from the rest of the individuals in this network. Interestingly, while the core periphery measure for the advice seeker network suggested AD1 and FA6 as the core group of this network, these individual measures suggest that AD1 and FA4 are the most central individuals in the network. This implies that AD1 and FA4 act as two somewhat unconnected hubs within this network. In the context of advice seeking, this suggests while AD1 and FA4 were the most active and connected seekers of advice, their individual ego networks were somewhat distinct.

Although FA4's eigenvector centrality score (0.3507) is not significantly greater than that of individuals with less centrality, his boundary spanning score (5.21) stands out, along with AD1's (6.77), from the rest of the individuals in this network. Interestingly, while the core periphery measure for the advice seeker network suggested AD1 and FA6 as the core group of this network, these individual measures suggest that AD1 and FA4 are the most central individuals in the network. This implies that AD1 and FA4 act as two somewhat unconnected hubs within this network. In the context of advice seeking, this suggests while AD1 and FA4

Table 3

Longleaf Technical College's Advice Seeker Network, Individual Measures

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA1	4	0.2529	2.33
AD1	8	0.5706	6.77
FA2	1	0.0393	1.00
FA3	1	0.0375	1.00
FA4	7	0.3507	5.21
FA5	3	0.3301	1.74
FA6	4	0.3347	2.41
AD2	3	0.1399	1.50
AD3	5	0.3262	3.24
FA7	2	0.1983	1.00
FA8	4	0.3134	2.41
Average	3.82	0.2631	2.60

Note. (n=11).

Table 4

Longleaf Technical College's Advice Sought Out Network, Individual Measures

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA1	5	0.2263	3.28
AD1	8	0.5377	6.37
FA2	0	0.0000	0.00
FA3	2	0.0688	1.00
FA4	5	0.2308	3.25
FA5	4	0.2816	2.24
FA6	6	0.4650	3.53
AD2	2	0.0800	1.17
AD3	6	0.2706	4.40
FA7	2	0.1925	1.00
FA8	4	0.4353	2.67
Average	4	0.2535	2.63

Note. (n=11).

Table 5

Longleaf Technical College's Advice Likely Network, Individual Measures

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA1	4	0.3133	1.70
AD1	8	0.4857	5.44
FA2	0	0.0000	0.00
FA3	0	0.0000	0.00
FA4	5	0.3433	3.20
FA5	5	0.3433	3.17
FA6	3	0.2338	1.67
AD2	3	0.2323	1.25
AD3	6	0.3986	3.94
FA7	4	0.2805	2.20
FA8	4	0.2898	2.50
Average	3.82	0.2655	2.28

Note. (n=11).

were the most active and connected seekers of advice, their individual ego networks were somewhat distinct.

Table 4 provides the individual calculations for Longleaf's advice sought out network. These measures show AD1 occupying the most central position, having higher scores for the total connections (8), eigenvector centrality (0.5377), and boundary spanner (6.37) measures than any other individuals in the advice sought out network. AD3 and FA6 each register six total connections, while FA1 and FA4 each register five total connections. Total connections, however, do not necessarily reflect an individual's total quality of connectivity in this network based on the eigenvector centrality scores for this network. Although AD1 and FA6 register the highest and second highest total connections and eigenvector scores, respectively, FA8, who has just four total connections, has the third highest eigenvector score. Also of note in these results is that two administrators, AD1 and AD3, have notably higher boundary spanner scores than the other individuals in this network. This is particularly interesting given that AD3 has a relatively low eigenvector score (0.2706, just slightly higher than the network average).

Table 5 provides the individual calculations for Longleaf's advice likely network. As with the other knowledge transfer networks, AD1 occupies the most central position in this network, with the highest scores for total connections (8), eigenvector centrality (0.4857), and boundary spanner (5.44).

The next most central individual in this network based on all three measures is AD3. FA4 and FA5 occupy the next most central positions. As was noted with the individual measures for the advice sought out network, AD1 and AD3 appear to be the distinctive hubs of this network.

In the aggregate, the individual measures for the three advice networks discussed above suggest that while Longleaf's knowledge transfer network is somewhat diverse in that its central core includes administrators as well as some faculty, administrators AD1 and AD3 seem to be

the dominant nodes. This may indicate that these administrators play a more significant role in Longleaf's knowledge transfer network than do the faculty involved with Longleaf's QEP. This contrasts with the results of the individual measures for Longleaf's communications network which suggest a small but diverse core that includes faculty and administrators. This contrast further implies that whereas Longleaf's communications network differs in structure from a top-down, administrative-directed dynamic, the knowledge transfer network exhibits a more conventional dynamic in which administrators are the centralized disseminators of institutional knowledge.

Informant Descriptions of Network Dynamics

Three individuals from Longleaf were interviewed in order to supplement the information derived from the own-tie survey results. These individuals were selected based on their centrality within Longleaf's QEP networks. Two of these individuals, FA4 ("Adam") and FA8 ("Beth"), occupy the most central quartile, while one individual, AD2 ("Carol"), occupies the least central quartile. Given these informants' different network vantage points as well as their different institutional roles, their perspectives on Longleaf's QEP network dynamics effectively triangulate the own-tie survey data.

Adam was not at Longleaf for the development of its QEP, but has had significant formal involvement with Longleaf's QEP since his arrival four years ago. Adam has served on a committee charged with promoting campus and community awareness of Longleaf's QEP and has also taught courses directly linked to the QEP's focus on improving students' reading skills. Adam's impressions of Longleaf's QEP process were mixed, both in terms of the communications and knowledge sharing dynamics associated with the QEP and the impact the QEP has had on Longleaf's organizational culture.

When Adam discussed the communications patterns he had observed as a participant in Longleaf's QEP, his main impression was that the levels of communication between individuals involved with the QEP had flagged during recent semesters. Adam described how in the last year communications about Longleaf's QEP "became a little stagnate." He attributed this stagnation in communications to the number of external mandates, coming primarily from the state's community college system office, that Longleaf had been forced to respond to in the last two years. These mandates had in effect drained institutional energy and attention away from Longleaf's QEP. As Adam explained, "All these other things began to eclipse what we were doing." Another consequence of these external pressures, according to Adam, was to increase the number and variety of responsibilities assigned to many of Longleaf's academic leaders. "So many people wear so many different hats," observed Adam. In terms of formal versus informal channels of communication, Adam described the prominent role of the subcommittees involved with Longleaf's QEP. These committees had, however, largely ceased to be effective facilitators of campus-wide communication about the QEP. Adam described how he had recently left his QEP subcommittee which was intended to "keep QEP in forefront of entire campus community," because he felt that he had "done about all [he] could on that committee."

Adam made similar observations about the knowledge transfer network for Longleaf's QEP. He described this network as focused around a small core of administrators to whom his colleagues would turn for advice for any QEP-related topics. More specifically, he identified AD1 as the primary source of knowledge relating to the QEP, with AD3 also serving as a go-to person for those seeking information about the QEP. This confirms the centrality indicated for AD1 and AD3 by the own-tie survey data. Adam also provided something of an explanation for why his colleagues relied on these two administrators to such a degree. According to Adam, because there had been so much turnover, particularly among faculty, at Longleaf since the

implementation of the QEP, new employees "are going to those who have had leadership positions in the QEP and those are usually the mainstays." Presumably, the turnover Adam described made the dispersion of QEP knowledge to a larger group of individual s impractical, thus leaving the core of AD1 and AD3 as the primary source of QEP-related knowledge and advice. When asked who AD1 and AD3 would themselves turn to for QEP-related knowledge and advice, Adam speculated they would seek out fellow administrators, particularly Longleaf's chief academic officer.

When Adam was asked whether he perceived Longleaf's network dynamics as being more top-down or bottom-up in nature, he consistently described top-down dynamics. Adam explained that initiating communications about Longleaf's QEP typically began with the college's administrators. "I would definitely say it's more administrative driven," he stated. According to Adam, faculty members were at this stage seldom engaged with the QEP unless prompted by Longleaf's administration. "Faculty tend to focus on their work and what they're doing," he explained. "Until someone says, 'hey wait a minute, there's a QEP, we're going to have a meeting,' then it comes to [faculty members'] attention." These observations further underscore Adam's perception that the QEP communications and knowledge sharing networks are centered on a small, persistent core of administrators. Based on Adam's responses, this core is the entity that is primarily responsible for maintaining an institutional focus on Longleaf's QEP even as the college attempts to respond to the additional external mandates Adam discussed. This in turn suggests that both the communications and knowledge transfer networks associated with Longleaf's QEP tend to be strategic, perhaps out of necessity due to the external pressures the college is experiencing.

Interestingly, an impending external pressure may also be elevating the attention given to Longleaf's QEP. SACSCOC requires that a member institution develop a report documenting the

impact of its QEP five years after beginning implementation. Longleaf was beginning the process of pulling together information for this report. This process, according to Adam, was doing more than anything else to raise campus awareness of the QEP. As he explained:

> Over at least the four year period I've been here, there seems to be an ebb and flow. There was a lot more going on in the first couple of years. The third year was down a little bit. But then it's like, well the five report is coming up so we need to crank some things up. We need to be doing more. We've got this coming up; we've got to get this ready.

This description also suggests that Longleaf's QEP networks are characterized by strategic, top-down dynamics. According to Adam's account, at this stage the communications and knowledge sharing associated with Longleaf's QEP are driven by the requirements of SACSCOC which are in turn communicated and addressed by a small core of administrators for the benefit of the rest of the campus community.

Like Adam, Beth occupies the most central quartile of Longleaf's QEP networks. Also like Adam, Beth has had formal involvement with Longleaf's QEP through multiple assignments. She served on the original steering committee that facilitated the selection of Longleaf's reading topic, assisted with editing the QEP document, taught courses that incorporated some of the specific instructional interventions entailed with the QEP, and currently serves on a subcommittee that is responsible for collecting assessment data for the QEP. Beth in fact described how Longleaf's QEP efforts have begun focusing more on gathering data for the impending five year impact report that Adam had mentioned. Beth explained with some exasperation that, "Everything's about data, everything is data driven. Can we get data? Can we get numbers? Our Vice President writes a report; everyone writes a report." According to her, the mantra at Longleaf had become "If you don't show your results, you can't prove it." For Beth

this new emphasis on data collection and analysis may be siphoning energy and resources away from the reading instruction emphasis that is the focus of Longleaf's QEP. She also explained that a new office had been created at Longleaf to facilitate data collection and assessment.

Beth described the communications patterns involved with the QEP as mainly formal in nature, occurring primarily through group email and committee meetings. These communications were also mainly administrative-driven, according to Beth. She explained how early on in the process of identifying the QEP topic, "We were told by the administration that this is a priority." Beth's perceptions of the knowledge transfer patterns associated with Longleaf's QEP were similar to those of Adam. Like him, Beth perceived AD1 to be the primary source of information and knowledge about the QEP.

When asked whether the QEP process at Longleaf was characterized by more top-down or bottom-up dynamics, Beth was unequivocal in her response. "It was very much administrative driven, top down," she explained. She went on to describe how "There's more work done on the bottom levels, but it's initiated from the top." She then elaborated that, "Very much the faculty are the ones doing the work. It's coming from above, and not just top administration, but people above me, people above faculty." These comments suggest that while the actual implementation activities of Longleaf's QEP fell to faculty, the impetus and direction for these activities came consistently from Longleaf's academic administrators. In fact, Beth felt that even during the selection of Longleaf's QEP topic, "The decision was made really before the decision was made." Additionally, Beth's description of these top-down dynamics echoed Adam's perception that SACSCOC requirements were somehow the ultimate drivers of those dynamics. "We were told several times that the reason we are doing this is for SACS, is for the QEP," she explained. "It's like the go to answer for everything." What emerges from these descriptions is a picture of

Longleaf's administration translating the external mandates of their regional accreditor into directives for faculty.

Despite Beth's emphasis on how top-down dynamics defined Longleaf's QEP, she also described examples of bottom-up, emergent patterns of communications and knowledge transfer. For instance, she described a partnership that developed between one of the departments that had primary responsibility for improving students' reading skills and an academic program in the health sciences area. This partnership began informally as a way to improve students' reading skills in the health science program and developed into a fruitful cross-curriculum collaboration. As Beth described it, "One advantage was we got to work with people we'd never worked with before, have a dialogue that had never happened before on our campus." This example suggests that while the primary structure for Longleaf's QEP communications and knowledge sharing networks is top-down and administratively driven, there were also opportunities for patterns independent of the college's formal hierarchy to develop during the implementation of the QEP.

Unlike Adam and Beth, Carol's perspective on Longleaf's QEP dynamics comes from a less central vantage point. Occupying the least central quartile in the QEP networks, Carol had limited involvement in and connection to the QEP process. As an administrator, she had provided input on some technical issues with assessing student gains in reading proficiency and had also served on a QEP subcommittee, although she explained that this subcommittee was now largely inactive. Like Beth, Carol perceived the communications patterns associated with the QEP to be largely formal in nature. She explained that, "Most of the communication took place face to face in meetings." She also observed that it was during these meetings that most of the important decisions relating to the QEP were made.

In describing the knowledge transfer network associated with the QEP, Carol identified AD1 as the primary source of advice and information, as did Adam and Beth. Carol also

described how AD1 had approached her informally for specific advice about assessing students' literacy skills on a number of occasions. This suggests that while AD1 was the most central figure in the QEP's knowledge transfer network, individuals like Carol on the periphery of the network could nonetheless be important sources of QEP-related knowledge.

Carol's perception of the top-down versus bottom-up dynamics of Longleaf's QEP were also similar to what was observed by Adam and Beth. She too observed that, "It started with the administration and then worked down." She explained that Longleaf's senior management set the tone and the priorities for the implementation of the QEP, and from her perspective, this approach was probably the most effective approach for Longleaf's QEP. "It was done the best way it could be done," she stated. Unlike Adam and Beth, Carol did not mention the impending five year impact report as a primary driver for recent QEP activities. This may indicate that her position at the periphery of the QEP networks has meant less exposure to the SACSCOC-related directives that Adam and Beth described.

Summary of Findings for Longleaf Technical College

Based on the own-tie survey data and the informant descriptions discussed above, it appears that the communications and knowledge transfer networks for Longleaf's QEP consist of a fairly concentrated core with AD1 as the most central member of this core. AD1 registers the highest centrality scores for every network measure, and her centrality is confirmed through the descriptions provided by each of the informants from Longleaf (Adam, Beth, and Carol). In addition to the prominence and centrality of AD1 in Longleaf's QEP networks, another administrator, AD3, and faculty members FA1, FA4 (Adam), FA6, and FA8 (Beth) also occupy relatively central and densely connected positions within these networks.

The descriptions provided by Adam, Beth, and Carol suggest that Longleaf's QEP network dynamics are largely top-down in nature, and seem to confirm the quantitative data from

the own-tie survey. AD1's apparent role as the dominant node for communications and knowledge transfer relating to Longleaf's QEP suggests a hierarchical arrangement in which Longleaf's formal organizational structure provides the channels through which the work of the QEP is done. As all three informants suggested, directives and initiatives almost always originated with administration (presumably through the leadership of AD1) and were then carried out by faculty. That two informants, Adam and Beth, also emphasized the pressure created by the impending five year impact report for SACSCOC may help explain Longleaf's top-down, strategic network dynamics. As Hoppes and Holley (2014) observe, external pressures tend to increase institutions' reliance on more formal structures of decision making. This reliance may in turn encourage more formal communications and knowledge transfer network structures.

Cypress Technical College

Cypress Technical College is a 2012-2022 SACS reaffirmation track institution. Cypress is therefore approximately halfway through the implementation phase of its QEP, which focuses on improving the success of students enrolled in developmental math courses. Cypress is the smallest of the three institutions in this study, with a 2013-2014 FTE of just over 2,000, and serves a large, mostly rural county in the Southeast. It should be noted that during the course of this study Cypress experienced significant restructuring and personnel changes, with the college president, the chief academic officer, and an academic dean leaving the institution.

Although Cypress was the smallest of the research sites examined in this study, it had the largest number of individuals (n=46) with direct involvement in its QEP. This group consisted of 19 individuals who identified themselves as faculty, 15 who identified themselves as administrators, and 12 who identified themselves as staff. The data collection methods used for Cypress, including data reconstruction and coding, were the same as those used for Longleaf

Technical College. Of the 46 individuals who received the own-tie survey instrument, 21 (46%) returned a completed survey.

