A CONCEPTUAL MODEL OF SYSTEMS THINKING LEADERSHIP IN COMMUNITY COLLEGES

Anne Powel Davis
Stevenson University, School of Graduate and Professional Studies
100 Campus Circle, Owings Mills, MD 21117
apdavis@stevenson.edu

ABSTRACT

The pluralistic and often competing goals of myriad constituents, the changing demographics of students, the uncertainty of funding, and the growing demands for accountability from stakeholders have increased the complexity of systems which community college leaders must manage. Emerging from the recent literature on community colleges is a call for new models of leadership in the context of leading in an increasingly uncertain and complex environment. Systems thinking offers a means to help leaders respond to these growing organizational complexities and move leadership from a traditional bureaucratic model to a more adaptive model better suited for today's dynamic community colleges. Despite a robust body of literature on systems thinking in myriad fields, there is comparatively scant evidence of systems thinking's application to organizational management or leadership per se in higher education and even less in community colleges. Hence, a systematic review of literature on systems thinking and complexity theory and their application in higher education was bolstered with evidence from healthcare. Findings reveal three reoccurring ways in which leaders apply systems thinking processes for improving organizational performance. A conceptual model for systems thinking leadership is proposed in which the three processes, characterized as *discovery*, *framing*, and *action*, can be enacted either individually or sequentially for enhancing organizational performance. The model draws upon boundary critique, critical systems thinking, systemic intervention, total systems intervention, systems dynamics, soft systems methodology, complexity theory and complex adaptive systems, yet uses language more readily identifiable and accessible to community college practitioners to encourage the use of these systemic practices. Systems Thinking Leadership, as proposed in this paper, provides a framework for community college leaders—presidents, chief academic officers, deans, department chairs, and faculty—to view their organization through a systems lens, and to enact and engage the adaptive and participatory practices of discovery, framing, and action for improving organizational performance.

Keywords: Systems Thinking, Community Colleges, Leadership, Higher Education, Complexity

INTRODUCTION

Institutions of higher education are facing a confluence of factors that are increasing the complexity of systems which leaders must manage. Changes in the marketplace spurred by technological innovation and globalization are necessitating the need for a more highly skilled labor force, yet greater numbers of college-aged and adult students are

lacking in literacy and numeracy skills (Kirsch, Braun, Yamamoto, & Sum, 2007; Roueche, Richardson, Neal, & Roueche, 2008). In addition, the disparity in proficiency among different ethnic, racial, and socioeconomic groups is widening, yet growth in the labor force will come from these typically underprepared populations (Kirsch et al., 2007; Roueche et al., 2008). These challenges will have to be met amidst a climate of fiscal restraint and growing demand for accountability (Christensen & Eyring, 2011; Roueche et al., 2008). Meeting the educational and employment needs of a changing labor force will primarily fall to the nation's community colleges (Alfred, 2008; Alfred, Shults, Jaquette, & Strickland, 2009; Boggs, 2003; Wallin, 2010; Watts & Hammons, 2002; Watba & Farmer, 2006).

Community colleges play a pivotal role in educating a large part of the undergraduate student population. Presently, nearly half of all undergraduate students in the United States are educated at community colleges and these institutions serve as the point of entry into higher education for the majority of first generation college students, minority students, students of limited financial means, and nontraditional aged students (American Association of Community Colleges [AACC], 2013). The community college's mission-based role of providing cost effective, accessible and flexible educational opportunities will continue to drive increases in student enrollments and pose challenges for leaders to meet the pluralistic and often competing goals of myriad constituents. The American Association of Community College's (AACC) 21st-Century Commission on the Future of Community Colleges' report verifies these challenges and calls for a system redesign brought about by transformative change that "cannot be achieved without committed and courageous leaders" (AACC, 2012, p.17).

The impending retirements of senior community college leaders has focused attention on leadership development and spurred a national dialogue spearheaded by AACC to identify the core competencies required by leaders (AACC, 2005; Boggs, 2003; Eddy, 2010; Shults, 2001; Weisman & Vaughn, 2007). While this leadership void has been termed a crisis by some (Shults, 2001), it also presents an opportunity for bringing new energy, ideas, and people into the arena of community college leadership (Amey, 2005; Boggs, 2003, Eddy, 2009). Leading in an increasingly uncertain and complex environment has prompted scholars to advocate for new models of leadership informed by complexity theory and systems thinking toward the goal of moving leadership from a traditional bureaucratic model to a more adaptive model better suited for today's complex organizations (Marion & Uhl-Bien, 2001; Senge, 1990; Uhl-Bien & Marion, 2009; Uhl-Bien et al., 2007).

Purpose

The purpose of this paper is to propose a conceptual model for analyzing the relevancy of systems thinking as a competency for community college leaders in an era of increasing complexity. Systems thinking, as explored in this paper, refers to an approach that views systems as wholes rather than compilations of individual components and allows one to see the interconnectedness and interdependencies of agents within systems, to frame problems as patterns, and to get at underlying causality. Much has been written on systems thinking for improving organizational performance in myriad fields, but there is

limited research specifically addressing systems thinking as a tool for leaders in higher education and none specifically addressing community colleges. Hence, the argument has been bolstered by literature in the healthcare field where systems thinking has been more robustly examined for improving organizational performance. The parallels between the fields of health care and higher education validate this comparison (Chaffee, 2009; Johnson, 1993).

