

THE NORTH TEXAS AEROSPACE MANUFACTURING AND AVIATION
INDUSTRIES: AN EXPLANATORY CASE STUDY OF
SCHOOL-TO-WORK COLLABORATIVE
NETWORKS

by

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Abstract

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The purpose of this study is to explore how educators, business partners and facilitators developed ties or networks to initiate a school-to-work collaboration to prepare students for jobs and careers in the aerospace manufacturing and aviation industries. There is growing concern about preparing a future workforce supply in these industries in North Texas. Workforce projections call for 8000 additional jobs between 2010 and 2020 (North Central Texas Council of Governments, 2013).

Collaboration is recognized as a valuable asset to connect disjointed segments within the K-16 trajectory. This study explores the contradiction between the stated need for collaborative strategies and the inability of

stakeholders attempting to collaborate across organizational and institutional boundaries to sustain these connections. Through the lens of networking theory, the roles of facilitators and the operation of networks and ties between and among partners are investigated.

Ten participants in a high school curriculum development project were interviewed, representing a business, community college, and K-12 education. Data analysis revealed findings associated with three major themes: facilitation, project activity and relationships. Nine individuals were identified as facilitators, and facilitators were perceived as helping the project move forward. Project activity benefited from the structured curriculum development process. Although relationships characterized by strong ties helped start the project, weak ties predominated among project participants.

Implications for theory include the need for more knowledge about facilitator roles and group dynamics. Further research about the functioning of weak and strong ties and facilitator skill sets relating to collaborative leadership would be valuable. Implications for practice include capturing lessons learned to apply to other industries, and overtly acknowledging the existence and importance of facilitators.

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Chapter 1

Design of the Study

1.1 Introduction

There is growing concern in the business community about preparing a workforce supply to meet demand in high-tech aerospace manufacturing and aviation jobs (Materna, Mansfield, & Deck, 2013; North Central Texas Council of Governments, 2010, 2013). We know that workforce preparation must begin in the K-12 educational system (Choy & Delahaye, 2011; Roberson, 2011). We also know that the workforce preparation process then continues into higher education and proceeds into jobs and careers that span a lifetime (Kuchinke, 2013; Stipanovic, 2010). This K-16 study explores how connections were initiated to form a school-to-work collaboration between stakeholders in K-12 education, postsecondary education, and businesses to enhance the preparation of the future aerospace manufacturing and aviation workforce.

Because successful academic preparation is an essential component of workforce preparation, the academic performance of United States students is an issue of concern. A recent study comparing the percentage of adults with associate degrees or higher by age group among major industrialized international countries reveals the troubling reality that United States students' academic attainment is lagging behind that of other countries (OECD, 2011). While the

United States exceeds educational attainment rates of selected global peers (Korea, Canada, Japan, United Kingdom, France, and Mexico) in the age group of 45 years and higher, the United States falls behind in the 25-34 age group in relation to all the other countries except for Mexico. This pattern is evident in Texas as well, where institutional retention and postsecondary degree attainment have remained relatively stagnant (ACT, 2012).

This stagnation is evident in findings from an international study released in December, 2013 comparing U.S. 15-year-old student performance in mathematics literacy, science literacy and reading literacy with the performance of their peers in other nations (PISA, 2012). The results were disheartening. In all three subjects, average scores of 18 other education systems exceeded average scores of the United States. These education systems are Australia, Canada, Chinese Taipei, Estonia, Finland, Germany, Hong Kong-China, Ireland, Japan, Liechtenstein, Macao-China, Netherlands, New Zealand, Poland, Republic of Korea, Shanghai-China, Singapore, and Switzerland. Also discouraging is the fact that the U.S. average PISA assessment scores in 2012 were not measurably different from the previous PISA assessments over the last decade or more with which comparisons can be made.

We know that a focus on increasing the level of academic attainment alone will not address the workforce preparation challenge. If the United States is to remain globally competitive, connections between school and career must be

strengthened. These connections prepare students to qualify for jobs providing economic self-sufficiency (Venezia & Kirst, 2005).

Aviation and aerospace manufacturing businesses in North Texas are coming to realize that valuable connections between students and the businesses who may hire them must be initiated as early as possible during students' tenure in the K-12 system (Jeffers, Safferman, & Safferman, 2004; Pelton, Johnson, & Flournoy, 2004; Ralston, Hieb, & Rivoli, 2013). The K-12 preparation then must extend into postsecondary education relevant to the skills and knowledge required to compete for jobs and pursue careers in the aviation and aerospace manufacturing industries (Materna et al., 2013; North Central Texas Council of Governments, 2010, 2013).