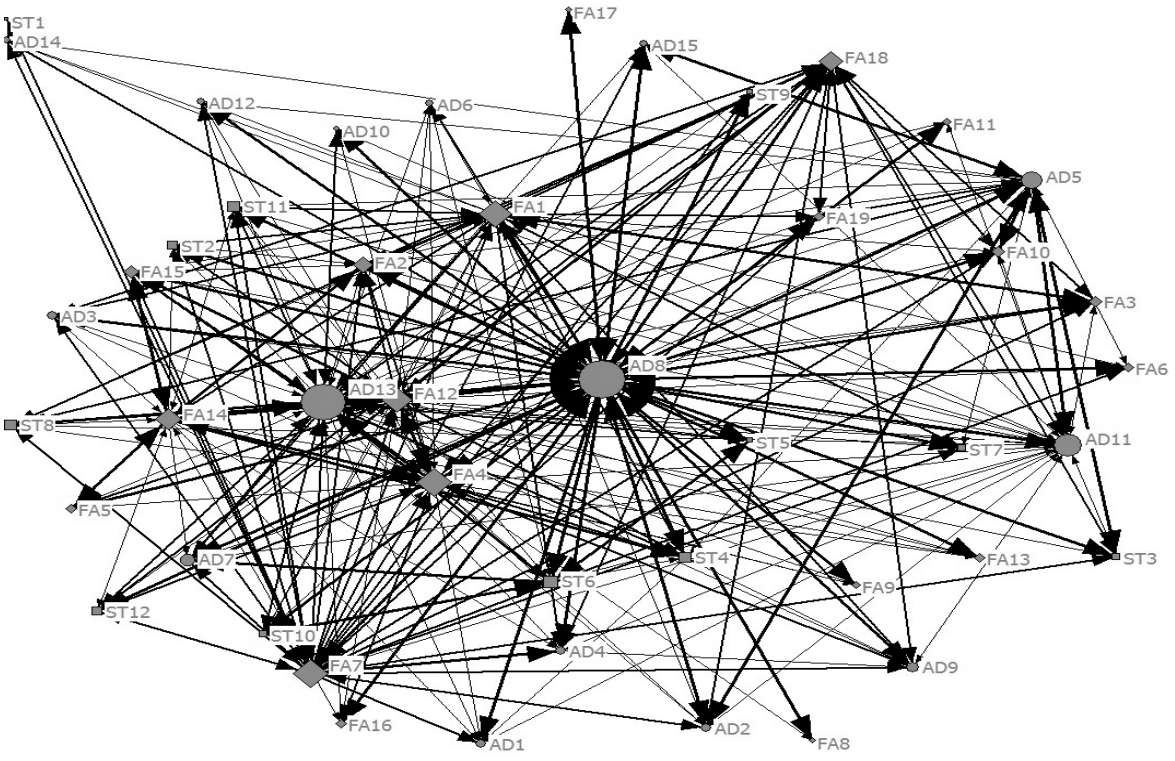
Complete Network Measures: Communications Network

Cypress's QEP communications network consisted of 46 individuals. Figure 10 provides a graph of this network with indicators for centrality and direction of communications. Figure 11 presents a summary of the complete measures for this network. As Figure 10 illustrates, AD8 is the most central and highly connected individual in Cypress's communications network. AD13 and FA4 are also relatively central and connected members of this network. Cypress's density measure for its QEP communications network was calculated as 0.208, or 20.8%. The core-periphery calculation for Cypress's communications network suggests that the network consists of a core of 11 individuals (AD5, AD 8, AD13, FA1, FA4, FA7, FA12, FA14, FA15, FA18, ST12) and a periphery of 35 individuals, which indicates a coreness measure of 24%. The external/internal measure based on institutional role for Cypress's QEP communications network was 0.265, suggesting that individuals in this network were slightly more likely to communicate with members with a different institutional role than with members with their same institutional role on matters relating to the QEP.

Individual Network Measures: Communications Network

Table 6 summarizes the individual measures for Longleaf's communications network. The individual measures for Cypress's QEP communications network indicate the same relative levels of centrality and connectedness as suggested by the complete network measures.

As illustrated in Table 6, the average number of total connections per individual for Cypress's communications network is 11. Relative to this average and their colleagues' levels of connectivity, AD8 and AD13 are the two most highly connected individuals in the network. AD8



Note. Faculty nodes are represented as diamonds; administrator nodes are represented as circles; staff nodes are represented as squares. Arrows indicate direction of ties. Node size indicates relative centrality.

Figure 10. Graph of Cypress Technical College's QEP communications network.

Network Density (ND)	Core-Periphery (CP)	External/Internal (E-I) (Institutional Role)
0.208	Core-1 (n=11); Periphery-2 (n=35) Ratio=24% Coreness Density matrix 1 2 ----- ---- 1 2.109 1.078 2 0.709 0.054	0.265

Figure 11. Cypress Technical College's communications network, complete measures (n=46).

Table 6

Cypress Technical College's Communications Network, Individual Measures

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA1	27	0.1916	21.37
ST1	1	0.0105	1.00
FA2	13	0.1607	7.36
AD1	7	0.0816	3.51
AD2	8	0.1067	4.40
ST2	7	0.0971	3.44
ST3	6	0.0920	3.18
FA3	7	0.1026	3.55
FA4	28	0.2501	21.14
FA5	5	0.1012	1.31
ST4	10	0.1245	5.35
FA6	5	0.0728	2.34
FA7	30	0.2449	25.37
AD3	8	0.1009	3.91
ST5	4	0.0733	2.11
AD4	8	0.1032	3.57
AD5	18	0.1389	15.31
FA8	2	0.0500	1.00
FA9	4	0.0603	1.32
FA10	7	0.1014	3.68
ST6	11	0.1195	7.89
FA11	4	0.0563	1.72
AD6	6	0.0558	2.66
FA12	24	0.2301	16.95
AD7	11	0.1392	6.60
AD8	44	0.5182	39.91
AD9	9	0.1103	4.51
AD10	4	0.0638	1.55
FA13	5	0.0763	1.36
FA14	20	0.2330	14.10
AD11	25	0.1363	18.72
AD12	6	0.0729	2.73
FA15	9	0.1489	4.00
AD13	42	0.2615	34.60
FA16	5	0.0760	1.36
ST7	5	0.0769	2.42
FA17	1	0.0444	1.00
FA18	19	0.2143	14.11
ST8	10	0.1077	5.33

Table 6 (continued)

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
ST9	3	0.0605	1.24
AD14	5	0.0538	2.56
ST10	6	0.0828	3.18
ST11	9	0.1007	4.79
FA19	6	0.0955	3.20
AD15	5	0.0835	2.80
ST12	7	0.1111	2.95
Average	11	0.1216	7.31

Note. (n=46).

possesses 44 ties and AD13 possesses 42 ties. In comparison, the next most connected individual, FA7, possesses 30 ties. The connectedness of AD8 and AD13 conform to their network positions as illustrated in Figure 10. The individuals with relatively high numbers of connections in this network also conform in most instances to the core-periphery calculation for the network; however, there are a few exceptions. The core-periphery calculation included ST12 as a core member, although ST12 has relatively few connections (7) compared to the other members of the core. Likewise, core member FA15 has only 9 connections. All the other members of the core group calculation have at least 18 total connections in the network. Conversely, AD11, with 25 total connections, was not included in the core group calculation. This suggests that while ST12 and FA15 have relatively few connections, the connections they do possess are to the other, more highly connected individuals in the network core. AD11, in contrast, possesses a relatively high number of connections, but these connections are to less-connected individuals on the periphery of Cypress's communications network.

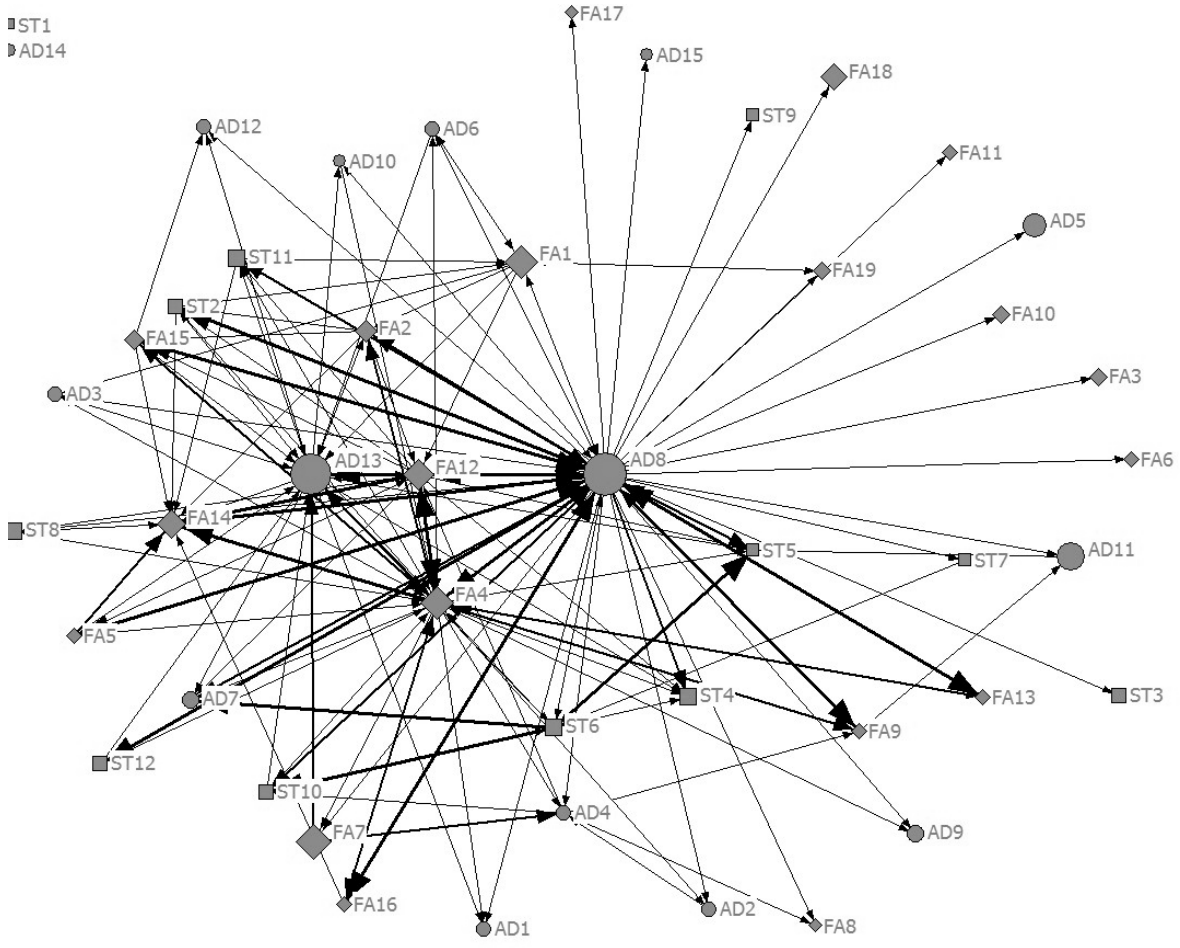
While the comparison of individuals' total connections to the core-periphery calculation suggests that Cypress's communications network has a densely intra-connected group at its core, the individual eigenvector centrality scores for the network suggest that there may in fact be a core within this core. AD8 has an eigenvector centrality score of 0.5182, nearly twice that of similarly connected AD13 (0.2615). Other highly connected individuals such as FA7 and FA4 have eigenvector centrality scores comparable to AD13 (0.2449 for FA7 and 0.2501 for FA4). The contrast between AD8's eigenvector centrality score and those for the next most connected individuals indicates that the core of Cypress's communications network formed around him. This in turn suggests that AD8's role in this network is even more central than what is depicted in Figure 10.

Complete Network Measures: Knowledge Transfer Network

Cypress's QEP knowledge transfer network included the same 46 individuals who comprised the communications network. As with the other two research sites examined in this study, Cypress's knowledge transfer network was treated as a composite of three directional advice networks: "advice seeker," "advice sought out," and "advice likely." Measures for each of these three networks are presented, followed by an aggregation of these measures for the complete knowledge transfer network associated with Cypress's QEP.

Figure 12 provides a graph of Cypress's advice seeker network with indicators for centrality and direction of communications. Figure 12 illustrates that AD8, AD13, FA4, and FA12 are the most central and connected individuals in the advice seeker network. FA1, FA7, FA14, and AD11 also occupy relatively central positions within this network. Also as Figure 12 shows, the advice seeker network has two isolates, ST1 and AD14. Another notable feature of this network is the relationship between AD8, the most central and connected individual in the network, and a number of other relatively isolated individuals. The upper right quadrant of Figure 12 shows eight individuals whose only connection in the advice seeker network is with AD8. More interestingly, all of these connections are directed from AD8 to these eight individuals. This suggests that AD8 served not only as a source of advice about QEP-related topics for his Cypress colleagues, but that he was an active seeker of advice from individuals not otherwise highly connected within the network.

Figure 13 provides the complete network measures for Cypress's advice seeker network. The density measure for Cypress's advice seeker network was calculated as 0.084, or 8.4%. This measure suggests that the density of Cypress's advice seeker network is relatively sparse.



Note. Faculty nodes are represented as diamonds; administrator nodes are represented as circles; staff nodes are represented as squares. Arrows indicate direction of ties. Node size indicates relative centrality.

Figure 12. Graph of Cypress Technical College's QEP knowledge transfer network (advice seeker).

Network Density (ND)	Core-Periphery (CP)	External/Internal (E-I) (Institutional Role)
0.084	Core-1 (n=5); Periphery-2 (n=41) Ratio=11% Coreness Density matrix 1 2 ----- ---- 1 3.050 0.746 2 0.395 0.026	0.302

Figure 13. Cypress Technical College's advice seeker network, complete measures (n=46).

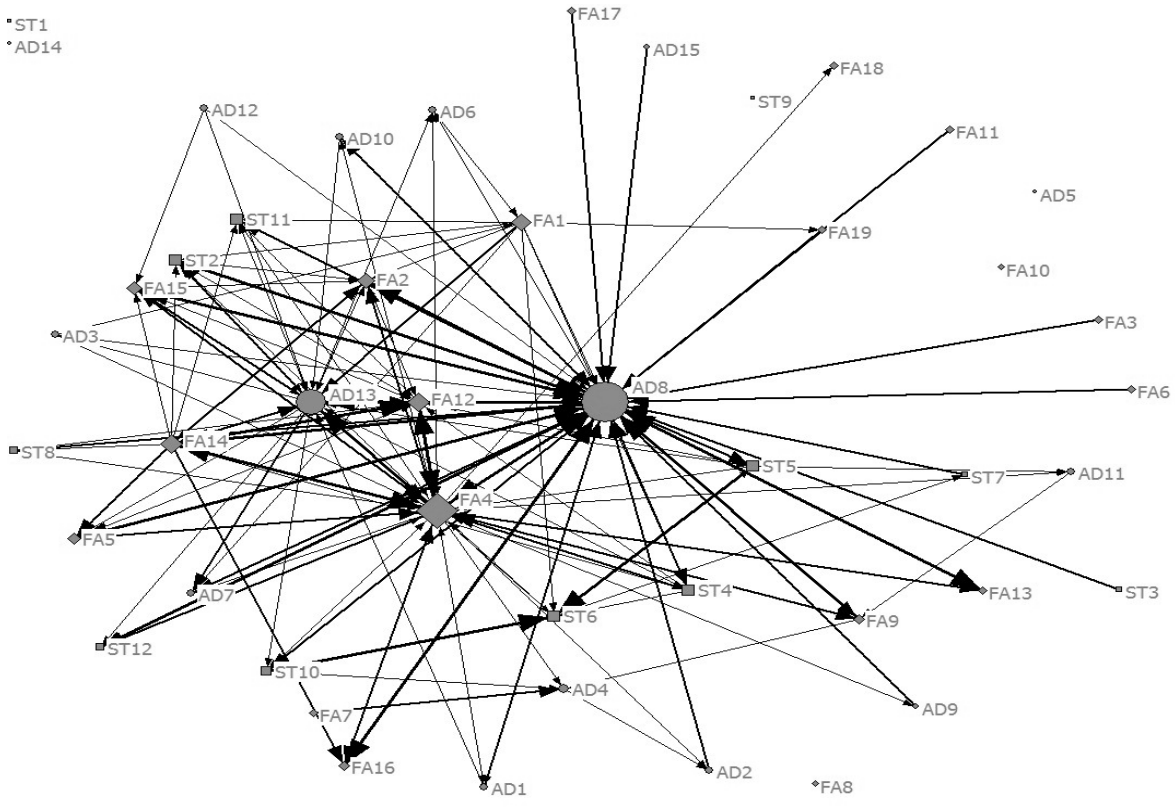
The core-periphery calculation for Cypress's advice seeker network suggests that the network consists of a core of five individuals (AD8, AD13, FA4, FA12, and FA15) and a periphery of 41 individuals, indicating a coreness measure of 11%. The external/internal measure using institutional role for the advice seeker network is 0.302, which indicates that individuals in this network were more likely to seek advice on QEP-related topics from colleagues with a different institutional role than theirs.