Research Questions

The two questions guiding the evidence-based research were *How does a system thinking approach provide value to community college leaders?* and *What practices encompassed in systems thinking are most valuable for community college leaders?*. The resulting conceptual model of systems thinking leadership posits that community college leaders—presidents, chief academic officers, deans, department chairs, and faculty—can improve organizational performance by engaging and enacting the adaptive and participatory practices of discovery, framing, and action.

RESEARCH METHODOLOGY

Systematic Review

A systematic review of literature was undertaken to identify studies relevant to systems thinking as a leadership competency within the complex environment of community colleges. As defined by Petticrew and Roberts (2006), systematic reviews are "literature reviews that adhere closely to a set of scientific methods that explicitly aim to limit systematic error (bias), mainly by attempting to identify, appraise, and synthesize all relevant studies (of whatever design) in order to answer a particular question (or set of questions)" (p. 9). A systematic review of literature is distinguished from a traditional literature review by the rigorous, detailed, and standardized methodological approach taken in searching and synthesizing the evidence (Okoli & Schabram, 2010).

Search Strategies

The expectation of a systematic review is that the search process be comprehensive and carried out with clearly defined protocols so as to avoid bias. Several search strategies were employed. First a keyword search was performed using extensive electronic databases for the themes of community college leadership, complexity theory, systems thinking theory, and systems thinking as a leadership competency in healthcare and higher education. Searches were conducted systematically initially using the broadest search terms and then sequentially narrowed to reflect the specific contexts of interest. Combinations of keywords and truncated versions of the terms were used to make the search more comprehensive.

Secondly, various tools of the Web of Science© were utilized to search for citations of key articles and for locating additional articles from seminal authors. Moreover, examination of reference lists of articles revealed literature that had not been uncovered in the keyword searches. As key journals to the research became apparent, individual searches of these journals was performed as well. In addition to seeking peer reviewed

articles, research published on websites of professional organizations in higher education and systems thinking was explored.

Inclusion Criteria

Inclusion criteria were dependent on the literature theme under consideration. For the literature relating to complexity and systems thinking theories underpinning the study, articles from foundational and seminal authors were sought. These authors were determined through the appearance of multiple and repeated citations by other authors and confirmed by analyses using the Web of Science© tools. For empirical studies sought to respond to the research questions, context was an important criterion. For studies related to systems thinking in higher education, literature was included that related systems thinking in educational management, administration, and/or leadership; literature was excluded if it pertained to educational curriculum. Initially, the community college context was sought as a criterion, however, scant empirical evidence in this context led to the broadening of criteria to include four year universities and/or colleges. Further, to supplement the limited literature in higher education, the search was expanded to include studies in healthcare based on the multiple parallels between the fields. Healthcare and educational organizations can both be characterized as complex adaptive systems (Bento, 2010; Clancy et al., 2008) and share organizational similarities due to their multiple missions, autonomous professionals, complex funding formulas, external accountability standards, and service to myriad stakeholders (Chaffee, 2009; Johnson, 1993). Empirical studies meeting these initial inclusion criteria were retained only if they subsequently met the standards of quality appraisal.

Quality Appraisal

Articles were subjected to assessment using a rubric developed by the author based on accepted standards of research quality and rigor and informed by the best available evidence in the field. Articles were appraised for their suitability of purpose, audience, and significance of problem; explicitness of assumptions; clarity and answerability of research questions; and appropriateness of population and context. Particular scrutiny was given to the articles' methodology: research design, collection, organization, and analysis of data, and the relevance of conclusions. An appraisal of these elements established the level of reliability, validity, credibility, and trustworthiness of the articles. Further, consideration was given to the explicit acknowledgement of limitations and rival explanations as well as the quality of references. Based on these criteria, articles were appraised along a continuum from high to low for their level of rigor (see Table 1). Within each thematic area of the review, decisions were made as to the value and weight to place on articles based on the level of rigor, applicability to the study, and availability of best evidence. The rating rubric is available upon request.

Synthesis of Evidence

In addition to the scholarly critique inherent in systematic reviews, another characteristic of systematic reviews that distinguish them from traditional literature reviews is the synthesis of evidence (Okoli & Schabram, 2010). Synthesis of reviews in the social

sciences requires skill and ability in evaluating, summarizing, and analyzing complex evidence drawn from multiple and heterogeneous methodologies (Petticrew & Roberts, 2006). Synthesis of quantitative studies may be accomplished through statistical synthesis of a meta-analysis or synthesis of effect sizes across studies (Petticrew & Roberts, 2006). Whereas qualitative studies might employ a wide range of synthesis methods depending on the nature of the research questions, the available evidence, and the epistemological stance taken by the research (Barnett-Page & Thomas, 2009).

The synthesis undertaken in the systematic review presented in this paper was that of textual narrative synthesis. Narrative synthesis is aligned with the epistemology of critical realism because it includes a specified protocol for quality appraisal of articles (Barnett-Page & Thomas, 2009). Narrative synthesis was carried out by organizing a narrative summary of the studies into categories such as context, population, quality, and outcomes (Barnett-Page & Thomas, 2009; Petticrew & Roberts, 2006). The studies were synthesized and analyzed for emergence of insights into the research questions (Barnett-Page & Thomas, 2009; Petticrew & Roberts, 2006).