To address this need, beginning in 2002, leaders from three Chambers of Commerce and three Workforce Development Boards identified North Texas aerospace manufacturing and aviation industries as major drivers of regional economic growth. They brought together business leaders in these industries to identify critical projected workforce shortages and long-term needs (Regional Workforce Leadership Council, 2013). For more than a decade, these business leaders have worked together to address the issue of preparing a future workforce supply, applying leadership strategies, developing systems thinking and working collaboratively to benefit all of their organizations (Burke, 2011; Senge, 2006; Uhl-Bien, Marion, & McKelvey, 2007).

The businesses recognize that to develop their future workforce, they need to do a better job of informing students in the K-12 system about their jobs and career opportunities if they expect to attract those students to work in their industries. Not only must students possess mastery of literacy, numeracy and problem-solving skills in the technology-rich environments that characterize business and industry today, but they also must gain an understanding of interpersonal communication, information processing, self-management, and the ability to continuously learn (OECD, 2013). Imparting these skills to students needs to be a shared endeavor between educators and the businesses with future workforce needs. Concepts presented in the classroom gain relevance to students when they can see those concepts applied in actual business environments. Partnerships between businesses and education to offer field trips, site visits, job shadowing or internship experiences help engage students in their learning by relating classroom learning to real-world challenges.

In the aviation and aerospace industries in particular, workforce projections in the North Texas area call for more than 8,000 additional jobs to be filled between 2010 and 2020 (North Central Texas Council of Governments, 2013). There is growing concern about the “skills gap” mismatch between workforce demand in high-wage, high-growth, high-tech career fields, including aerospace manufacturing and aviation, and workforce supply to fill current and future jobs (Materna et al., 2013). In addition to the ongoing need to hire

engineers, researchers, and managers, finding skilled production workers for the aerospace manufacturing and aviation industries is a growing concern based on projected retirements from 2012-2015. National data show that projected retirement ranges from 18% of the hourly manufacturing employee workforce in 2012 to 24% of the hourly manufacturing employee workforce in 2015 (Hedden, 2012).

The need for businesses to extend and expand direct involvement with K-16 education institutions is urgent because it requires a significant amount of time to develop qualified entrants into the future workforce applicant pool. An exploration of available networks within organizations and across organizational boundaries that may link the disconnected segments of the K-16 continuum (McGrath, Donovan, Schaier-Peleg, & Van Buskirk, 2005) is needed, particularly information about the genesis of networks that enhance the transition between K-12 and postsecondary education and the future aerospace manufacturing and aviation workforce.

McGrath et al. (2005) assert that these collaborative strategies are valuable not only to unify the segments of the K-16 system but also to connect the K-16 system to future economic prosperity by creating school-to-work transition programs that link K-16 preparation to projected future workforce needs. Collaborative strategies are important to streamline connections between the segments of the K-16 system and to interlace the K-16 system with the future

workforce system (Garmston & Wellman, 2013). Networks that connect K-16 institutions to the future workforce create essential communication links that must endure in order to establish commitment by multiple stakeholders to pursue collaborative projects that advance systemic change toward a smoothly articulated, seamless K-16 system (Fullan, 2011; Northouse, 2010).

1.2 Statement of the Problem

The smooth functioning of the K-16-workforce continuum is thwarted by a chronic problem: disconnected segments within that continuum (Takahashi & Smutny, 2002). Although the image of a linear, smoothly articulated, seamless education/workforce pipeline is still useful for participants attempting to structure school-to-work collaboratives, the notion of the pipeline is changing. Various trajectories from K-12 through postsecondary education into jobs and careers are being explored to offer alternative pathways to prepare the future workforce. For example, dual credit is a widespread and growing practice nationally (Borden, Taylor, Park, & Seiler, 2013). Multiple pathways from K-12 education into college and career are transforming the iconic pipeline from a one-lane highway to a massive freeway with multiple high-speed lanes and many opportunities to exit and re-enter along the way. Stakeholders working together to help students complete their education and enter the workforce must often navigate a rugged obstacle course in which transitions from K-12 to postsecondary education and into the workforce can be difficult to structure (McGrath et al., 2005).

This is a surprising and counterintuitive discovery, given the abundant encouragement (from all stakeholder groups) touting the need to collaborate. Organizational and institutional barriers can impede collaborative processes. These cumbersome disconnects waste time and money and produce frustration in the stakeholder groups valiantly attempting to streamline, link and align their endeavors (Liedtka, 1996; White & Wehlage, 1995). Resources to manage and administer the work of the collaborative may be insufficient. Incentives to motivate connections that support collaboration between and among the segments of the K-16-workforce pipeline are often lacking because the segments of the K-16-workforce pipeline are operating separately and answer to different and multiple jurisdictions. The stated need to implement collaborative strategies and the apparent inability to establish and sustain them on a widespread basis presents a troubling contradiction.