Figure 14 provides a graph of Cypress's advice sought out network with indicators for centrality and direction of communications.

A summary of the complete network measures for Cypress's advice sought out network is provided in Figure 15.

Cypress's advice sought out network structure is similar to that of the advice seeker network. As with the advice seeker network, AD8, AD13, FA4, and FA12 occupy the most central and highly connected positions within this network, with AD8 and FA4 displaying slightly more prominence in this network. Figure 14 also illustrates the reciprocal nature of AD8's central position in Cypress's knowledge transfer network. The otherwise isolated individuals whom AD8 reported turning to for advice as shown in Figure 12 also reported seeking advice from AD8 as shown in Figure 14.

Figure 16 provides a graph of Cypress's advice likely network with indicators for centrality and direction of communications. A summary of the complete network measures for this network is provided in Figure 17 14. Figure 17 shows that the density of Cypress's advice likely network is 0.058, or 5.8%, indicating a network more sparsely connected than the advice seeker (8.4%) and the advice sought out (8.3%) networks. The core-periphery measure for Cypress's advice likely network suggests a core of nine individuals (AD4, AD7, AD8, AD13,

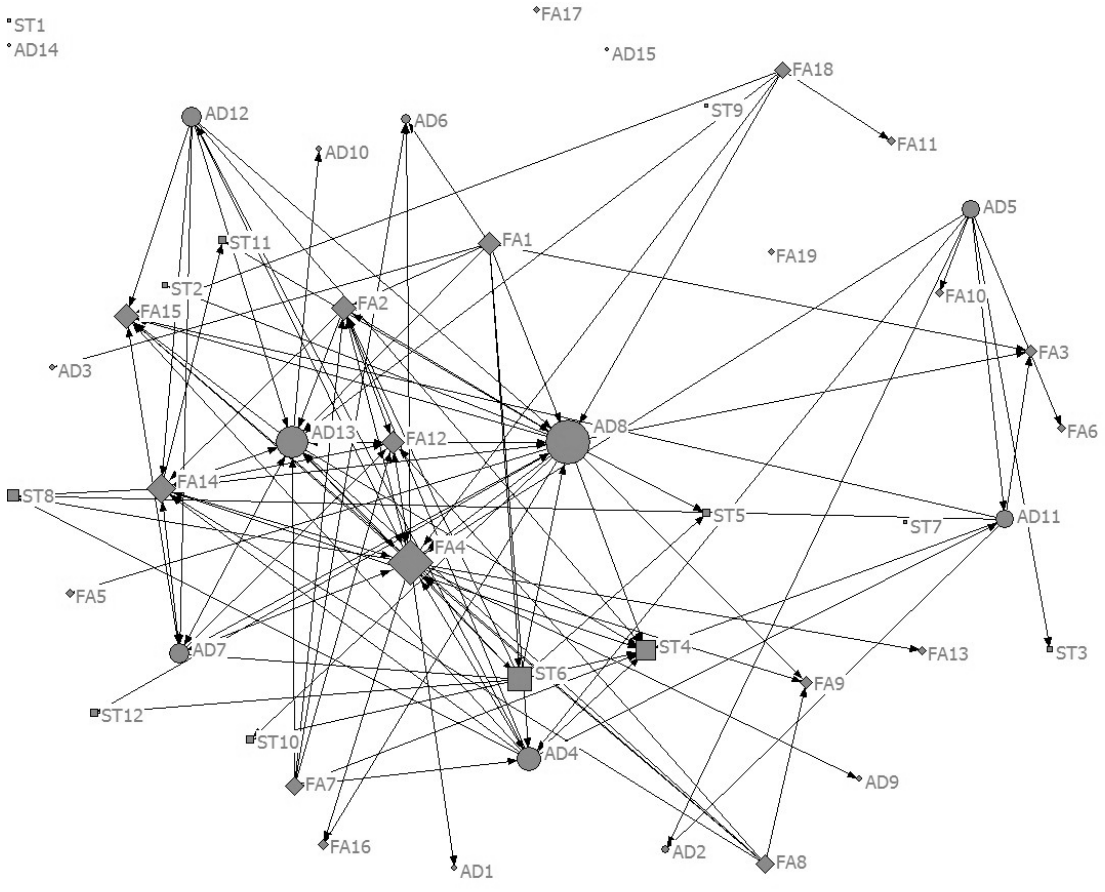


Note. Faculty nodes are represented as diamonds; administrator nodes are represented as circles; staff nodes are represented as squares. Arrows indicate direction of ties. Node size indicates relative centrality.

Figure 14. Graph of Cypress Technical College's QEP advice sought out network.

Network Density (ND)	Core-Periphery (CP)	External/Internal (E-I) (Institutional Role)
0.083	Core-1 (n=5); Periphery-2 (n=41) Ratio=11% Coreness Density matrix 1 2 ----- ---- 1 3.750 0.556 2 0.561 0.021	0.311

Figure 15. Cypress Technical College's advice sought out network, complete measures (n=46).



Note. Faculty nodes are represented as diamonds; administrator nodes are represented as circles; staff nodes are represented as squares. Arrows indicate direction of ties. Node size indicates relative centrality.

Figure 16. Graph of Cypress Technical College's QEP advice sought out network.

Network Density (ND)	Core-Periphery (CP)	External/Internal (E-I) (Institutional Role)
0.058	Core-1 (n=9); Periphery-2 (n=37) Ratio=20% Coreness Density matrix 1 2 ----- ---- 1 0.569 0.105 2 0.069 0.016	0.271

Figure 17. Cypress Technical College's advice likely network, complete measures (n=46).

FA2, FA4, FA12, FA14, ST6) and a periphery of 37. This represents a significantly larger core group than that of the advice seeker and advice sought out networks, each of which was characterized by a core of just five individuals. This larger core for Cypress's advice likely network may indicate that more individuals were considered potential sources of QEP information by their colleagues than were actually utilized as such.

The external/internal measure for Cypress's advice likely network was 0.271, indicating that individuals in this network were slightly more likely to contact colleagues with a different institutional role than theirs for advice on QEP-related topics. This measure is similar to the external/internal measures for Cypress's advice seeker (0.302) and advice sought out (0.311) networks.

Individual Network Measures: Knowledge Transfer Network

Tables 7, 8, and 9 present the individual measures for Cypress's three knowledge transfer networks.

As Table 7 shows, the average number of total connections for individuals in Cypress's advice seeker network is 5.61, the average eigenvector centrality score is 0.1034, and the average boundary spanner score is 3.78. Not surprisingly, AD8 has the largest number of total connections (43), followed by FA4 (27), AD13 (22), FA12 (15), and FA14 (11). These five individuals also had the highest eigenvector scores, although the ranking of these scores differed slightly from the total connections ranking. AD8 again had the highest score with 0.5752 and FA4 had the second highest score with 0.4010. However, whereas for total connections AD13 had the third highest score, FA12 had the third highest eigenvector score (0.2878). AD13 had the fifth highest eigenvector score (0.2640), just behind FA14 (0.2674). The boundary spanning scores for Cypress's advice seeker network more faithfully reflected the ranking of total connections, with AD8 scoring 40.76, followed by FA4 (22.98), AD13 (16.92), FA12 (8.87), and

Table 7

Cypress Technical College's Advice Seeker Network, Individual Measures

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA1	9	0.0834	5.82
ST1	0	0.0000	0.00
FA2	8	0.1397	4.00
AD1	3	0.0612	1.23
AD2	3	0.0550	1.51
ST2	7	0.1350	2.93
ST3	1	0.0388	1.00
FA3	1	0.0388	1.00
FA4	27	0.4010	22.98
FA5	5	0.1502	1.82
ST4	5	0.1068	2.10
FA6	1	0.0388	1.00
FA7	4	0.0872	2.57
AD3	4	0.0446	2.17
ST5	6	0.1038	3.73
AD4	8	0.0814	5.96
AD5	1	0.0388	1.00
FA8	2	0.0415	1.00
FA9	4	0.1224	1.91
FA10	1	0.0388	1.00
ST6	8	0.0889	6.12
FA11	1	0.0388	1.00
AD6	4	0.0446	2.13
FA12	15	0.2878	8.87
AD7	5	0.1137	3.08
AD8	43	0.5752	40.76
AD9	2	0.0523	1.00
AD10	3	0.0612	1.15
FA13	2	0.1181	1.04
FA14	11	0.2674	6.38
AD11	3	0.0464	1.54
AD12	3	0.0537	1.40
FA15	7	0.1805	2.74
AD13	22	0.2640	16.92

Table 7 (continued)

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA16	3	0.1361	1.13
ST7	2	0.0418	1.00
FA17	1	0.0388	1.00
FA18	1	0.0388	1.00
ST8	4	0.0710	1.45
ST9	1	0.0388	1.00
AD14	0	0.0000	0.00
ST10	5	0.0953	2.91
ST11	6	0.1021	2.48
FA19	2	0.0416	1.00
AD15	1	0.0388	1.00
ST12	3	0.1134	1.14
Average	5.61	0.1034	3.78

Note. (n=46).

Table 8

Cypress Technical College's Advice Sought Out Network, Individual Measures

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA1	11	0.0635	8.92
ST1	0	0.0000	0.00
FA2	8	0.1686	4.12
AD1	3	0.0596	1.13
AD2	3	0.0510	1.77
ST2	7	0.1340	2.97
ST3	1	0.0364	1.00
FA3	1	0.0364	1.00
FA4	28	0.4141	23.86
FA5	5	0.1539	1.65
ST4	7	0.1164	3.38
FA6	1	0.0364	1.00
FA7	1	0.0022	1.00
AD3	4	0.0435	2.17
ST5	6	0.0951	4.26
AD4	5	0.0224	4.31
AD5	0	0.0000	0.00
FA8	0	0.0000	0.00
FA9	4	0.1156	2.41
FA10	0	0.0000	0.00
ST6	7	0.0545	6.14
FA11	1	0.0364	1.00
AD6	4	0.0435	2.29
FA12	12	0.2801	6.90
AD7	4	0.0986	1.77
AD8	34	0.5467	31.63
AD9	2	0.0502	1.00
AD10	3	0.0596	1.08
FA13	2	0.1142	1.00
FA14	12	0.3486	6.98
AD11	3	0.0208	1.93
AD12	3	0.0335	1.51
FA15	7	0.1788	2.72
AD13	21	0.2814	15.49

Table 8 (continued)

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA16	3	0.1374	1.20
ST7	2	0.0382	2.00
FA17	1	0.0364	1.00
FA18	1	0.0138	1.00
ST8	4	0.0711	1.36
ST9	0	0.0000	0.00
AD14	0	0.0000	0.00
ST10	5	0.0858	3.59
ST11	6	0.1008	2.62
FA19	2	0.0385	1.50
AD15	1	0.0364	1.00
ST12	3	0.1098	1.09
Average	5.17	0.0949	3.54

Note. (n=46).

Table 9

Cypress Technical College's Advice Likely Network, Individual Measures

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA1	8	0.1495	6.50
ST1	0	0.0000	0.00
FA2	9	0.2321	5.18
AD1	1	0.0390	1.00
AD2	2	0.0166	1.00
ST2	1	0.0351	1.00
ST3	1	0.0075	1.00
FA3	3	0.0594	2.33
FA4	20	0.3816	16.42
FA5	1	0.0351	1.00
ST4	8	0.1880	5.31
FA6	1	0.0075	1.00
FA7	6	0.1268	4.25
AD3	1	0.0153	1.00
ST5	2	0.0564	1.00
AD4	11	0.2138	7.79
AD5	7	0.0739	6.21
FA8	6	0.1570	3.42
FA9	3	0.0901	1.67
FA10	1	0.0075	1.00
ST6	10	0.2084	7.18
FA11	1	0.0133	1.00
AD6	3	0.0672	3.00
FA12	8	0.2171	3.91
AD7	8	0.2532	3.59
AD8	21	0.3437	17.42
AD9	1	0.0390	1.00
AD10	1	0.0331	1.00
FA13	1	0.0390	1.00
FA14	12	0.3077	7.63
AD11	7	0.0888	5.57
AD12	8	0.2276	3.94
FA15	9	0.2165	5.94
AD13	15	0.3240	10.20
FA16	2	0.0741	1.00

Table 9 (continued)

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
ST7	0	0.0000	0.00
FA17	0	0.0000	0.00
FA18	5	0.1306	3.00
ST8	4	0.1013	2.38
ST9	0	0.0000	0.00
AD14	0	0.0000	0.00
ST10	2	0.0564	1.00
ST11	2	0.0665	1.00
FA19	0	0.0000	0.00
AD15	0	0.0000	0.00
ST12	2	0.0564	1.00
Average	4.65	0.1034	3.26

Note. (n=46).

FA14 (6.38). Taken together, these three measures confirm that this network is dominated by a relatively small core of highly connected individuals. This core is not homogenous, however, and while an administrator, AD8, is the most prominent hub of this network, the second most central and connected individual is a faculty member, FA4.

Table 8 presents the individual scores for Cypress's advice sought out network. As indicated, the average number of total connections for individuals in Cypress's advice sought out network is 5.17, the average eigenvector centrality score is 0.0949, and the average boundary spanner score is 3.54. As in the advice seeker network, AD8 has the largest number of total connections (34), followed by FA4 (28), AD13 (21), FA12 (12), and FA14 (12). Also as in the advice seeker network, these five individuals had the highest eigenvector scores, and the ranking of these scores differed slightly from the ranking of total connections. The boundary spanning scores for Cypress's advice sought out network indicate the diversity of connections of AD8 (31.63), FA4 (23.86), and AD13 (15.49). Compared to the next highest boundary spanner scorers—FA1 (8.92), FA14 (6.98), and FA12 (6.90)—these scores of these three individual also illustrate how widely connected they are within the advice sought out network. The network measures presented in Table 8 thus reinforce the advice seeker network measures discussed earlier and further suggest that Cypress's knowledge transfer network is characterized by a relatively small, the hub of which is AD8.

Table 9 presents the individual scores for Cypress's advice likely network. The average number of total connections for individuals in Cypress's advice likely network is 4.65, the average eigenvector centrality score is 0.1034, and the average boundary spanner score is 3.26. The individual scores for Cypress's advice likely network suggest that this network is slightly less concentrated around a small core than the advice seeker and advice sought out networks. With those networks, four or five individuals were disproportionately central and connected.

These same individuals are also prominent in the advice likely network, but individuals who were not central to the other two networks have relatively high numbers of connections in this network. Specifically, AD4 has 11 total connections and ST6 has 10 total connections. This reinforces the larger coreness measure suggested by the advice likely network's core periphery measure. Likewise, the implication of this larger core is that more individuals are considered potential sources of advice about Cypress's QEP than are regularly utilized as such.

The three individual measure datasets discussed above suggest that Cypress's knowledge transfer network centers on a relatively small core of individuals, with AD8 being the most prominent individual in this core. Despite this small core, however, there were few isolates in each of the networks discussed above, with an average of five isolates for the three networks. This may indicate that while AD8 and the other four to five most central individuals in Cypress's knowledge transfer network were the primary sources of information, most of the 46 individuals involved with Cypress's QEP were also either senders or receivers of information.

Informant Descriptions of Network Dynamics

Three Cypress faculty members were interviewed in order to triangulate the data from the own-tie survey. These faculty members had varying degrees of involvement in the development and implementation of the QEP. FA4 ("Dave"), who has been an instructor at Cypress for 17 years, was involved with several phases of the QEP process. FA14 ("Ella") has been with Cypress for eight years and had more involvement with the QEP in its development phase. FA18 ("Fay") has been with Cypress for 10 years and currently serves as both an instructor and department chair; she has had less involvement with Cypress's QEP than either Dave or Ella. Interestingly, despite this lack of involvement, Fay was in the most central quartile for Cypress's communications network, along with Dave and Ella. Conversely, she was in the least central

quartile for Cypress's knowledge transfer network, while Dave and Ella were again in the most central quartile.

As mentioned earlier, during the course of this study Cypress experienced significant upheaval, with a few high level administrators leaving the college. Among these were AD8 and AD13, both of who had considerable involvement in Cypress's QEP and proved to be highly central and connected individuals within the communications and knowledge transfer networks associated with the QEP. All three of the Cypress informants interviewed for this study emphasized the prominent roles AD8 and AD13 played in the development and implementation of the QEP and the disruptions caused by their departure from the college.