Limitations

Drawing on literature from the health care field in support of systems thinking leadership in community colleges presents a potential limitation. However, given the numerous parallels identified between the two fields, confidence in the findings is not diminished. Additionally, the constructs of systems thinking and complexity are often poorly defined and difficult to quantify, hence every attempt was made to retain literature that employed a similar definition or implied usage of these terms. Though the studies were of a qualitative nature of varying rigor and considered weaker evidence in the hierarchy of evidence for systematic review (Reay, Berta, & Kohn, 2009), taken as a whole, the compilation of evidence pointing to similar outcomes increases confidence in the findings. For social interventions in complex systems, as is offered here, a "best evidence synthesis" approach is taken that acknowledges the limitations of the evidence but works with what is available (Petticrew & Roberts, 2006, pp. 181-187).

RESULTS AND DISCUSSION

The search, evaluation of criteria, and subsequent quality appraisal resulted in fifteen empirical studies selected— seven in healthcare and eight in higher education (Table 1). Of the seven articles in healthcare, five were case studies illustrating the application of systems thinking for addressing public health concerns and two were studies employing systems thinking for change initiatives in healthcare. Of the eight empirical studies revealed in higher education, five case studies specifically explored the use of systems thinking methodologies for organizational interventions within a university setting. While no literature was uncovered that intentionally sought to explore systems thinking methodologies in community colleges, three cases from the community college literature were included because they represented methodologically robust studies exploring successful organizational practices that could be characterized as systems thinking practices.

Table 1. Summary of systems thinking processes employed and organizational outcomes achieved in 15 empirical case studies in healthcare and higher education

Author(s) / Level of Rigor	Systems thinking processes employed	Organizational outcomes achieved
Healthcare Studies:		
Gregory and Midgley (2000) Medium to High	▪ Discovering desires and needs of stakeholders ▪ Eliciting input through participatory workshops ▪ Developing "rich pictures" ▪ Modeling systems ▪ Structuring framework for action	▪ Representatives from 19 different agencies came together and developed a multi-agency plan for providing mental health counseling services in times of crises ▪ Feedback from participants indicated process was largely successful ▪ During a subsequent crisis event, the plan was tested and effectively and efficiently implemented
Kapsali (2011) High	▪ Managing boundaries and responding to emerging issues with flexibility and creativity ▪ Accepting alternative pathways to reach project goals	▪ Greater deployment and continued operation of innovative technology for healthcare systems
Midgley, Munlo, and Brown (1998) Medium to High	▪ Identifying stakeholders ▪ Uncovering values, assumptions, and needs of stakeholders ▪ Identifying marginalized groups ▪ Creating "problem maps" of interdependencies and illustrating boundaries to minimize marginalization	▪ Systems thinking process of boundary critique revealed needs of users and stakeholders that had not previously been identified ▪ Designed a multi-organizational housing system which met the needs and included the elements desired by users and housing managers
Solberg, Klevan, and Asche (2007) Medium to High	▪ Uncovering gaps ▪ Identifying points of leverage ▪ Employing system wide collaboration, cooperation, coordination	▪ Markedly improved scores on a composite measure of diabetic patient health
Suba, Murphy, Donnelly, Furia, Huynh, and Raab (2006) Medium	▪ Discovering underlying interdependencies and interactions ▪ Structuring interventions	▪ Researchers successfully developed a systems map that revealed obstacles to successful cervical screening and illustrated the interrelationships between different elements of the cervical screening program ▪ Understanding the gaps in cervical screening systems allowed for structuring the most appropriate interventions for improvement

Table 1. Summary of systems thinking processes employed and organizational outcomes achieved in 15 empirical case studies in healthcare and higher education

Author(s) / Level of Rigor	Systems thinking processes employed	Organizational outcomes achieved
Temel (2004) Medium	▪ Mapping interactions and interdependencies ▪ Examining feedback mechanisms ▪ Modeling interactions	▪ Developed a framework that included the multiple agencies and influences on malaria control ▪ Allowed for analysis of gaps and structuring of improvements in the malaria control system through cross-sector cooperation ▪ Tested the approach in a case study
Wolstenholme (1993) Low to Medium	▪ Mapping interactions and interdependencies ▪ Modeling feedback loops	▪ Developed a model for transiting patients between home, community and hospital care ▪ Improved strategic planning capabilities for patient care between home, community, and hospital settings
Higher Education Studies:		
Ayers (2002) High	▪ Flexible and flattened organizational structures ▪ Multi-directional communication ▪ Interdependency of networks, collaboration	▪ Improved ability of the college to respond to changing learner needs when systems interdependencies are acknowledged
Clarke and Lehaney (2000) Medium to High	▪ Discovering needs of stakeholders, designing a change plan	▪ Developed and designed an information systems plan for a university which included both functional and human centered needs ▪ A clearer perception of how information systems strategy can be developed and managed ▪ Formation of an IS strategy committee with broad participation ▪ Participative approach of developing the plan had added benefits in other IS areas
Córdoba & Midgley (2008) Medium to High	▪ Uncovering concerns, issues, and ideas of diverse stakeholders ▪ Exploring of opposing views through personal interviews and group workshops ▪ Drawing of rich pictures	▪ Clarified the main issues of concern and identified stakeholders to be included ▪ Successfully avoided the marginalization of groups ▪ Designed and structured an information systems plan
Houston, Robertson, and Prebble (2008) Medium	▪ Discovering values and concerns of stakeholders, ▪ Mapping boundaries and interdependencies, ▪ Structuring frameworks for intervention	▪ Visually mapped boundaries and interdependencies of academic department, structured intervention to align purpose and values for quality improvement ▪ Encouraged dialogue and debate among department members

Table 1. Summary of systems thinking processes employed and organizational outcomes achieved in 15 empirical case studies in healthcare and higher education

Author(s) / Level of Rigor	Systems thinking processes employed	Organizational outcomes achieved
Jenkins (2007) High	▪ Strengthening alignment, coordination, and integration of services across campus ▪ Promoting collaboration among faculty, staff, and administrators	▪ Improved student success measured by degree completion or retention in programs that were well-aligned with coordinated ▪ Integrated systems across campus and collaboration of faculty, staff, and administrators
Levin, Cox, Cerven, and Haberler (2010) High	▪ Promoting partnerships ▪ Aligning support and resources ▪ Adapting to changing contexts ▪ Shifting structures to recognize faculty contributions	▪ Success in closing the student achievement gap of underrepresented groups in programs with characteristics of cohesion, cooperation, connection, and consistency
Somerville, Schader, and Huston (2005) Low to Medium	▪ Identifying stakeholders ▪ Uncovering values, assumptions, and needs of stakeholders ▪ Aligning systems and structures	▪ Redesigned library systems and services to align with changing purpose of academic libraries ▪ Shifted thinking of library personnel from a service to a learning and teaching orientation
Warren and Adman (1999) Medium	▪ Discerning stakeholder perceptions ▪ Mapping problem situation ▪ Developing frameworks ▪ Designing new systems	▪ Streamlined and centralized call logging ▪ Improved customer service ▪ Redesigned reception space of a university information systems service center

Exploration of Research Questions

RQ: How does a system thinking approach provide value to community college leaders? A synthesis of organizational outcomes extracted from the 15 empirical cases in healthcare and higher education demonstrate a positive impact on organizational performance when systems thinking approaches are employed. Eight of the 15 case studies employed systems thinking approaches for exploring the preliminary stages of an intervention in order to uncover values and assumptions of stakeholders and structure framework for designing an intervention. Though implementation of an intervention was not part of these studies, in each case, the desired outcome of developing a plan or framework for an intervention that was inclusive, participatory, and considerate of the needs of stakeholders was achieved (Clarke & Lehaney, 2000; Córdoba & Midgley, 2006; Gregory & Midgley, 2000; Houston, Robertson, & Prebble, 2008; Midgley, Munlo, & Brown, 1998; Suba et al., 2006; Temel, 2004; Wolstenholme, 1993).

Specific to the higher education setting, Clarke and Lehaney (2000) developed and designed a university information systems plan that successfully accounted for human user needs. The participatory nature of the systems thinking approach resulted in consensus on a plan where prior attempts had failed. Further, the benefits of the participatory approach were realized in Córdoba and Midgley (2008) and Warren and

Adam's (1999) information systems (IS) initiatives in an academic setting. Similarly, Houston, Robertson, and Prebble (2008) successfully reached consensus among members of an academic department of a university on a framework for quality improvement. Evidenced from these cases was the benefit derived from using a systems thinking approach for planning and structuring an intervention.

Four of the cases employed systems thinking approaches to plan, structure, and implement changes in healthcare (Kapsali, 2011; Solberg, Klevan, & Asche, 2007) and educational settings (Somerville, Schader, & Huston, 2005; Warren & Adman, 1999). In Kapsali's (2011) study, 100% of the healthcare projects using a systems approach were successfully deployed while in those projects using conventional management, only 22% were marginally successful and none were fully operational long term. Solberg, Klevan, and Asche (2007) demonstrated a seven-fold increase in patient health parameters as a result of implementation of a systemic intervention. Somerville, Schader, and Huston (2005) successfully redesigned an academic library's services and Warren and Adman (1999) redesigned information technology (IT) services in a university using systems thinking approaches from planning through implementation. Despite the methodological limitations alluded to above, these cases strongly support the value to a leader in using systems thinking for improving organizational performance.

While the three community college empirical studies were of high methodological rigor based on the quality appraisal criteria, they were not designed to assess systems thinking nor did they directly reference systems thinking (Ayers, 2002; Jenkins, 2007; Levin, Cox, Cerven, & Haberler, 2010). These studies were nonetheless included because they uncovered the organizational practices that promoted successful student outcomes in community colleges. The studies identified colleges or programs that had successful outcomes and explored the practices that led to successful implementation of systems change. The evidence revealed that successful practices and programs were those that took a systemic approach that engaged multiple stakeholders and were collaborative and coordinated across multiple areas of the college.

RQ: What practices encompassed in systems thinking are most valuable for community college leaders?

The evidence synthesized from the empirical studies in health care and higher education demonstrated the positive impact of systems thinking on organizational performance in response to the first research question. A deeper exploration of the specific practices employed in a systems thinking approach was required to respond to the second research question. An integration of the empirical research in health care and higher education underpinned by the theoretical contributions of systems thinking revealed three reoccurring ways in which leaders applied systems thinking processes for improving organizational performance. The systems thinking practices of discovering underlying values and assumptions of stakeholders and justifying boundaries; framing problems as patterns and discerning interrelationships of subsystems; and acting systemically when implementing change were the most valuable practices for community college leaders. These three systems thinking practices, characterized as *discovery, framing,* and *action,* are described in Table 2.