The own-tie survey results suggested that Dave was one of the most central and highly connected individuals in both the communications and knowledge sharing networks associated with Cypress's QEP. Dave described the various ways he was involved with the development of Cypress's QEP and his role in the early implementation stages of the QEP. He served on the original QEP development team and was also involved with several components of the initial implementation of the QEP.

As mentioned above, Cypress recently underwent significant turnover at its highest administrative levels, with the college president, a vice president, and a dean leaving Cypress in the first half of 2014. Additionally, prior to this administrative turnover, the position of QEP Director had been eliminated, resulting in no individual at Cypress having formal responsibility for the implementation of the QEP. Dave emphasized throughout his comments the disruptions these departures and the elimination of the QEP Director position caused the QEP process at Cypress.

Dave described the communications patterns he observed during the development and implementation of Cypress's QEP as mainly formal, with the bulk of QEP-related

communications happening between and within the teams that were formed to conduct research on the QEP topic and write the QEP document. Dave reported that these teams always met in Cypress's boardroom, the setting helping to reinforce the formality of the teams' work. This formality has diminished considerably, however, since the administrative turnover, according to Dave. He observed that, "It's informal now because we don't really have a true leader of the QEP." This decrease in formality has also been accompanied by more dispersed communication patterns. "It's not near as concentrated as it was before [the administrative turnover]," Dave stated. In his view, the administrative turnover adversely affected the flow of communications. "During early stages communication really flowed well," he recalled. However, since the turnover, "The communication is not where it needs to be at this point."

Dave's descriptions of Cypress's knowledge transfer network confirm the centrality of administrators AD8 and AD13. He stated that he and his colleagues would most often turn to AD13 for advice or information about Cypress's QEP; if AD13 was unavailable or could not provide the information requested, AD8 would be the next person most often sought out. Dave also suggested that two other administrators, AD4 and AD9, would also be likely sources of advice or information about the QEP for their colleagues. This statement confirms AD4's inclusion in the core of Cypress's advice likely network, but also suggests that AD9 may be more central to this network than what is indicated by the own-tie survey results (AD9 had only one connection in the advice likely network).

The effects of the administrative turnover at Cypress were also central to Dave's descriptions of the top-down versus bottom-up dynamics associated with the QEP. "I think it was top-down and it has changed because the top is no longer here" he observed. More specifically, Dave described how AD13 was the individual who most influenced the QEP process at Cypress. "[AD13] was the one that was driving it. He basically knew, he had a very vast knowledge of the

QEP process and he kind of led it" he recalled. Dave also recalled how AD13 exerted his authority during some contentious moments during the development of the QEP. Dave described how "There were times when we didn't all agree, but [AD13] kind of directed it toward some of his own initiatives." According to Dave, AD13 maintained a top-down, strategic emphasis throughout the QEP development process. For example, Dave described how there were "A couple of instances where the math department really wanted to go one way, and [AD13] wanted to pursue it another way." Despite, or perhaps because of, AD13's top-down, authoritative approach, Dave considered him an indispensable part of Cypress's QEP process. "The QEP would not have been near as successful without his efforts. It would not have even been close," he argued.

Ella's involvement with Cypress's QEP was similar to Dave's in that she participated in both the research and development phase and the implementation phase of the plan. Like Dave, she emphasized in her comments the disruption caused by the administrative turnover at Cypress. Ella stated that it is "kind of like we're in limbo" because "There's no one technically in charge" of implementing the QEP. Despite not having someone in charge of the QEP, Ella explained that the implementation of the plan was ongoing and included efforts to collect data about the impact of the plan on student learning.

Ella described the communications patterns relating to Cypress's QEP as primarily formal, with most of the communications she observed happening within the context of standing committees or subcommittees. According to her, these committees communicated either via email or at face-to-face committee meetings. In discussing the communications patterns she had observed, Ella explained that she felt there was not adequate faculty representation on the committees involved with the development of the plan. More specifically, she stated that there were not enough math instructors on these committees, even though math was the focus of

Cypress's QEP. "Only one math person was on the QEP Task Force, the large committee," she explained. "It wasn't where the math department involvement needed to be."

Ella's descriptions of the knowledge transfer networks associated with Cypress's QEP emphasized the role of the math department as a source for information and advice about the QEP. Ella described how colleagues from various service areas and academic departments would often go straight to Cypress's math faculty with questions about the QEP, despite the lack of representation of math faculty during the QEP development process. "Sometimes they thought that the math people were involved in the process, the entire process" she explained. She also, like Dave, emphasized the importance of AD13 as a source for QEP-related information. Ella described how AD13 and the math department each utilized the other in order to provide advice and information about the QEP. She explained that AD13 would often direct math-specific questions to the math department, while math faculty would often direct broader questions about the implementation of the QEP to AD13.

When asked about whether she perceived the communications and knowledge transfer dynamics of Cypress's QEP process as more top-down or bottom-up, Ella described a primarily top-down process that began with the selection of Cypress's QEP topic. "It was kind of geared toward certain topics, and from there when [AD13] established meetings, school-wide meetings, committees . . . those choices were made from his office" she explained. "It wasn't like our school met together and said, 'Okay, let's build it from scratch.'" From Ella's perspective, this top-down process, driven mainly by AD13, missed opportunities to include broader input, particularly from math faculty. "We should have been involved more," she said. "Decisions were being made for us" by "non-math people." According to Ella, this lack of inclusion of content experts led to several problems during the implementation of Cypress's QEP. "Maybe some decisions were made that could have been better" she concluded.

Although Ella bemoaned the lack of inclusivity she associated with AD13's top-down approach, she also, like Dave, emphasized the importance of having strong, consistent leadership. "Someone needs to be in charge for the implementation" she observed. "As for the direction, for the leadership, that needs to be there from the beginning through the end." Like Dave, Ella thought that Cypress's QEP would be more successful had there not been the administrative turnover. Also like Dave, Ella described the need for leadership in terms of managing goals and collecting data, particularly in preparation for the five year impact report required by SACSCOC. In this sense, both Dave and Ella conveyed an awareness of the accountability standards required by SACSCOC. Ella also noted that the questions she addressed during the interview caused her to reflect more deeply on the dynamics of Cypress's QEP process. "I didn't realize the importance of, you know, beginning to the end and it being a top-down [process], until I actually looked at the questions and thought this through" she stated.

Unlike Dave and Ella, Fay was not directly involved in the development phase of Cypress's QEP. She currently is part of a committee that has some involvement with the implementation of the QEP, although she explained that the committee had not met in months, which she attributed to the administrative turnover at Cypress. Like Dave and Ella, she felt the QEP was somewhat in limbo due to the lack of supervision and leadership resulting from the turnover. Fay's primary impression of the communications dynamics associated with Cypress's QEP was that little communication had been taking place since the administrative turnover. She recalled that, "Last year, the only thing I heard that they were doing 'Pi Day.'"

Fay's perception of the knowledge sharing network was similar to those of Dave and Ella in that she felt a small core of individuals, primarily AD8 and AD13, functioned as the main sources of information for their colleagues about Cypress's QEP. Fay speculated that the dominance of AD8 and AD13 in Cypress's QEP process may have in fact led to the

administrative turnover. “That may have been one of the problems that the institution might have had with the people [AD8 and AD13] who they asked to leave,” she shared. “They were very much in control and maybe there wasn’t as much communication and involvement with faculty in those processes.” In the absence of AD8 and AD13, Fay felt that AD4, AD9, FA4 (Dave), and FA11 would be the individuals most central to Cypress’s knowledge sharing network. Although AD4 and Dave were both relatively central in Cypress’s knowledge transfer networks based on the own-tie survey, AD9 and FA11 were not. Fay’s mention of FA11 as a source of potential advice or information nonetheless confirms the results of the own-tie survey in which she identified FA11 as a likely source of QEP-related knowledge.

Fay’s perception of whether Cypress’s QEP process could be characterized as more top-down or bottom-up was also similar to those of Dave and Ella. Fay felt that the initial development phase of Cypress’s QEP was “very faculty driven.” However, she felt that the implementation phase was much more top-down. “It was like we never really heard anything about [the QEP]” after the initial phase, she stated. Fay expressed a hopefulness that the QEP process might again become more inclusive of faculty input as a result of the administrative turnover at Cypress. “We’re hoping that we will have more input into things and going forward with it” she explained. This sentiment suggests that unlike Dave and Ella, Fay perceived the administrative turnover as an opportunity for broader involvement in the QEP rather than just a disruption to the continuity of the process.

Summary of Findings for Cypress Technical College

The informant descriptions of Cypress’s QEP networks reinforce the own-tie survey data in suggesting that these networks were characterized by a small, powerful core of individuals led by AD13 and AD8. These two individuals were the prominent hubs for communications and information about Cypress’s QEP. Because these individuals were also high-ranking

administrators, the dynamics of Cypress's QEP networks must be characterized as primarily strategic and top-down. These dynamics are also implied by the lack of activity that the Cypress informants reported since the departure of AD8 and AD13. When these individuals left, Cypress's QEP efforts literally lost their center.

Despite the prominence of the AD8 and AD13 in Cypress's QEP networks, the core group indicated by the core periphery measure for the communications network is, at 11 individuals and 24% coreness, a substantial one that includes more faculty members than administrators. This suggests that while the own-tie survey data and informant descriptions point to the strategic, top-down nature of Cypress's QEP networks, there were also more emergent, dispersed patterns of communications involved with the QEP. The larger core measure for the advice likely network also suggests that knowledge transfer activities were not solely dependent on central individuals such as AD8, FA4 (Dave), and AD13. From a broader perspective, these patterns suggest that despite the administrative turnover at Cypress and the loss of AD8 and AD13, there are pathways of communications and knowledge transfer that can be utilized to reinvigorate Cypress's QEP efforts.

Seaside Technical College

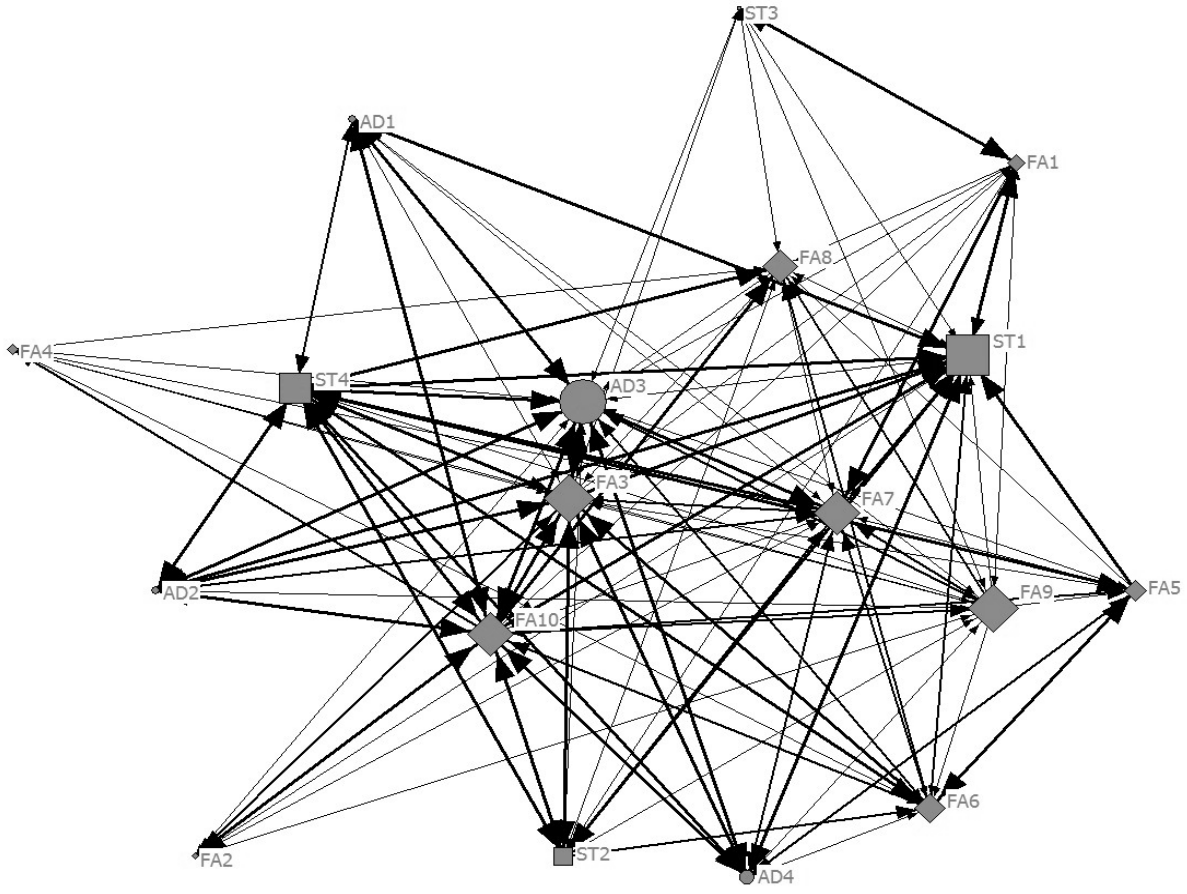
Of the three research sites examined in this study, Seaside Technical College is in the earliest phase of its QEP process. Seaside received its reaffirmation of accreditation from SACS in 2014 and began the implementation of its QEP, which focuses on improving student outcomes in online classes, that same year. Seaside is a medium-sized community college with an enrollment of just under 4,000 for 2013-2014. Seaside offers a variety of associate in arts and associate in applied science degrees programs as well as professional certificate and diploma programs.

The data collection methods used for Seaside were the same as those for Longleaf and Cypress Technical Colleges. Seaside's QEP Director provided me with a roster of individuals who had been directly involved with Seaside's QEP in the last year. Of the 18 individuals on this roster, 9 (50%) returned completed own-tie surveys. The data reconstruction methods discussed earlier were then used to address non-respondent data gaps. Of the 18 individuals involved with Seaside's QEP, four identified as administrators, ten as faculty, and four as staff. As with the other two research sites, these individuals were coded alphabetically by institutional code.

Complete Network Measures: Communications Network

Figure 18 provides a visual representation of the communication network associated with Seaside's QEP. This network consists of 18 individuals. As Figure 18 illustrates, there are several individuals who occupy relatively central positions in this network. Of these individuals, AD3, FA3, FA7, FA10, and ST1 are most central and have a high number of connections with other individuals in this network. Figure 18 also conveys the density of Seaside's communications network as well as the absence of isolates.

Figure 19 provides more specific measures for this network. The overall density of Seaside's communications network is 0.578, the highest density of any of the networks analyzed in this study. The core periphery measure for Seaside's communications network suggests that the network has a relatively large core of 8 individuals (AD3, AD4, FA3, FA7, FA10, ST1, ST2, ST4), yielding a coreness ratio of 44%. The external/internal measure for the communications network is -0.360, suggesting that individuals in this network tend to communicate with colleagues who have the same institutional role.



Note. Faculty nodes are represented as diamonds; administrator nodes are represented as circles; staff nodes are represented as squares. Arrows indicate direction of ties. Node size indicates relative centrality.

Figure 18. Graph of Seaside Technical College's QEP communications network.

Network Density (ND)	Core-Periphery (CP)	External/Internal (E-I) (Institutional Role)
0.578	Core-1 (n=8); Periphery-2 (n=10) Ratio=44% Coreness Density matrix 1 2 ----- ----- 1 3.679 1.563 2 1.675 0.578	-0.360

Figure 19. Seaside Technical College's communications network, complete measures (n=18).

Individual Network Measures: Communications Network

Table 10 presents the individual network measures for Seaside's QEP communications network. As this table shows, these are several individuals in this network with a high number of total connections. AD3 has the most total connections with 17, followed by four individuals with 16 total connections each. AD3 also had the highest eigenvector centrality score (0.9728) and boundary spanner score (10.43). These measures indicate that AD3 is the most central and prominent individual in Seaside's communications network.

The individual measures presented in Table 10 largely support the core periphery structure suggested for this network, with the exception of FA6, who has 16 total connections but was not included in the suggested core for the network. This is likely due to FA6 having more and stronger ties to individuals in the suggested peripheral group for this network, which is also implied by FA6's boundary spanner score of 9.28, second only to AD3. The averages for the three measures presented in Table 10 also confirm that Seaside's communications network is relatively densely connected and has no isolated members. The average of total connections for this network is 14.22, and no individual has fewer than 10 connections.