Table 2. Practices of Systems Thinking Valuable for Community College Leaders

Practices	Description
Discovery	• Explore and justify boundaries for inclusion of stakeholders and issues • Uncover values and assumptions of stakeholders through participatory practices • identifying marginalized groups
Framing	• Map patterns of behavior and model feedback loops • Diagram relationships and identify points of leverage • Structure interventions, design frameworks for change
Action	• Engage participation of all stakeholders • Promote communication, collaboration, and coordination of networks • Align support and resources

Discovery

The practice of discovery is grounded in boundary critique as advanced by Ulrich (1983) and Midgley (2000) and builds on the foundational work of Churchman (1970). Churchman proposed that systems' boundaries were not based in structural realities but in the social and personal constructs of social systems. Hence, he advocated for the expanding of boundaries to include a wider range of knowledge and stakeholders. Ulrich (1983) and then Midgley (2000) more fully developed the practice of boundary critique. Discovery encompasses the practice of boundary critique, but is referenced here as discovery to be more readily understood by community college practitioners.

As revealed in the empirical case literature, the discovery practices encompassed in a systems thinking approach were processes that were participatory and inclusive in nature and attempted to minimize the marginalization of any stakeholder groups. In a pair of research studies addressing community public health concerns, Gregory and Midgley (2000) and Midgley, Munlo, and Brown (1998) solicited feedback from a wide range of stakeholders, some of whom were previously discounted in discussions, and placed an emphasis on the input of the end users of services as well as the decision makers. By taking adequate time to explore the values, assumptions, and needs of all stakeholders, the resulting interventions garnered buy-in from the stakeholders, which demonstrated the value of the discovery practices (Gregory & Midgley, 2000; Midgley et al., 1998). Similarly in the higher education setting, both Clarke and Lehaney (2000) and Córdoba and Midgley (2006) carried out extensive discovery activities as a precursor to structuring an information systems intervention. Though significant time and effort was required for these tasks, satisfaction with the resulting inclusiveness and participatory decision-making also resulted in significant buy-in from stakeholders.

Similar processes were advocated by Amey (2010) for fostering partnerships in community colleges. Amey posited that leading partnerships required a "systems thinker" (p. 22) that negotiates relationship needs of partners, explores the roles and responsibilities in the relationship, and instills trust through inclusive and participatory behaviors. Amey's research interests in partnerships were revealed in her robust case

study (Amey, Brown & Sandmann, 2002) in which many of the same discovery processes were shown as necessary for effective partnerships. In the study, community and multi-disciplinary university members were assembled as a team to explore and structure a university-community partnership. In spite of potential conflicts, the university leadership intentionally structured a multi-disciplinary team to invite a multitude of voices to the discussion (Amey et al., 2002). Further, the practices of the team included meeting in a neutral space to uncover the philosophy of group members and explore values and develop norms for the group (Amey et al., 2002). Though the researchers acknowledged that the time required to thoroughly discover the concerns of all stakeholders was a challenge, it "proved essential to producing a quality outcome" (p. 22). These processes are the same as those advocated by Amey (2010) for fostering partnerships in community colleges, align with those of boundary critique as described by Midgley (2000), and are proposed as the discovery phase of the systems thinking leadership framework.

Framing

The practice of framing encompassed in the systems thinking leadership framework includes the mapping of patterns over time, identifying the interrelationships, interconnections, and points of leverage within a system, and structuring frameworks for change. Framing is theoretically grounded in methodological pluralism whereby practitioners draw upon multiple practices from various systems thinking perspectives as appropriate to the organizational context (Jackson, 1991; Midgley, 2006: Mingers & White, 2010).

Mapping and modeling are practices revealed in the empirical health care literature as effective for framing problems and structuring interventions. Drawing on the qualitative data collected in their research, Midgley et al. (1998) developed visual "problem maps" to illustrate to stakeholders the interdependencies of their concerns related to developing housing options for elderly people. Gregory and Midgley (2000) used modeling exercises with stakeholders to diagram systems for responding to mental health issues during disasters. Suba et al. (2006) created a systems map that outlined the obstacles in implementing cervical cancer screening that helped uncover gaps in the system and structure appropriate interventions. Similarly, Temel (2004) created a matrix for understanding the organizational linkages in malaria systems controls across various sectors for planning and implementation purposes. Wolstenholme (1993) used influence diagrams to model the flow of patients between hospital, community, and home settings. Each of these cases relied on some form of diagramming, modeling, mapping, or synthesizing data across a matrix for illuminating relationships and structuring interventions, demonstrating that multiple framing approaches are possible.

Visual mapping and modeling practices were less apparent in the higher education case studies. In these instances, framing practices were encompassed in the cognitive processes by which interrelationships and patterns of behavior were recognized and accounted for in planning and designing interventions, but were not visually diagrammed as maps or models. One exception was Houston et al.'s study (2008) where the researchers visually mapped the boundaries of the academic department under study.

Other examples of framing practices were drawing "rich pictures" as advanced by Checkland (Córdoba & Midgley, 2006) and conceptual models (Somerville et al., 2005).

In most cases, framing practices were also evidenced by the aligning of systems, services, and/or activities in the designing, planning, and structuring of interventions (Clarke & Lehaney, 2000; Córdoba & Midgley, 2006; Somerville et al., 2005; Warren & Adman, 1999). Though Jenkins' (2007) empirical study comparing high and low impact community colleges took a retrospective look at practices and therefore did not address the design phase of interventions; nonetheless, the researcher found that the college with the highest impact on student retention and completion had well-designed and aligned student support service and used institutional data to track outcomes over time – both of which are consistent with framing practices.

Framing has been characterized in the community college literature as the way in which leaders frame meaning for sensemaking by organizational members (Eddy, 2003). Though the use of the term in this way is narrower than is assumed in the systems thinking leadership model offered in this paper, shaping meaning for campus constituents does rely on elements of systems thinking. The way a leader chooses to frame meaning for constituents is influenced by the leader's cognition and shaped by his or hers mental models. In a case study that explored the leadership approaches of two community college presidents, Eddy (2003) proposed that a leader's cognition played a "critical role in framing" (p. 454) meaning. Amey (2005) argued that cognitive ability allows for continual assessment and adjustment by the leader to the complexities of the organization. In fact, Bensimon and Neumann (1993) argued for structuring cognitive teams that ensure a wide variety of worldviews and perspectives for meeting organizational challenges. The mapping and modeling practices, as conceptualized in the systems thinking literature, together with the cognitive practices in the higher education literature offer a rich variety of activities that characterize framing. All of these framing activities are focused toward implementation of organizational initiatives.

Action

Action refers to the systemic approach taken when implementing change initiatives or interventions and is theoretically underpinned by Foster-Fishman, Nowell, and Yang's (2007) systems change framework and Midgley's (2000) systemic intervention. The practices characterizing action include engaging multiple stakeholders, collaborating, coordinating, and aligning systems for the change implementation. As revealed in the literature, action can be enacted either in concert with the systems thinking practices of discovery and framing (Kapsali, 2011; Somerville et al., 2005; Warren & Adman, 1999), or singularly (Ayers, 2002; Jenkins, 2007; Levin et al., 2010), depending on the goal of the intervention.

In most of the health care empirical studies, the researchers did not address action practices because they were only engaged through the structuring of the intervention and not the implementation (Gregory & Midgley, 2000; Midgley et al., 1998; Suba et al., 2006; Temel, 2004; Wolstenholme, 1993). However, in the two health care cases in which discovery, framing, and action were all enacted (Kapsali, 2011; Solberg et al, 2007), the gains in organizational performance were notable. Kapsali (2011) found that

when implementing a new health care technology, all of the projects managed with a systems thinking approach were deployed and operational two years hence, whereas none of the projects managed with a conventional approach remained operational. When using a systemic, integrated, and coordinated approach to patient treatment, Solberg et al. (2007) realized a seven-fold gain in patients' diabetic health parameters as compared to patients being treated conventionally. In the community college literature, researchers explored the practices of successful programs and found those enacted systemically with coordination and integration across campuses were most effective (Ayers, 2002; Jenkins, 2007; Levin et al., 2010).

The evidence revealed that the practices encompassed in a systems thinking approach of discovery, framing, and action were the most valuable for community college leaders. Hence, systems thinking leadership offers a means for responding to the increasing complexities facing community colleges and answer the call from complexity scholars (Marion & Uhl-Bien, 2001; Uhl-Bien & Marion, 2009) and higher education scholars (Alfred, 2012; Amey, 2005; Eddy, 2012; Kezar, 2000) for more adaptive, participatory, and distributive forms of leadership.

A CONCEPTUAL MODEL

Birnbaum (1988) posited that "a model is an abstraction of reality that, if it is good enough, allows us to understand (and sometimes to predict) some of the dynamics of the system that it represents" (p. 83). The conceptual model depicted in Figure 1 illustrates the relationships informed by the review of literature through the lenses of complexity theory and systems thinking theory. The model posits that systems thinking leadership is characterized by the three processes of discovery, framing, and action and that a leader's use of these processes for meeting challenges in the increasingly complex community college environment will enhance organizational performance.

The multiple missions and highly connected networks of semi-autonomous agents encompassed in community colleges characterized them as complex adaptive systems. Further, the myriad challenges that community colleges must respond to are well-documented in the community college literature. The outer boundary of the model in Figure 1 is drawn with a dotted line to represent the uncertain and changing boundaries and complex dynamics of community colleges.

Evident in the community college leadership literature is the call for more collaborative, cooperative, and participatory leadership (Bensimon, Neumann, & Birnbaum, 1989; Eddy, 2010; Kezar, 1998; Kezar, 2006), which is theoretically validated as appropriate for complex systems in the complexity theory literature (Uhl-Bien & Marion, 2009). Complexity leadership theory posits the use of adaptive leadership that is contextual and responsive to the dynamic changes in the environment as more appropriate for complex adaptive systems. Hence, the systems thinking processes are illustrated as an upward spiral indicative of the "bottom up" non-linear nature of adaptive leadership rather than a top down approach. The arrow drawn inside the upward spiral represents emerging organizational performance resulting from exercising leadership that is adaptive and contextual rather than a one size fits all approach (Uhl-Bien & Marion, 2009).

A sequential pathway could be followed in which leaders move progressively from discovery, to framing, to action when carrying out an intervention or, depending on the time, resources, and nature of the problem, a leader could enact individual elements of systems thinking leadership separately. For instance, if a systems change required rapid implementation due to a mandate or crisis, discovery and framing could be by-passed, and action exercised with a systems thinking leadership approach. Hence, a leader can employ, adapt, or enact these elements of systems thinking leadership at any point along the arrow within the spiral.