Complete Network Measures: Knowledge Transfer Network

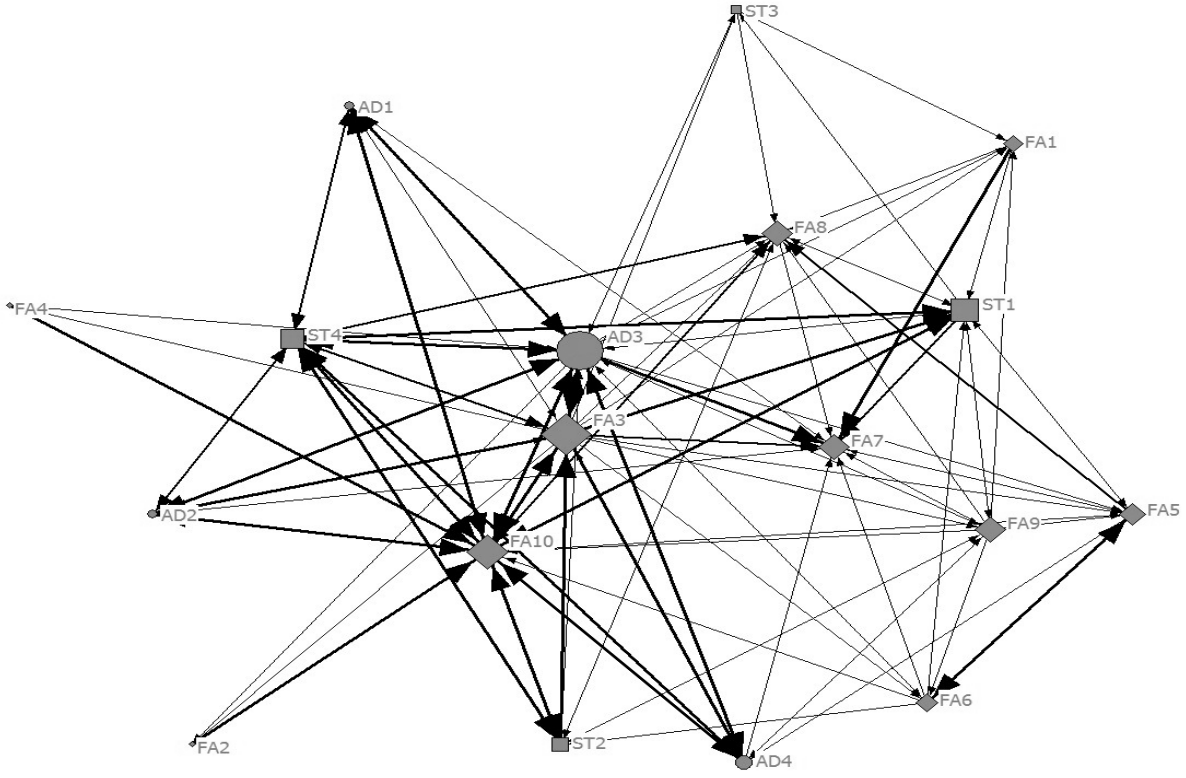
The knowledge transfer network associated with Seaside's QEP also consisted of 18 individuals. A graph of Seaside's advice seeker network is provided in Figure 20.
As Figure 20 illustrates, this network appears to be relatively highly connected, with AD3, FA3, and FA10 at its center and no isolates on the perimeter. Figure 21 provides the complete network measures for Seaside's advice seeker network. The density of the advice seeker network is 0.366, or 36.6%. The core-periphery measure for the advice seeker network suggests that this network is comprised of a core group of five individuals (AD3, AD4, FA3, FA10, and ST4) and a periphery of 13 individuals, for a coreness measure of 28%. The external/internal

Table 10

Seaside Technical College's Communications Network Individual Measures

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA1	10	0.2992	6.39
AD1	13	0.5239	6.68
FA2	15	0.5343	7.86
FA3	16	0.6527	9.06
FA4	12	0.3303	5.57
AD2	14	0.617	7.58
ST1	15	0.5843	9.1
FA5	14	0.5429	7.57
FA6	16	0.7213	9.28
FA7	15	0.7221	8.28
AD3	17	0.9728	10.43
FA8	10	0.3762	5.09
AD4	14	0.5415	7.2
ST2	13	0.545	6.46
ST3	15	0.6666	8.44
ST4	16	0.8057	8.92
FA9	16	0.6945	8.7
FA10	15	0.7288	8.45
Average	14.22	0.6033	7.84

Note. (n=18).



Note. Faculty nodes are represented as diamonds; administrator nodes are represented as circles; staff nodes are represented as squares. Arrows indicate direction of ties. Node size indicates relative centrality.

Figure 20. Graph of Seaside Technical College's QEP advice seeker network.

Network Density (ND)	Core-Periphery (CP)	External/Internal (E-I) (Institutional Role)
0.366	Core-1 (n=5); Periphery-2 (n=13) Ratio=28% Coreness Density matrix 1 2 ----- ---- 1 2.333 1.442 2 0.675 0.436	-0.158

Figure 21. Seaside Technical College's advice seeker network, complete measures (n=18).

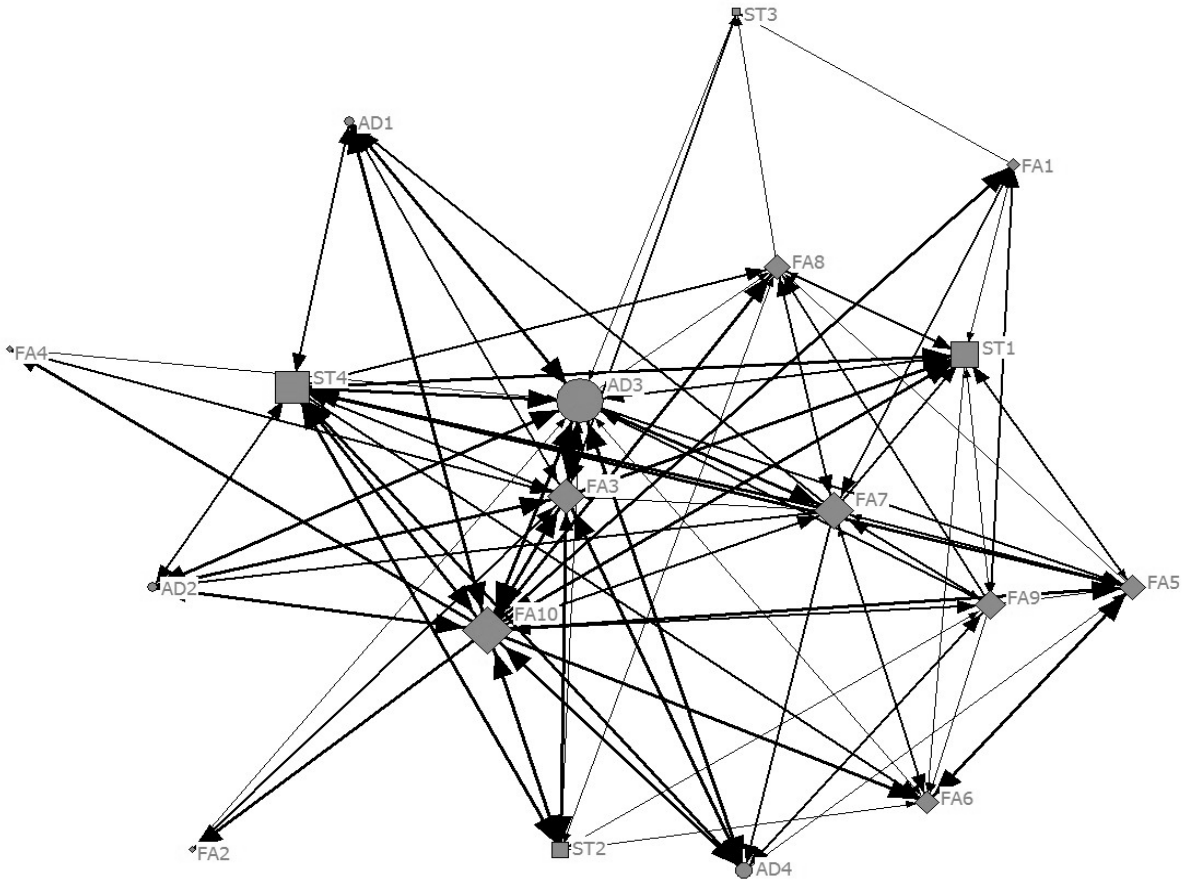
measure of the advice seeker network is -0.158, indicating that individuals in this network slightly more often turn to colleagues with their same institutional role for advice or information about Seaside's QEP.

Figure 22 presents a graph of Seaside's advice sought out network. This network exhibits a structure similar to that of the advice seeker network, with AD3, FA3, and FA10 as the most central and connected individuals. Also like the advice seeker network, the advice sought out network has no isolates.

Figure 23 presents the complete network measures for the advice sought out network. The overall density of this network is 0.376, or 37.6%. The core-periphery measure for the advice sought out network is the same for that of the advice seeker network, with a core group of five individuals (AD3, AD4, FA3, FA10, and ST4) and a periphery of 13 individuals, yielding a coreness measure of 28%. The external/internal measure for this network (-0.158) is also similar to that for the advice seeker network, indicating that individuals are slightly more often contacted by individuals with their same institutional role for advice or information about the QEP.

Figure 24 presents a graph of Seaside's advice likely network. This graph illustrates how the advice likely network appears to be less dense and interconnected than the other two knowledge transfer networks. As with the other two knowledge transfer networks, AD3 and FA3 are central and highly connected. However, in this network FA10 is less prominent and ST4 is more prominent than in the other two knowledge transfer networks. Also unlike the other two knowledge transfer networks, the advice likely network has three isolates on its perimeter.

Figure 25 presents the complete network measures for the advice likely network. The density of this network is 0.131, considerably less than either the advice seeker or advice sought out networks. Despite this difference in density, the advice likely network has the same suggested core-periphery structure as the other two knowledge transfer networks. The suggested

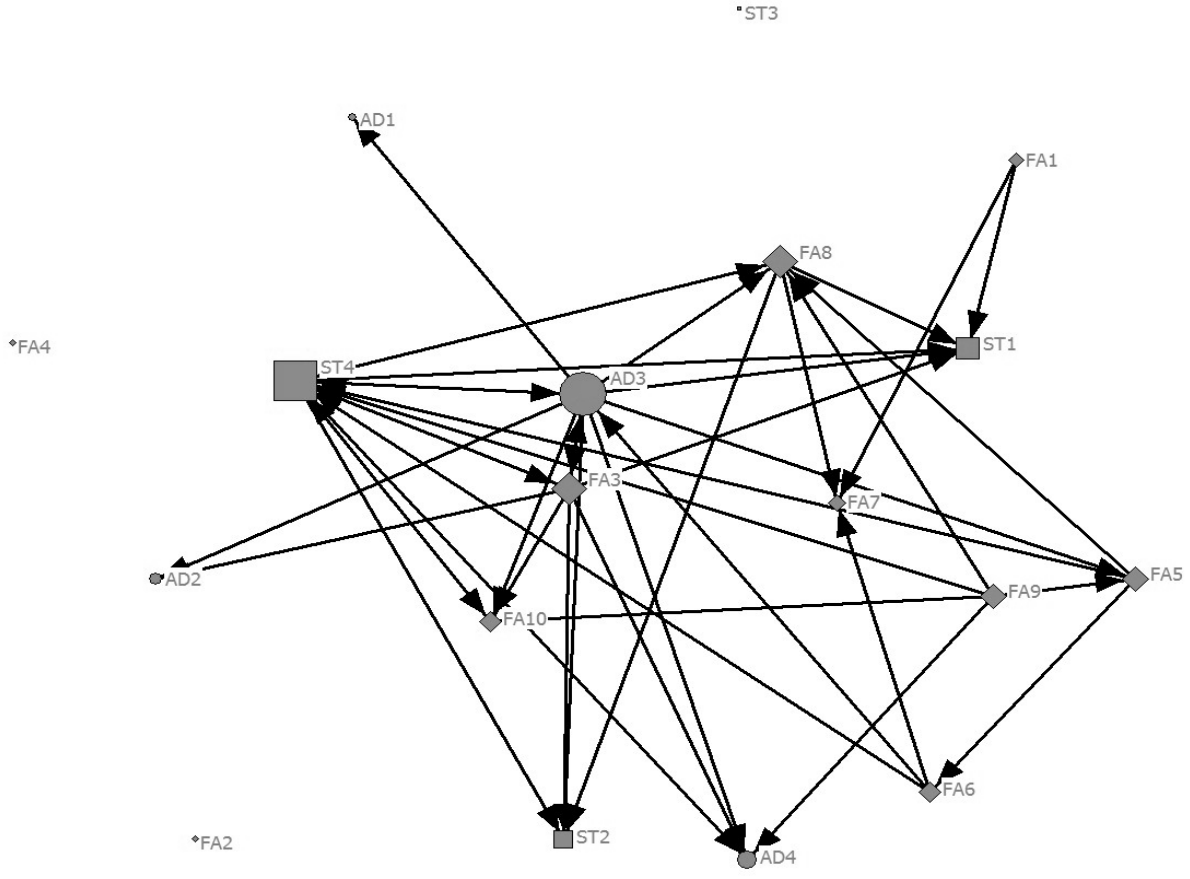


Note. Faculty nodes are represented as diamonds; administrator nodes are represented as circles; staff nodes are represented as squares. Arrows indicate direction of ties. Node size indicates relative centrality.

Figure 22. Graph of Seaside Technical College's QEP advice sought out network.

Network Density (ND)	Core-Periphery (CP)	External/Internal (E-I) (Institutional Role)
0.376	Core-1 (n=5); Periphery-2 (n=13) Ratio=28% Coreness Density matrix 1 2 ----- ---- 1 4.450 1.708 2 1.462 0.397	-0.158

Figure 23. Seaside Technical College's advice sought out network, complete measures (n=18).



Note. Faculty nodes are represented as diamonds; administrator nodes are represented as circles; staff nodes are represented as squares. Arrows indicate direction of ties. Node size indicates relative centrality.

Figure 24. Graph of Seaside Technical College's QEP advice likely network.

Network Density (ND)	Core-Periphery (CP)	External/Internal (E-I) (Institutional Role)
0.131	Core-1 (n=5); Periphery-2 (n=13) Ratio=28% Coreness Density matrix 1 2 ----- ---- 1 0.650 0.246 2 0.108 0.038	0.150

Figure 25. Seaside Technical College's advice likely network, complete measures (n=18).

core membership for the advice likely network is slightly different than that of the other two knowledge transfer networks, with FA8 replacing AD4. The external/internal measure for the advice likely network (0.150) also differs from the other two knowledge transfer networks and indicates that individuals in this network are more likely to contact colleagues with a different institutional role than theirs for advice or information about Seaside's QEP.

Individual Network Measures: Knowledge Transfer Network

Tables 11, 12, and 13 present the individual network measures for Seaside's knowledge transfer network. Table 11 provides data on the advice seeker network. Although the overall connectivity of individuals in this network is less than what was observed in Seaside's communications network, the individuals in the advice seeker network still tend to have numerous total connections. The average total connections for this network is 10.56, and all but five individuals in this network have 10 or more connections.

As with the communications network, AD3 has the highest number of total connections (17), followed by FA3 (16), and AD2 (15). AD2 has the highest eigenvector score (0.3686), followed by AD3 (0.3677) and ST4 (0.3573). These same three individuals also have the highest boundary spanner scores, with AD3 having the highest score (11.27), followed by FA3 (10.28) and AD2 (9.47).

Table 12 presents the individual network measures for the advice sought out network. In this network, AD3, FA10, and ST4 have the most total connections with 15 each. FA7 has the next most connections with 14.

These four individuals also have the highest eigenvector scores, with FA10 having the highest score (0.3934), followed by ST4 (0.3576), AD3 (0.3340), and FA7 (0.3121). AD2 also has a score of 0.3121. The same individuals also score highest in this network as boundary

Table 11

Seaside Technical College's Advice Seeker Network, Individual Measures

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA1	5	0.0519	2.52
AD1	10	0.1762	5.06
FA2	11	0.1522	6.36
FA3	16	0.3045	10.28
FA4	5	0.1577	2.28
AD2	15	0.3686	9.47
ST1	12	0.1838	7.59
FA5	7	0.0823	4.83
FA6	12	0.1834	8.15
FA7	8	0.2294	4.44
AD3	17	0.3677	11.27
FA8	5	0.0582	2.10
AD4	11	0.2142	5.87
ST2	11	0.2699	5.87
ST3	9	0.2011	5.29
ST4	13	0.3573	7.63
FA9	11	0.2098	5.77
FA10	12	0.3056	7.58
Average	10.56	0.2152	6.24

Note. (n=18).

Table 12

Seaside Technical College's Advice Sought Out Network, Individual Measures

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA1	4	0.0196	2.72
AD1	9	0.1690	5.04
FA2	9	0.1329	4.33
FA3	9	0.2213	4.55
FA4	6	0.1541	2.44
AD2	11	0.3121	6.94
ST1	9	0.1892	5.40
FA5	9	0.1610	5.36
FA6	7	0.1012	3.91
FA7	14	0.3121	9.20
AD3	15	0.3340	10.50
FA8	6	0.0739	3.29
AD4	10	0.2306	5.11
ST2	11	0.2455	5.40
ST3	11	0.2467	6.74
ST4	15	0.3576	9.77
FA9	12	0.1999	6.73
FA10	15	0.3934	10.39
Average	10.11	0.2141	5.99

Note. (n=18).

Table 13

Seaside Technical College's Advice Likely Network, Individual Measures

Respondent	Total Connections	Eigenvector Centrality	Boundary Spanner
FA1	2	0.0984	2
AD1	0	0.0000	0
FA2	4	0.1922	3
FA3	7	0.3177	3.29
FA4	1	0.0729	1
AD2	4	0.2215	1.5
ST1	0	0.0000	0
FA5	3	0.1204	2.10
FA6	4	0.1721	2.67
FA7	8	0.3178	5.25
AD3	13	0.4912	9.17
FA8	4	0.1760	2.5
AD4	4	0.2049	2
ST2	4	0.2215	1.5
ST3	2	0.1316	1
ST4	9	0.3956	5.77
FA9	7	0.2883	4.14
FA10	4	0.1807	2
Average	4.44	0.2002	2.72

Note. (n=18).

spanners, with AD3 having the highest score (10.50), followed by FA10 (10.39), ST4 (9.77), and FA7 (9.20).

Table 13 presents the individual measures for Seaside's advice likely network. As noted in the discussion of the complete measures for the advice likely network, this network is less densely connected than the other two knowledge transfer networks. This also shows up in the individual measures for this network.

The average total connections for the advice likely network is 4.44, less than half the same measure for the other two knowledge transfer networks, and only one individual in this network, AD3, has more than 10 total connections (13). AD3 also has the highest eigenvector score (0.4912) and boundary spanner score (9.17) of the individuals in this network.

Considered together, the individual measures for Seaside's knowledge transfer networks suggest these networks are relatively densely connected and center around a few administrators, faculty, and staff. Although AD3 is the most consistently central and connected individual in these networks, there are several other individuals who are prominent as well. This may indicate that the individuals in these networks perceive the knowledge transfer dynamics associated with Seaside's QEP to be fairly dispersed, with a variety of colleagues serving as actual or potential sources of advice and information about the QEP.

Informant Descriptions of Network Dynamics

The three informants from Seaside who were interviewed for this study provided differing perspectives on the communications and knowledge transfer dynamics associated with Seaside's QEP. FA10 ("Gwen") identified herself as faculty but also serves as a department chair at Seaside. She has been with the college for over 15 years and has been involved with the QEP process from its earliest stages, serving on committees that facilitated the identification of the QEP topic and assisted with the development and implementation of the plan. She continues to

be involved in the implementation of the plan and serves on an executive committee that monitors the plan's progress. FA1 ("Hal") is a faculty member who has been with Seaside for over five years. Hal was active in some of the development activities for the QEP, but has had less involvement with the plan since its implementation phase began. ST4 ("Iris") is new to Seaside, having been hired as QEP Director in the last year. Although she had no involvement in the development phase of the QEP, she is now heavily involved with the implementation phase as would be expected for her position. Gwen and Iris occupy the most central quartiles for both the communications and knowledge transfer networks, while Hal occupies the least central quartile for both networks.

Gwen described the communications patterns associated with Seaside's QEP as a mix of formal and informal dynamics. Specifically, she described how the development of the QEP involved both informal communications such as casual drop-in sessions as well as more formal communications such as official surveys. Gwen also explained how faculty who were integrating QEP standards and activities into their classes followed a formal series of steps and protocols for communications. This level of formality does not characterize the communications between those who are responsible for Seaside's QEP, however. According to Gwen, "Among the Executive Committee and the people that are in charge of the QEP, it's more informal." She added that, "We do have an advisory committee now that's made up of faculty that is kind of the body that monitors, too, besides the Executive Committee and that's kind of an informal structure, too." This comment indicates that there is considerable collaboration between faculty, staff, and administrators for implementing the QEP.

As with the communications involved with the QEP, Gwen described the advice seeking activities connected to the QEP as sometimes formal and often informal. During the development of the QEP topic, Gwen and her colleagues would host retreats in their homes to brainstorm

about the QEP. However, Gwen also said that she would most often turn to her administrators (AD1, AD2, AD3, and AD4) and now the QEP Director (Iris) for advice or information about the QEP, indicating her preference for seeking information through the established channels of Seaside's hierarchy.

When asked whether she perceived the dynamics associated with Seaside's QEP process as more top-down or bottom-up, Gwen shared that the process changed throughout its various phases. At the very beginning of the process, the need to develop a QEP was communicated to the college from the highest levels of Seaside's administration. "To say that we had to do a QEP obviously came from the top, because it's SACS" she explained. After the QEP imperative was communicated to the college, the process for identifying a topic for the QEP became more bottom-up in nature. "The topic definitely came from the bottom," Gwen stated.

This bottom-up approach seemed to change once the implementation phase began, however. Gwen described how "now it's more top down" and most of Seaside's faculty have become somewhat disengaged from the QEP process. "Faculty's kind of in their groove," she explained. "They teach their day to day thing. They don't care about the QEP." She further explained that only faculty who are directly involved with the QEP either through committee membership or by virtue of having their classes reviewed for the new standards that are the focus of Seaside's QEP are still active participants in the QEP process. Many of these faculty members, Gwen explained, are frustrated by being asked to do extra work related to the QEP. "It's really intensive on some of the faculty," she stated. "What we're asking the faculty's a lot, and it's not much compensation."

Gwen also discussed her perception of the burden that the QEP requirement places on institutions. From her perspective, the external mandate imposed by SACSCOC that accredited

institutions develop a QEP as part of the decennial reaffirmation process may at some point become counterproductive. She observed that:

> I think it's great that SACS gives us something that forces us to do something positive. I mean that's basically what they're doing right, forcing us to do something that has a positive impact on our campus hopefully? But I'm not sure that they should put such a significant amount of weight on them during the reaffirmation process.

For Gwen, the QEP requirement means tying up institutional energy and resources. "There's so much emphasis on it and it's so stressful for the institution," she concluded. "I'm not sure that it's worth it."

Like Gwen, Hal described a mix of formal and informal patterns of communication during the development phase of Seaside's QEP. Hal's involvement with the development of the QEP involved formal emails and committee meetings, but he also described informal meetings and exchanges of ideas. More specifically, he described how during the development of the QEP his committee would break into small, informal groups of two to three individuals to research and discuss specific topics related to the QEP.

Hal also discussed the formal and informal ways in which individuals involved with Seaside's QEP would seek out advice. Although he mentioned the lead faculty member for the development of the QEP, FA7, as a primary source of information, Hal also explained how he would turn to other members of his colleagues such as ST1 and ST3 for advice or information about the QEP. Hal also described how much of the work involved with developing the QEP was limited to formal committee assignments. "I think we were pretty insular in that sense," he recalled. "We were just trying to create something we could bring back to the greater group." According to Hal, although the committee assignments for the development of the QEP were

formal institutional assignments, the internal dynamics of these committees were typically informal. As he explained,

> Once we were charged with [the committee assignment], then it became very horizontal in terms of the approach, because we were working across different departments. Some were department chairs, others were staff members, and then once we were in our meetings there was definitely no hierarchy in terms of how the meetings went. We were completely free to do what we wanted.

This freedom extended to the small groups Hal mentioned earlier. “We formed some subcommittees, but it was more or less, ‘Hey who wants to work with who?’” he recalled.

Like Gwen, Hal contrasted these type of bottom-up dynamics with the more top-down style of communications that accompanied the initial push to begin the QEP process at Seaside. “The initial momentum is generated in a top-down sense” he explained, with the importance of the SACSCOC reaffirmation process being conveyed by Seaside’s top administrators to the rest of the college. Hal explained how in the very beginning of the SACSCOC reaffirmation and QEP processes, direction came from “the hierarchy, definitely in the kickoff, but once we were kicked off it became more horizontal in terms of how that worked.” According to Hal, Seaside’s QEP has now entered a third phase in which responsibility for the implementation of the plan has been consolidated under a new QEP Director (Iris). This transition, in Hal’s opinion, has lessened the sense of immediacy and ownership that faculty attach to the QEP, echoing Gwen’s observations. Since the transition, “It kind of feels like it’s kind of gone away a little bit, honestly” he explained. “I haven’t really heard a peep.”

Iris was hired as Seaside’s QEP Director after the plan had been developed and reviewed by SACSCOC. Even so, she asserted that, “We are still somewhat developing or fine tuning the QEP” to make sure the actions outlined in the plan align with the plan’s objectives. Iris described

her primary responsibility as supporting faculty whose classes are involved with the implementation phase of Seaside's QEP. This involvement typically involves an instructor revising an online class to meet the standards established in the QEP in order to improve student success and retention. Iris meets with these instructors and assists them with the course revision process. Although Iris's responsibilities are considerable given the institutional importance of the QEP, she adamantly designates herself as support staff. "I'm staff. I definitely wouldn't say that I'm an administrator" she offered at the beginning of our interview.

In describing the communications patterns she has observed relating to Seaside's QEP, Iris mentioned the communication she has with her supervisor, AD3, and FA3 and "Gwen," who she referred to as her "go-to" people. She also described how she communicated with the faculty she works with. She relies on both email and face-to-face communications as well as packets of information to help guide faculty through the course review process. Iris also explained that she provides QEP updates at annual faculty meetings.

Iris's descriptions of the knowledge transfer networks associated with Seaside's QEP focused primarily on her role as liaison for faculty and department chairs seeking information about the QEP. "[Faculty] would contact me first as the QEP director, and from there I might send them to the [Distance Learning] department if they need additional training if they're talking about course enhancement" she explained. "A lot of department chairs, they're calling on me to know what to tell their faculty" she continued. According to Iris, these patterns of advice seeking conform to the established paths of information flow at Seaside. "I guess it's our basic chain of command" she offered. Despite these patterns, Iris emphasized how the idiosyncrasies of Seaside's academic departments must be taken into account when attempting to share advice or information about the QEP. As she explained, when it comes to the particulars of the course review process, "It depends on the department and how the department chairs want to handle it."

When asked to reflect on the extent to which the communications and knowledge transfer dynamics associated with Seaside's QEP were more top-down or bottom-up, Iris emphasized that the QEP process has been an overwhelmingly faculty-driven, bottom-up initiative. From her vantage point, Seaside's QEP has been "Most definitely bottom-up. I've never seen anything like the SCC culture as far as bottom up." She stated that "students and the faculty drive this college and it really has some awesome results here and the QEP is no different." "It's been bottom up the whole way" she concluded. As an example of this bottom-up focus, Iris described how "there were heavy discussions around is it fair to put this on the faculty, whereas if it was a top down situation there would be no discussion about it, but that's just not the culture here."

In Iris's opinion, Seaside's bottom-up approach to the development and implementation of the QEP has been a key to the success of the initiative. "It was so faculty driven, and you can't really mess with that" she observed. However, Iris also acknowledged that there were occasions when top-down leadership was required to keep the momentum of the QEP going. She explained how after Seaside's SACSCOC on-site visit the previous year, not much was done with the QEP. She recalled how "it was pretty much at a standstill" prior to her arrival. Iris went on to state that she has been working on getting the process back on track since she took her position at Seaside.

Summary of Findings for Seaside Technical College

The sum of the own-tie data and the informant descriptions of the communications and knowledge transfer networks associated with Seaside's QEP suggests both emergent and strategic dynamics. Seaside's communications and knowledge transfer networks are more densely connected than those observed at Longleaf and Cypress, indicating that flows of information relating to the QEP are less dependent on a small core of individuals. This dynamic is also indicated by the average eigenvector and boundary spanner scores for Seaside's communications network, which are the highest average scores of the three research sites

examined in this study. The high eigenvector average suggests that individuals in this network tend to be connected to others who are in turn well connected in the network, while the boundary spanner score suggests that individuals in this network have opportunities to broker information between otherwise unconnected individuals and also have access to information from unique sources. Despite the robust connectivity detected in Seaside's networks, the structure of these networks still conforms to the established groups and hierarchy of the college. This is evidenced by the tendency for individuals in all four of the networks analyzed to communicate and share information about the QEP with colleague who have the same institutional role.

The patterns suggested by the own-tie survey data seem to be supported by the informant descriptions of Seaside's communications and knowledge sharing networks. All three informants perceived a mix of bottom-up, emergent and top-down, strategic dynamics in Seaside's QEP process. Gwen and Hal both saw the QEP development process as essentially bottom-up and faculty drive. Hal in particular described a flattening of Seaside's hierarchical structure during the development of the QEP. Gwen and Hal also perceived a shift toward a more top-down, administrative driven process with the implementation phase of the QEP. Iris, who did not have the benefit of experiencing the QEP development process at Seaside, perceived the implementation phase as a bottom-up, faculty driven process as well. This may be due to the central role she plays in the implementation process and the one-on-one interactions she has with faculty who are directly involved in the QEP during this phase. Despite Iris's perception of the implementation phase as a bottom-up process, she also acknowledged that Seaside's QEP had lost momentum in the absence of leadership after the SACSCOC visit. Taken together, these informants' accounts of Seaside's QEP process confirm what was indicated by the own-tie survey results: while the development phase of Seaside's QEP topic was largely bottom-up and emergent in nature, the implementation phase may require a more top-down, strategic approach.

Cross-Case Analysis

Table 14 presents a comparison of the complete network measures for the three research sites examined in this study. As these measures show, there is considerable variance in the characteristics of these networks. Longleaf and Seaside's communications networks are roughly twice as dense as Cypress's communications network. Longleaf and Seaside also have larger core groups by percentage within their communications networks than does Cypress. Table 14 also shows that there are variances in how likely individuals in these institutions' networks are to contact colleagues with institutional roles different than theirs on QEP-related matters. Individuals in the QEP communications networks at Longleaf and Seaside are more likely to communicate with colleagues with the same institutional role, whereas individuals in Cypress's communications network are more likely to communicate with colleagues who have a different institutional role.

When these three research sites are analyzed based on their SACSCOC reaffirmation tracks, there does not appear to be a clear pattern of evolving network dynamics based on the length of time an institution has been engaged in a QEP process. Seaside has been engaged in its QEP process for less time than the other two sites, and its network densities are the greatest of the three sites. However, Cypress, which is midway through its QEP process, has densities less than those of Longleaf, which is nearing the end of its first QEP process. Cypress's densities may be due at least in part to the administrative turnover that occurred there during the course of this study. This basic pattern is also reflected in the core-periphery measures for these three institutions. Seaside has the largest ratio of core for its communications and knowledge transfer networks, followed by Longleaf and then Cypress. A comparison of the averages for the individual network measures for each research site are presented in Table 15. These measures largely support the assumption that Seaside has the most densely connected QEP networks of the

Table 14

Comparison of Complete Network Measures

Measures	Networks	Longleaf Technical College (2010 Track) n=11	Cypress Technical College (2012 Track) n=46	Seaside Technical College (2014 Track) n=18
Network Density	Comm.	0.409	0.208	0.578
	Advice Seeker	0.264	0.084	0.366
	Advice Sought	0.264	0.083	0.376
	Advice Likely	0.218	0.058	0.131
Core-Periphery	Comm.	Core-1 (n=3) Peri-2 (n=8) Ratio=27%	Core-1 (n=11) Peri-2 (n=35) Ratio=24%	Core-1 (n=8) Peri-2 (n=10) Ratio=44%
	Advice Seeker	Core-1 (n=2) Peri-2 (n=9) Ratio=18%	Core-1 (n=5) Peri-2 (n=41) Ratio=11%	Core-1 (n=5) Peri-2 (n=13) Ratio=28%
	Advice Sought	Core-1 (n=3) Peri-2 (n=8) Ratio=27%	Core-1 (n=5) Peri-2 (n=41) Ratio=11%	Core-1 (n=5) Peri-2 (n=13) Ratio=28%
	Advice Likely	Core-1 (n=4) Peri-2 (n=7) Ratio=36%	Core-1 (n=9) Peri-2 (n=37) Ratio=20%	Core-1 (n=5) Peri-2 (n=13) Ratio=28%
External/ Internal	Comm.	-0.083	0.265	-0.360
	Advice Seeker	-0.048	0.302	-0.158
	Advice Sought	-0.127	0.311	-0.158
	Advice Likely	0.048	0.271	0.150

Table 15

Comparison of Individual Network Measures

Measures	Networks	Longleaf Technical College (2010 Track) n=11	Cypress Technical College (2012 Track) n=46	Seaside Technical College (2014 Track) n=18
Average Total Connections	Comm.	4.73	11	14.22
	Advice Seeker	3.82	5.61	10.56
	Advice Sought	4	5.17	10.11
	Advice Likely	3.82	4.65	4.44
Average Eigenvector Centrality	Comm.	0.2601	0.1216	0.6033
	Advice Seeker	0.2631	0.1034	0.2152
	Advice Sought	0.2535	0.0949	0.2141
	Advice Likely	0.2655	0.1034	0.2002
Average Boundary Spanner	Comm.	2.95	7.31	7.84
	Advice Seeker	2.63	3.78	6.24
	Advice Sought	2.60	3.54	5.99
	Advice Likely	2.28	3.26	2.72

three research sites. This is particularly the case for Seaside's communications network, which has the highest average scores for total connections, eigenvector centrality, and boundary spanner.