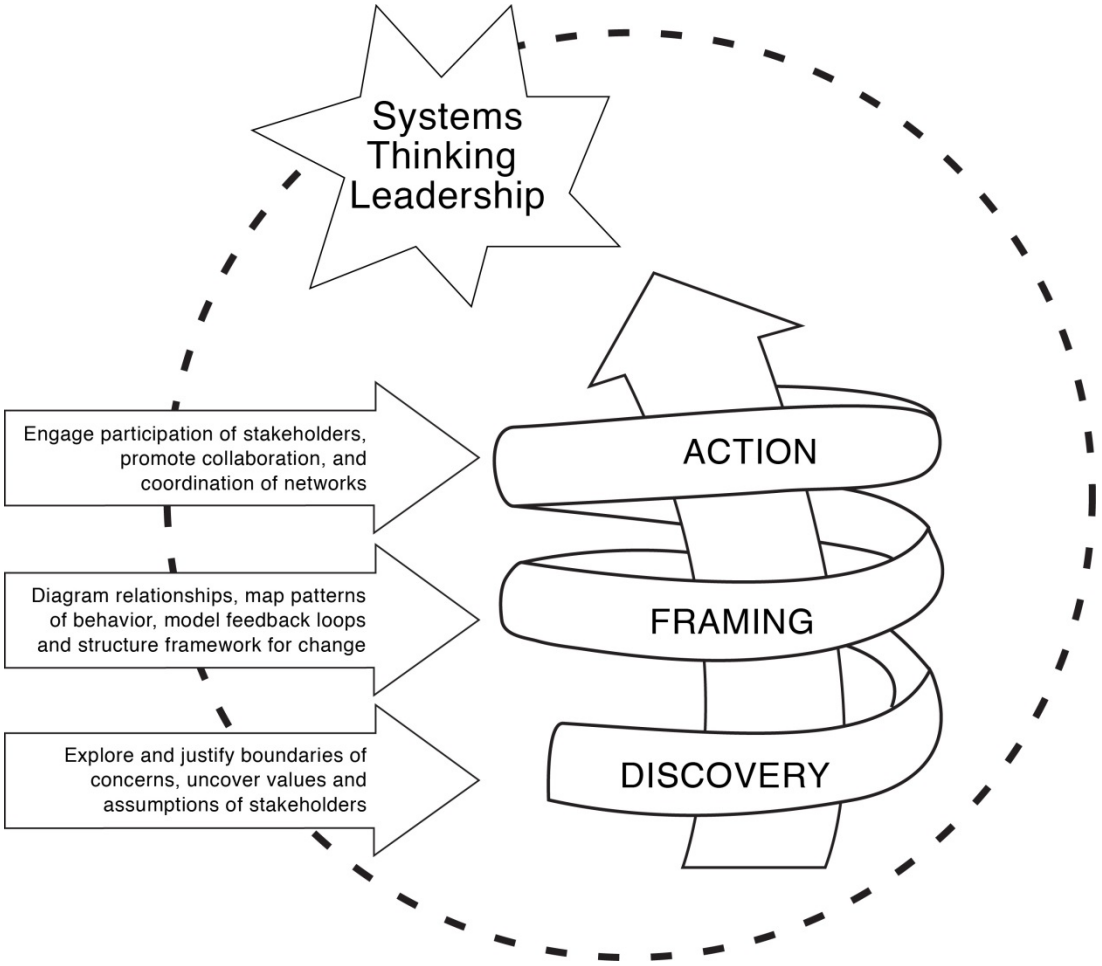

Figure 1. A conceptual model of systems thinking leadership within the dynamic environment of community colleges.

CONCLUSION

Community colleges mirror the history of the democratization of higher education in America, serve as the gateway to tertiary education for students that are otherwise marginalized, and are drivers of economic growth and revitalization in their communities. In the current and future era of increasing complexities, the challenges faced by community colleges is daunting, and yet, like so many of the students they serve, they are

"pulling themselves up by their bootstraps" and experimenting with creative and innovative systems, structures, and processes to better meet student needs and remain relevant in an ever crowded educational marketplace. Leaders who enact a systems thinking leadership framework, who view their organization through a systems lens, engage leadership competencies systemically, and guide change through the adaptive and participatory practices of discovery, framing, and action will be better poised to turn challenge into opportunity and successfully lead their organizations into the next century.

Practical Implications

A systems thinking approach moves away from viewing leadership as an individual endeavor dependent on the charisma of a single leader. In a complex system of interrelated and interconnected parts, properties emerge that are not present in the individual components. The leader is only one of the many interacting parts accounting for the system's outcomes. A call for managing the complexities of systems in higher education using a systems approach is not new; Birnbaum (1988, 1989) was among the first to suggest doing so. Yet systems thinking has struggled to gain wide acceptance, due in part to systems theorists' inability to convey the concepts in language that is approachable and understandable to "potential users" (Ackoff, 2006, p. 707). The systems thinking leadership framework of discovery, framing, and action suggests a set of tools for applying systems thinking leadership.

Discovery practices

Discovery practices seek to explore the boundaries of the issue, concern, or system change so that stakeholders are clarified and their values and assumptions revealed. Various forms of systems inquiry are encompassed in discovery practices. One of the primary tools of the discovery phase is that of boundary critique. Boundary critique is incorporated within the systems thinking frameworks of critical heuristics (Ulrich, 1983); critical systems thinking (Midgley, 1996) and systemic intervention (Midgley, 2000). Boundary questions allow an examination of multiple perspectives and the ability to more fully "understand people's differences and handle them more constructively" (Ulrich & Reynolds, 2010, p. 245).