The average eigenvector score for Seaside's communications network suggests that individuals in this network tend to have connections to other relatively connected colleagues, and vice versa. Seaside's boundary spanner scores, on the other hand, indicate that despite the overall density of the communications network, there are structural holes present in numerous triadic relationships, where an individual is connected to two otherwise unconnected colleagues.

Conclusion

This chapter presented the findings of this study. These findings derive from analyses of data collected from the three research sites examined in this study: Longleaf Technical College, Cypress Technical College, and Seaside Technical College. These three sites are of comparable size, locale, and mission and have all developed and begun implementing a QEP in accordance with the requirements of their regional accrediting agency, SACSCOC. Longleaf is nearing the end of the implementation process, Cypress is midway through implementation, and Seaside is just beginning implementation. An own-tie survey instrument was distributed to individuals at each site who had formal involvement with their institution's QEP in order to collect quantifiable data about the communications and knowledge transfer network characteristics associated with each site's QEP. Three complete network measures and three individual network measures were then calculated using a social network analysis program for each site. Based on the results of the individual network measures, three individuals of varying centrality in their institution's QEP networks were interviewed from each research site. These individuals' descriptions of the communications and knowledge transfer network dynamics associated with their institution's QEPs provided triangulation for the data collected using the own-tie network survey instrument.

The four research questions addressed in this study consider the communications and knowledge transfer dynamics that characterize the development and implementation of quality enhancement initiatives such as QEPs, as well as the extent to which these dynamics exhibit more strategic and top-down or emergent and bottom-up patterns. The results of this study suggest that both the communications and knowledge transfer networks associated with quality enhancement initiatives become slightly less densely connected and more reliant on a small core of individuals over the course of an initiative's implementation. Based on the examples provided by the three research sites examined in this study, this pattern seems also to be influenced by external mandates, particularly SACSCOC requirements and timelines. Seaside, the institution earliest into the implementation phase, exhibits relative density and high coreness, perhaps reflecting the broad based effort involved in developing the QEP. In contrast, Cypress, midway through the implementation phase, is more sparsely connected and has smaller core groups by ratio in its communications and knowledge transfer networks. Longleaf, nearing the end of its implementation phase, demonstrates higher densities and larger cores by ratio than Cypress, but less than Seaside; this may reflect the ramping up of QEP-related activities as Longleaf prepares its five year impact report for SACSCOC.

The findings related to the emergent and strategic dynamics of quality enhancement initiatives seem to suggest that such initiatives tend to be dominated by strategic, top-down dynamics. The prevalence of strategic dynamics also seems conversely related to network density, with an increased reliance on small, administrator-led cores as an initiative is implemented and its associated networks become less densely connected. The extent to which the institutions examined in this study had primarily strategic dynamics associated with their QEPs was also affected by internal disruptions and external pressures. Longleaf's QEP became more characterized by top-down, strategic dynamics as it adjusted to new external mandates

from its system office that directly affected the QEP and prepared for the SACSCOC required five-year impact report. Cypress experienced a significant internal disruption that resulted in the loss of its administrative leadership and the implementation of the QEP coming to a standstill. Seaside encountered a less dramatic disruption, but did embrace a more strategic approach to its QEP by appointing a full-time QEP director who had not been involved in the more bottom-up QEP development process. For all three research sites' QEPs, strategic dynamics were more prevalent than were emergent dynamics.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

The final chapter of this study consists of the following sections. The first section provides a discussion of how the findings described in the previous chapter address this study's four primary research questions. The second section of this chapter discusses the theoretical implications of these findings, specifically as they relate to social network analysis and complex adaptive systems theory. The third section discusses the practical implications of this study's findings and what they suggest for institutions that are developing externally-mandated quality enhancement initiatives. The fourth section discusses the methodological implications of this study's findings, particularly in the context of conducting social network analysis in higher education. This chapter closes with a brief discussion of the potential directions of further research that are suggested by this study's findings.

The purpose of this study was to investigate the network dynamics associated with the development and implementation of quality enhancement initiatives by higher education institutions. More specifically, this study examined the social networks of three community colleges that developed and implemented quality enhancement initiatives as part of their reaffirmation of accredited status with SACSCOC, the regional accrediting body for higher education institutions in the Southeast. This study also explored whether these social networks exhibited strategic or emergent dynamics. The larger aim of this study was to understand how the internal organizational dynamics of higher education institutions change as a result of developing and implementing quality enhancement initiatives.

Network Characteristics of Quality Enhancement Initiatives

The first research question that this study seeks to address is "What are the characteristics of the communications networks involved in the development and implementation of quality enhancement initiatives?" Based on the data collected from the three research sites examined in

this study, the following conclusions warrant consideration. The QEP communications networks of Longleaf and Cypress Technical Colleges both centered on a relatively small core of individuals who had high levels of responsibility for or involvement with their institutions' QEPs. Seaside Technical College's QEP communications network was the most densely connected network examined in this study and was centered on a relatively large number of highly connected individuals.

According to informant descriptions, the communications networks at Longleaf and Cypress were characterized by primarily formal dynamics that adhered to established lines of communications and institutional hierarchy. For both of these institutions, there were mitigating factors that may have contributed to these formal dynamics. At Longleaf, the impending five year impact report required by SACSCOC seemed to drive the formality of communications patterns, while new external mandates from the state system office diverted energy and resources that could have facilitated broader and more inclusive patterns of communications. At Cypress, the QEP process was developed and directed primarily by two high-level administrators, who have since left the college. The Cypress informants' descriptions of the disruption to communications caused by the departure of these two administrators highlight how central they were to the QEP initiative.

These patterns suggest that the communications networks associated with the development and implementation of quality enhancement initiatives tend to reflect both the phase at which an institution is in its process and the internal and external pressures the institution experiences during its process. Communications at both Longleaf and Cypress evolved to have more formal and focused dynamics since the implementation of their QEPs. Seaside, still in an early phase of its process, had less formal and more widely distributed patterns of communications than were observed at Longleaf and Seaside.

The second research question that this study seeks to address is "What are the characteristics of the knowledge transfer networks involved in the development and implementation of quality enhancement initiatives?" As was the case with the communications networks discussed above, the knowledge transfer networks examined in this study seemed to reflect the institutional contexts within which these research sites developed and implemented their QEPs. The knowledge transfer networks Longleaf's knowledge transfer networks were centered on a small core, with a single administrator (AD1) being the primary focal point of QEP-related advice. One informant attributed this concentration to the amount of turnover the college had experienced since first developing its QEP. This turnover meant that knowledge pertinent to the QEP was left in the hands (and minds) of a smaller group of individuals. A similar pattern characterized Cypress's knowledge transfer networks, with a relatively small core of mostly administrators appearing to dominate the advice seeking and sharing activities associated with the QEP. However, with the disruption of this core due to administrative turnover, Cypress's knowledge transfer networks may be in the process of becoming more distributed, as evidenced by the number of individuals identified as potential sources of QEP information on the own-tie survey.

Although both Longleaf and Cypress's knowledge transfer networks were similar in structure and the centrality of a small number of administrators, Cypress exhibited an important difference in its external/internal orientation. Unlike individuals in Longleaf and Seaside's knowledge transfer networks, individuals in Cypress's networks were slightly more likely to exchange advice and information about their QEP with colleagues who have a different institutional role. This preference may reflect the disruption caused by the administrative turnover at Cypress which removed two primary sources of QEP information. In the wake of this

disruption, individuals at Cypress may have been more apt to turn to colleagues with different institutional roles in an effort to seek out new sources of QEP-related information.

The knowledge transfer networks at Seaside exhibit many of the same dynamics seen in the college's QEP communications network. These networks tend to be more densely connected than those of Longleaf and Cypress. Based on informant descriptions, the development phase of Seaside's QEP was characterized by collaborative and informal knowledge sharing. This dynamic may be changing, however, as the college enters the implementation phase of the QEP process. The apparent necessity of hiring a QEP Director ("Iris") to facilitate the implementation of the QEP suggests that knowledge transfer activities will more often be directed through formal institutional channels during this phase.

Strategic and Emergent Dynamics of Quality Enhancement Initiatives

The third research question addressed in this study is "What are the strategic dynamics that influence the development and implementation of an institution's quality enhancement initiative?" Based on the data collected from the three research sites examined in this study, it can be concluded that quality enhancement initiatives tend to be characterized by strategic, top-down dynamics. Although the strategic dynamics of each research site's QEP varied somewhat, each site's initiative had significant strategic elements. Primarily, these strategic elements were represented by the individuals who were most central and connected in their institutions' QEP networks. At both Longleaf and Cypress, the QEP networks were centered on administrators. Although these networks also included in their cores highly connected faculty and staff members, the administrators who were directly involved with their institutions' QEPs were consistently most central and highly connected individuals in these networks.

In addition to the centrality of administrators in Longleaf and Cypress's QEP networks, informant descriptions of the QEP development process at each of these institutions also

suggests strategic dynamics. At Longleaf, "Beth" emphasized that although faculty got to vote on potential QEP topics, the development process was an "administrative thing." Beth also noted that there were few faculty on the committees that developed Longleaf's QEP. Likewise, "Ella" described the QEP development process at Cypress as top-down from its beginning.

Longleaf provides two important examples of strategic dynamics that can influence an institution's quality enhancement initiative. First, the SACSCOC requirement that an institution submit a five year impact report detailing the extent to which its QEP improved student learning has forced administrators at Longleaf to begin a systematic data collection process. At Longleaf this process is being facilitated through the vice president's office. The five year impact requirement represents an external pressure that would seem to necessitate a top-down process of assessment and data collection, and this is indeed the case at Longleaf. Second, the state level mandate involving the redesign of developmental reading disrupted Longleaf's focus on its QEP. As "Adam" explained, the developmental redesign contributed to the "ebb and flow" of Longleaf's QEP efforts. When Longleaf entered an "ebb" period of implementing its QEP, the responsibility for reinvigorating the initiative fell to administrators who used the chain of command and established committee structures to refocus the college's energy on the QEP. This dynamic is also apparent in the knowledge transfer networks associated with Longleaf's QEP, with AD1 occupying the most central and highly connected position in all three of the knowledge transfer networks.

The fourth research question addressed in this study is "What are the emergent dynamics that influence the development and implementation of an institution's quality enhancement initiative?" The three research sites examined in this study demonstrate that the emergent dynamics associated with quality enhancement initiatives tend to be more pronounced in the earlier stages of initiatives. Informants at both Longleaf and Cypress described campus-wide,

broad-based involvement during the development phases of their institutions' QEPs. However, these descriptions also tended to emphasize how the QEP process at both institutions was primarily top-down and administratively driven.

At Longleaf, Beth described one striking example of emergent dynamics related to the QEP. This example involved a rather spontaneous collaboration that developed between two departments to improve students' reading skills in a specific program of study not otherwise involved in Longleaf's QEP. Beth also described how the assessment and data collection activities that were undertaken in preparation for Longleaf's five year impact report resulted in greater faculty involvement, even though these activities were initiated by the college's administration. There were also some examples of emergent dynamics associated with Cypress's QEP. Ella described how math instructors who were not formally involved with Cypress's QEP would be approached for information or advice about the QEP by colleagues from other departments or areas of service. This dynamic is also suggested by the tendency of individuals in Cypress's communications and knowledge to seek out colleagues with institutional roles different from their own for QEP-related information. "Dave" also described emergent dynamics at Cypress that resulted from the administrative turnover there. When the administrative core that had been driving Cypress's process left the college, communications and knowledge transfer activities for the QEP reverted to largely emergent patterns due to the lack top-down leadership.

Of the three institutions examined in this study, Seaside provided the most examples of emergent patterns that influence the development and implementation of a quality enhancement initiative. The informants from Seaside described the QEP development process as largely bottom-up and broad-based, even though the initial impetus for developing the QEP came from a top-down directive, which itself derived from the external mandate imposed by SACSCOC. "Hal" in particular recalled how during the development process collaboration between

individuals from different subunits and levels of institutional hierarchy became more common, describing a process that "became more horizontal." Likewise, Iris, who now has primary responsibility for implementing Seaside's QEP, described several emergent dynamics she has observed during the implementation phase. These dynamics include more casual interactions and communications between individuals at various levels of Seaside's organizational structure and the importance of faculty leaders serving as informal advisors for Iris during the implementation phase.

However, even in the context of these observations of emergent dynamics, the informants from Seaside also described more strategic dynamics. For example, while Iris described the informality with which she gets and conveys QEP-related information, she also emphasized that in general these patterns conform to "our basic chain of command." "Gwen" also observed that while the identification of Seaside's QEP topic and the development of the plan were mainly bottom-up processes, since implementation began, the initiative has become "more top down." In Gwen's view, Seaside's faculty had become largely disconnected from the initiative unless they were being directly affected by it. This shift is also reflected in the centrality of AD3 and Iris in Seaside's knowledge transfer networks.

Theoretical Implications

The theoretical context for this study utilizes a synthesis of complex adaptive systems theory (CAS) and social network analysis (SNA) to examine the phenomenon of externally mandated quality enhancement initiatives in higher education. As discussed earlier in this study, CAS and SNA provide complementary mechanisms of describing and explaining externally mandated organizational change (Mischen & Jackson, 2008). CAS asserts that organizations respond and adapt themselves to new external environmental demands by changing their internal structures and processes in order to achieve a minimum level of "fitness" with these demands

(Mischen & Jackson, 2008). The changes organizations undergo in order to respond to external pressures may be characterized by strategic or emergent dynamics, or some combination of the two. Strategic changes will take place within an organization's existing, formal structures. Emergent changes will create new, informal structures within an organization. The extent to which an organization's change dynamics are strategic or emergent will depend both on the nature of the organization's internal structure and the nature of the external pressure.

SNA provides a conceptual framework for describing internal structures and processes by measuring the existence, type, and frequency of connections between an organization's members and subunits. SNA is distinguished from other varieties of organizational analysis by its emphasis on how individuals are connected to each other and the structures these connections create rather than on group or individual attributes. Because of this emphasis, SNA offers a potentially powerful way of describing organizational change by describing how organizational members' connections evolve during or as a result of the change process. SNA complements CAS by providing metrics for capturing strategic versus emergent change dynamics.

This study sought to contribute to both CAS and SNA by analyzing how institutions of higher education respond to mandates from their regional accrediting agencies to develop and implement quality enhancement initiatives. In doing so, this study begins to address the research agenda Kezar (2014) articulated last year in *The Journal of Higher Education*. Kezar advocates for shifting "the focus of change research from the campus (organization) as the only analytic unit to the network (or network in combination with the campus)" (2014). This study contributes to that shift by analyzing networks of individuals who are affiliated specifically by their involvement in their institutions' QEP processes, which are presumed to be change processes. Analyzing networks based on affiliations defined by such criteria is a departure from both the

campus-level analysis Kezar describes and the individual-level focus typical of other approaches to organizational change analysis.

Perhaps the most significant theoretical implications of this study involve the effect of external influences on institutions' internal strategic dynamics. Considered together, the QEP processes of the three institutions examined in this study suggest an ebb and flow of strategic dynamics and network densities. Informants from each institution described QEP development processes that were often inclusive and broad-based. At Seaside, the institution at the earliest stage of the QEP process, this dynamic was largely intact at the time network data were collected. Seaside's complete network measures for density and core-periphery bear this out, with high density and large cores relative to the other two research sites. Cypress, midway through its QEP process, exhibited the lowest density and smallest core values for its complete network measures. Longleaf, nearing the end of its QEP process and preparing for the five year impact report required by SACSCOC, had slightly lower density and core values than Seaside, but higher values than Cypress.

When these comparative values are considered alongside informant descriptions of the external influences affecting these institutions' processes, the ebb and flow pattern emerges. This pattern seems to reflect the waxing and waning of the external pressures exerted by SACSCOC. An institution such as Seaside that has just submitted its QEP and completed its reaffirmation of accreditation still exhibits highly connected communications and knowledge sharing networks, afterglows of the institution-wide efforts recently completed. An institution such as Longleaf that is compiling its five year impact report and collecting the data required for that report has reactivated its communications and knowledge sharing networks in response to this external requirement. Cypress, seemingly languishing in the doldrums of the QEP cycle, finds its communications and knowledge sharing networks depleted and dependent mainly on a

small core of administrators and faculty. One implication of these findings is that institutional momentum for externally-mandated quality enhancement initiatives is difficult to maintain in the absence of more regular reporting requirements.

A related implication of these findings involves the nature of the external pressure that is exerted on institutions. For SACSCOC's QEP requirement, there is significant emphasis on assessment and data collection activities and less emphasis on innovation and experimentation. Because assessment and data collection activities, particularly those undertaken for accreditation purposes, are generally the purview of college administrators, there is a built in strategic element involved with the QEP process. The same may well be true of any externally mandated quality enhancement or curricular improvement initiative. This is an important consideration for the development of Kezar's research agenda for analyzing social networks in the context of change in higher education. Researchers wishing to study institutions' social networks during times of institutional change should consider whether the change initiative is primarily assessment and data driven; in such cases, a predominance of strategic, administratively driven dynamics are to be expected.

Another theoretical implication of this study's findings relates to the external/internal measure (E-I index) of network connections between individuals with different institutional roles. McGrath and Krackhardt (2003) have found that higher measures of E-I index, which indicate more connections between individuals in different subunits than between individuals within the same subunits, facilitate more successful change initiatives. In this study, just one institution, Cypress, had positive E-I indices for all its QEP networks. That the individuals involved with Cypress's QEP more often communicated and shared knowledge about the QEP with colleagues with different institutional roles is an interesting finding considering the turmoil Cypress underwent as a result of significant administrative turnover. A more intuitive prediction

would be that during such a time of turmoil individuals would communicate and seek information from those nearest and most similar to them. One possible explanation is that because Cypress's QEP focused on improving students' math skills, math faculty were often sought out by their colleagues for information about the QEP even though, as informant Ella pointed out, few math faculty had been involved in the development stages of Cypress's QEP process. Additionally, according to Ella, Cypress administrators would often refer technical questions about the QEP to math faculty. The combination of these two dynamics likely contributed to the higher E-I indices at Cypress. Less clear is how these higher measures contributed to the overall success of Cypress's QEP. The tumultuous situation at Cypress and the lack of significant inclusion of math faculty early in the QEP process may have created higher E-I indices than what were observed at the other two research sites, but these same factors may have also diminished the ultimate effectiveness of Cypress's QEP. More specifically, the Cypress findings suggest that high E-I measures in the context of institutional change can indicate internal uncertainty about loci of expertise and authority as much as they indicate opportunities for collaboration and diffusion as McGrath and Krackhardt suggest (2003).

Practical Implications

This study offers several practical implications for educational leaders to consider. First, the findings discussed here suggest that quality enhancement initiatives tend to feature administrators and select faculty leaders as the key players. This is not surprising since these campus leaders may be best positioned to facilitate the implementation of such initiatives, particularly when those initiatives require substantial data collection and assessment activities. However, if it is assumed that quality enhancement initiatives require broad-based involvement and faculty buy-in to be successful and sustainable, campus leaders must encourage numerous champions for their initiatives. Considered from a social network perspective, this means

creating multiple hubs of potential knowledge transfer within an institution's social networks. The sparse advice networks at Cypress provide a cautionary example of what not creating such hubs can mean for the viability of an initiative.

Another, closely related practical implication of this study is the potential of faculty members to function as important leaders for quality enhancement initiatives. At each of the three institutions examined in this study at least one faculty member was a highly connected and central node in the communications and knowledge transfer networks associated with the QEP. Even though the networks analyzed in this study tended to be dominated by administrators, the prominence of some faculty leaders indicates that it is possible to facilitate meaningful faculty involvement in quality enhancement initiatives.

Finally, this study suggests that campus leaders who are tasked with implementing large-scale change initiatives should consider collaborating with colleagues who can function as boundary spanners in their institution's social networks. The findings of this study indicate that within an institution's social networks some individuals play an outsized role as boundary spanners. Such individuals have disproportionally more connections with colleagues who are otherwise not connected to one another than most others in their network. Consequently, such individuals will be able to exploit the structural holes that exist in the absence of connections between colleagues. These structural holes create opportunities for boundary spanners to have access to greater varieties of perspectives and information than their peers; they also enable boundary spanners to act as brokers for the distribution of information to their colleagues. For a campus leader beginning a change initiative, enlisting those who function as boundary spanners as champions for that initiative would seem to be a prudent initial step. This approach may even provide an effective precursor step in the coalition building approach Andrade (2011) suggests for managing change.

Methodological Implications

This study employed both quantitative and qualitative methods of social network analysis. The quantitative method of analysis had participants at each of the three research sites provide information about the social networks associated with their institutions' QEPs through the completion of an own-tie survey. This survey asked respondents to assign numerical values to the frequency of their communication and knowledge transfer exchanges with the other individuals at their institution who had involvement in the QEP process. At each research site the individual who had direct responsibility for the QEP provided a roster of names of the individuals who had been formally involved with the QEP in the last year. This roster was then used to construct the own-tie survey.

Using rosters provided by the QEP director at each research site to construct the own-tie survey imposed two important limitations on this study's quantitative data collection. First, this approach privileged the perspective of the QEP director. In assembling the roster for the own-tie surveys, the QEP directors were reflecting their own version of the structure and membership of their QEPs' social networks. Even though the QEP director at each site was asked to include in the roster only those individuals who had formal involvement with their institutions' QEPs, what constituted formal involvement relied on the discretion of the QEP director. It is therefore possible that QEP directors at different research sites could have defined formal involvement differently.

A second, related limitation associated with the construction of the own-tie survey is the absence of opportunity for respondents to identify additional individuals for membership in their institution's QEP social network. Although limiting respondents' choices to the names provided by each research site's QEP director ensured a consistently-defined social network and facilitated the reconstruction of reciprocal network data for non-respondents, this approach also introduced

error (Tortoriello, Reagans, & McEvily, 2012) by excluding possible network members not known to the QEP director. Allowing respondents to identify additional network members would have complicated the data analysis process, but would also have created a more complete picture of the QEP social network at each research site. Also, as Tortoriello, Reagans, and McEvily (2012) note, it is impossible to calculate the potential effect of this error because it is unknown how many additional network members would have been suggested by survey respondents. Researchers seeking to collect social network data using roster-generated own-tie surveys should give consideration to the potential for error in the roster generation process and the limiting of respondent choices.

A final methodological issue to consider is the effect of response rates on the validity of the network measures calculated for each research site. The response rates for the own-tie survey varied considerably between the research sites, with the highest response rates coming from Longleaf (8 responders out of 11 survey recipients, or 73%), followed by Seaside (9 responders out of 18 survey recipients, or 50%), and Cypress (21 responders out of 46 survey recipients, or 46%). As discussed earlier, a data reconstruction method based on assumed reciprocity was used to account for the network data gaps created by non-responses. This reconstruction method is based on the work of Stork and Richards (1992) and Kossinets (2006) and is effective for filling in network data gaps using respondents' reports of incoming and outgoing ties to non-respondents.

There are two areas of potential error related to this reconstruction method. First, this method does not reconstruct ties between non-respondents. Therefore, network data gaps persist for ties between non-respondents. Wang, Shi, McFarland, and Leskovec (2012) classify these gaps as false negative nodes, and such gaps lessen the extent to which an observed network (one based on available and reconstructed data) accurately describes an ideal network (one in which

all the actual ties between a network's nodes are known). The second, closely related area of potential error stems from how data gaps are treated. Znidarsic, Ferligoj, and Doreian (2012) examine the problem of assigning zero scores to missing data for ties between non-respondents, showing that the zero scores can skew some network measures, particularly for block modeling procedures.

The wide difference between response rates at the research sites is another source of potential error for the validity of the network measures presented in this study. Whereas Longleaf's network measures rely on reconstructed data for only three non-respondents, the measures for Seaside and Cypress rely on significantly more reconstructed data for non-respondents by both number and percentage. This difference should be taken into account when comparing the network measures of the three research sites examined in this study. One way this study attempted to address network data gaps created by non-responses was by using semi-structured interviews with three informants from each research site to complement the data produced via the own-tie instrument. For researchers using methods similar to those used in this study, collecting network data from additional informants through semi-structured interviews may be a way to ameliorate the error effects of low and different levels of response rates.

Suggestions for Further Research

This study suggests several directions for subsequent research on how social networks affect and are affected by quality enhancement initiatives in higher education. The most immediate of these is examining those phenomena in other types of higher education institutions, such as four year public and private colleges and universities. It should also be noted that the three community colleges examined in this study are relatively small enrollment schools, and the dynamics of quality enhancement initiatives at larger community colleges could be quite

different. Institutions with different regional accrediting bodies should also be considered as possible venues for examining the social network dynamics of quality enhancement initiatives.

Another possibility for future research on these topics would be examining quality enhancement initiatives that are not mandated by a regional accrediting agency or other types of external stakeholders (system offices, granting agencies, consortiums, etc.). As noted above, the data collection and assessment emphasis associated with externally mandated initiatives may skew the social network dynamics under consideration to be more strategic rather than emergent. Initiatives with an internal impetus may well involve social network dynamics that are more emergent in nature.

Finally, a longitudinal study of a single institution as it develops and implements a quality enhancement initiative might yield more insightful data about how the social networks involved with that initiative evolve over the course of the change process. One challenge this study encountered was the difference in the nature of and group involvement with the research sites' initiatives. Focusing on a single institution for the duration of its quality enhancement initiative would nullify these variables and make the analysis of social networks a more consistent process.

Conclusion

This study attempted an approach to organizational analysis that has heretofore been underutilized in the study of higher education institutions. Although SNA has been used extensively to study other types of institutions, it has not been fully applied to this area, particularly in the context of institutional change (Kezar, 2014). In addition to using SNA to understand quality enhancement initiatives in higher education, this study sought to synthesize SNA with CAS as suggested by Mischen and Jackson (2008) and Morcol and Wachhaus (2009). This synthesis was attempted in the context of three higher education institutions responding to

the external mandate of their accrediting agency that its member institutions develop a quality enhancement initiative as part of their decennial reaffirmation process. As demands by external stakeholders for accountability in higher education increase, such examinations of the effects of external mandates on the internal workings of institutions can provide explanatory frameworks as well as practical conceptualizations for academic leaders.

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APPENDIX A: QUANTITATIVE OWN-TIE SURVEY INSTRUMENT

Thank you for participating in this study. The first set of questions asks you to provide some basic information about yourself. The second set of questions asks you to describe your interactions with your colleagues during the development and/or implementation of your institution's quality enhancement plan (QEP).

Part I: Personal Information

1. Name:
2. Age:
3. Gender:
    3.1. Male
    3.2. Female
4. Institutional Role:
    4.1. Faculty
    4.2. Support Staff
    4.3. Administrator
    4.4. Other:
5. Department/Unit:
6. How long have you been at this institution?
7. How long have you been in your current position?
8. Of which QEP committee, subcommittee, team, or unit where/are you a member? (Please check all that apply).
    8.1. [Specific committees, subcommittees, teams, and units will vary by institution]

Part II:

Please respond to the following items based on your interactions with your colleagues during the development and/or implementation of your institution's Quality Enhancement Plan (QEP).

9. From the list provided, please indicate how often you have communicated (via face-to-face, telephone, email, or other medium) with these individuals regarding your QEP in the last year. (Please leave the indicator for your name blank.)

    9.1. [Roster will vary by institution]

        9.1.1. (5) Once or more per week on average

        9.1.2. (4) Two to three times per month, on average

        9.1.3. (3) Once a month, on average

        9.1.4. (2) Two to three times every sixth months, on average

        9.1.5. (1) One to three times this year

        9.1.6. (0) Have not communicated with this individual

10. From the list provided, please indicate how often you have contacted these individuals for ideas or advice on any matter related to your school's QEP in the last year.

    10.1. [Roster will vary by institution]

        10.1.1. (5) Once or more per week on average

        10.1.2. (4) Two to three times per month, on average

        10.1.3. (3) Once a month, on average

        10.1.4. (2) Two to three times every sixth months, on average

        10.1.5. (1) One to three times this year

        10.1.6. (0) Have not communicated with this individual

11. From the list provided, please indicate how often you have been contacted by these individuals for ideas or advice on any matter related to your school's QEP in the last year.

11.1. [Roster will vary by institution]

11.1.1. (5) Once or more per week on average

11.1.2. (4) Two to three times per month, on average

11.1.3. (3) Once a month, on average

11.1.4. (2) Two to three times every sixth months, on average

11.1.5. (1) One to three times this year

11.1.6. (0) Have not been contacted by this individual

12. From the list provided, please select the individuals you would be most likely to contact for ideas or advice on any matter related to your school's QEP.

12.1. [Roster will vary by institution]

12.1.1. (1) Would likely contact

12.1.2. (0) Would not likely contact

Thank you for participating in this study. You may be contacted by the researcher for further information about your responses. If you have any questions about this study or this survey, please contact the researcher at chaffinj10@students.ecu.edu.

APPENDIX B: STRUCTURED INTERVIEW PROTOCOL

IP-1. Please discuss your role in the development and implementation of your institution's QEP.

IP-2. Please describe the patterns of communication you observed during the development and implementation of your institution's QEPs.

IP-3. Please discuss how those individuals involved in the development and implementation of your institution's QEP sought out advice or information from their colleagues about QEP-related subjects. Who sought you out for advice or information? Who did you seek out for advice or information?

IP-3A. Who were the individuals most often sought out for advice or information? Why do think they were sought out by their colleagues?

IP-4. When you reflect on the development and implementation of your institution's QEP, do you think these processes were more top-down or bottom-up in nature? That is, did your institution's QEP develop as a result of strategic directives from administrators, or did it develop as a result of more informal processes? Can you provide some specific examples of either the top-down and/or the bottom-up processes involved with your QEP?

IP-5. How would characterize the overall success of your institution's QEP so far? In reflecting on the development and implementation of your QEP, what would like to see happen differently during the next reaffirmation process?

APPENDIX C: IRB NOTIFICATION OF INITIAL APPROVAL

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · **www.ecu.edu/irb**

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB

To: John Chaffin

CC: David Siegel

Date: 3/11/2014

Re: UMCIRB 14-000088
Social Network Dynamics of Quality Enhancement Initiatives in the Community College Setting

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 3/11/2014 to 3/10/2015. The research study is eligible for review under expedited category #6, 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).
The approval includes the following items:

Name	Description
Appendix A.docx	Data Collection Sheet
Appendix A.docx	Surveys and Questionnaires
Appendix B.docx	Interview/Focus Group Scripts/Questions
Dissertation Research Proposal (J Chaffin).docx	Study Protocol or Grant Application
Email language.docx	Recruitment Documents/Scripts
Survey-Consent-Letter-Template-for-Expedited-Research-03.12.2012.docx	Consent Forms

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

APPENDIX D: INFORMANT CONSENT LETTER

Dear Participant,

I am a student at East Carolina University in the Higher, Adult & Counselor Education department. I am asking you to take part in my research study entitled, "Social Network Dynamics of Quality Enhancement Initiatives in The Community College Setting."

The purpose of this research is to understand the effects that QEPs have on colleges' internal organizational dynamics. By doing this research, I hope to learn how colleges' communication and knowledge sharing networks evolve as a result of developing and implementing QEPs**.** Your participation is voluntary.

You are being invited to take part in this research because you are or were directly involved with your college's QEP. The amount of time it will take you to complete this study is approximately 12 minutes.

You are being asked to complete a survey about the communication and knowledge sharing networks associated with your college's QEP. Based on your responses, you may be asked to provide additional information about the communication and knowledge sharing networks associated with your college's QEP via a brief interview. This interview may be audio recorded.

Because this research is overseen by the ECU Institutional Review Board, some of its members or staff may need to review my research data. Your identity will be evident to those individuals who see this information. However, I will take precautions to ensure that anyone not authorized to see your identity will not be given access.

If you have questions about your rights as someone taking part in research, you may call the UMCIRB Office at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, you may call the Director of UMCIRB Office, at 252-744-1971.

You do not have to take part in this research, and you can stop at any time. If you decide you are willing to take part in this study, please click "AGREE" and continue on with the survey below.

Thank you for taking the time to participate in my research.

Sincerely,

Jason Chaffin, Principal Investigator