Another discovery practice that helps clarify boundaries and reveals values of stakeholders is Appreciative Inquiry. Appreciative Inquiry (AI) is a strategy for system change that relies on a collaborative process of inquiry whereby organizational members engage in reciprocal interviewing to uncover values and assumptions of stakeholders (Sullivan, 2004; Whitney & Cooperrider, 1998), not unlike boundary critique. Among the key principles of AI is a perspective of treating the organization as a whole system and recognizing the dynamic nature of the systems interactions (Sullivan, 2004), which align with the principles of systems thinking.

A third discovery practice is the inquiry based process of *creativity,* the first phase of total systems intervention (TSI) (Flood & Jackson, 1991). This phase of TSI employs an inquiry process to identify systems metaphors "as organizing structures to help managers think creatively" (p. 201) about their organizations. The inquiry process helps clarify the ways in which the organization functions and identifies a systems metaphor for

conceptualizing the organization. Examples of some metaphors are: "the organization as a 'machine' (closed system view), the organization as an 'organism' (open systems view), the organization as a 'brain' (learning systems view); the organization as a 'team' (unitary political system), and the organization as a 'prison' (coercive political system)" (pp. 201-202).

Framing practices

There are a rich variety of practices encompassed in the framing phase including mapping patterns of behavior over time, identifying feedback loops, diagramming relationships and identifying points of leverage and framing change for stakeholders. The tools and techniques for accomplishing these tasks draw from a variety of systems thinking perspectives that lean heavily on diagramming and modeling techniques. Diagramming can include various types of drawings. Checkland (2000) advanced drawing "rich pictures" as part of soft systems methodology suggesting that "pictures are a better medium than linear prose for expressing relationships" (p. 16). He posited that pictures more accurately present whole situations and thus encourage systems thinking rather than reductionist thinking (Checkland, 2000). Rich pictures use symbols and cartoonish drawings with limited words to evoke insights about the system under study and help "groups arrive at a consensual analysis of a situation" (Bell & Morse, 2012, p.332).

One of the systems thinking methodologies most noted for modeling techniques is system dynamics. Systems dynamics relies upon standard symbols of stocks and flows, feedback loops and can include mathematical equations and computer modeling to map the dynamic complexities of systems (Sterman, 2001). In order to convey these concepts more simply, Senge (1990) developed a set of systems archetypes made of reinforcing and balancing feedback loops and time delays that represent templates of the most common systems behaviors. Senge (1990) promoted the use of systems archetypes for grasping the underlying complexities of organizations in his seminal work, *The Fifth Discipline*. An accompanying field book presents strategies and tools for developing skills in recognizing and mapping these systems archetypes (Senge et al., 1994).

Framing practices can also include data analytics that show patterns in behaviors over time and allow identification of points of leverage that will provide the most likely success for an intervention. For instance, in designing interventions to improve student success and completion rates, an analysis of patterns over time of enrollment, retention, and course success would be far more likely to reveal the points where support is most needed than relying on faculty and staff perceptions. Complex systems are often counterintuitive and what leaders think will produce a desired effect may not. Other framing tools and techniques can include process maps, system matrices, and conceptual models. Framing practices can also include the ways in which leaders shape meaning for stakeholders through symbols and language.

Action practices

Action is the implementation phase of the systems thinking leadership framework. The practices enacted in this phase include engaging the participation of stakeholders; promoting communication, collaboration, and coordination of system networks; and

aligning support and resources. Systemic practices for implementing change were revealed as essential for successful implementation of systems change (Jenkins, 2007; Levin et al., 2010). The best example of how to enact action practices comes from Jenkins' (2007) study on institutional effectiveness and student success. Action practices in high impact community colleges, as compared to low impact colleges, were clearly delineated. To better promote success, it appears that not only do particular student support services need to be in place—including in-depth orientations, proactive advising, early warning systems, and well-organized academic support services—but those services must be well aligned and coordinated across the campus. While administrators may see different functional areas of a college as providing discrete services, students do not see, nor should they experience, such divisions. Seamless integration of services from the student's perspective and collaboration among faculty, staff, and administration in providing these services are what seem to contribute most to student success (p. 959).

Institutions of higher education are frequently criticized for operating in "departmental silos" (Kezar, 2006, p. 805) and collaboration is often stymied by "bureaucratic/hierarchical administrative structures" (p. 805). Practices that can promote collaboration include communicating collaboration as part of the college's mission, structuring campus processes and systems to encourage collaboration, developing cross-disciplinary centers and courses, utilizing cross-functional teams, fostering external partnerships, and aligning resources to reward collaborative efforts (Kezar, 2006). Of importance as well is the support and visible modeling of collaboration by the senior leadership of the institution (Kezar, 2006). Enacting discovery and framing practices within the systems thinking leadership framework prior to the implementation phase of a systems change builds a foundation for collaborative participation that carries over into the action phase.

While criticism has been directed at systems theorists by one of their own as being too removed from the practitioner's viewpoint (Ackoff, 2006), there is a plethora of resources widely available through web forums and workshops developed by and for managers for gaining practical skills in systems thinking. The tools and techniques offered here for enacting the discovery, framing, and action phases are samplings of practices that are grounded in systems thinking theory.

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