This study explores that contradiction. Through the conceptual framework of networking, the roles of facilitators and brokers and the operation of networks and ties between and among partners were investigated by the researcher to see how they contributed to initiating a specific school-to-work collaboration. Granovetter (1973) and others engaged in network research would attribute the anomaly of the need for collaborative strategies and the apparent inability to establish and sustain them on a widespread basis to the underdevelopment of ties or networks essential for the transmittal of information needed for collaboration.

From Granovetter's perspective, there have been too few weak ties, or collaborative networks, developed to link the silos of K-12 educators, higher education educators and potential employers. Without the development of these weak ties, the transmission of collaborative information is unlikely or difficult at best. Clearly, there is a need to further explore how collaborations between K-12 educators, higher education educators and potential employers are initially established, what factors contribute to success, and the role of ties and networks in that process.

1.3 Purpose of the Study

The purpose of the study is to explore how educators, business partners and facilitators developed ties or networks to initiate a school-to-work collaboration to prepare students for jobs and careers in the aerospace manufacturing and aviation industries (Burke, 2011; Burt, 1997; Granovetter, 1973; Weerts & Sandmann, 2010; Whitchurch, 2010). The study examines the perceptions of stakeholders in a North Texas school-to-work collaborative. Of particular interest is discovery and analysis to examine the perceptions of key stakeholders (e.g., K-12 and higher education partners, major aerospace manufacturing and aviation-related companies, Chambers of Commerce and the Texas Workforce Commission) about the processes, factors, conditions, or ties that enabled them to launch the collaborative to strengthen the link between education and the workforce.

1.4 Research Questions

The study seeks to answer four research questions:

1. What occurs in collaborative projects designed to connect business and education that aim to increase workforce preparation for the aerospace manufacturing and aviation industries?
 - a. What practices and processes are found that build connections?
 - b. What are the roles of facilitators and/or brokers in this process?
2. In what ways does the conceptual framework of networking explain the practices, processes and roles of facilitators/brokers in collaborative projects?
3. How useful is the conceptual framework of networking for explaining education and workforce collaboratives?
4. What other realities of collaboration are revealed in this study?

1.5 Orienting Theoretical/ Conceptual Framework

The conceptual framework serving as a lens through which to view the practices, processes and roles that were examined in this study is networking. Networking theory (Ahuja, 2000; Burke, 2011; Burt, 1992, 1997; Burt, Jannotta, & Mahoney, 1998; Granovetter, 1973; Walker, Kogut, & Shan, 1997; Weerts & Sandmann, 2010; Whitchurch, 2010) pertains directly to the function and interactions of educators, business partners and facilitators in a school-to-work collaboration. Other closely related theories in addition to networking theory

helped frame my study because of their relevance to the functions performed by facilitators.

Networking involves fostering understanding among multiple stakeholders and promoting mutually beneficial cross-institutional strategies (Weerts & Sandmann, 2010). Burke (2011) emphasizes the importance of networks and organizational structures that enhance teamwork, suggesting that we need to know more about “why there is so much talk about teamwork, with so little real action” (p. 319). He places emphasis on further exploration of networks as the “next frontier” of research. Burke also characterizes networks as “composed of nodes, where pivotal people serve as connectors . . . and gatekeepers, those who facilitate or impede entry and participation in the network” (p. 321). This exploration of networks pertains directly to the function and interactions of educators, business partners and facilitators in a school to work collaboration.

Granovetter (1973) describes the strength of interpersonal ties and how interaction in small groups becomes translated into larger patterns. He illustrates that weak ties in which dissimilar people connect with one another actually produce a chain of connections that in the aggregate forms strong ties. Individuals proficient in networking are described as having successfully developed “blended identities” that allow them to bridge the gap between distinctly different institutional cultures (Whitchurch, 2010).

1.6 Procedures/ Methods

This is a phenomenological study, involving in-depth interactions with a small number of participants to understand the meaning of a person's experiences and the person's interpretation of those experiences (Rossman & Rallis, 2003). Phenomenology deals with lived experience, seeks to learn how individuals construct reality, and has intellectual and emotional significance (Gall, Gall, & Borg, 2007). Qualitative methods were used for this study to discover, explore and understand how individuals representing K-12 education, higher education, and a business in the aviation and aerospace industry operated in a collaborative project. The function of individuals acting as facilitators was also addressed. Field observation and field notes were used to help identify potential interviewees. Lightly structured interviews were used to encourage maximum flexibility within a uniform interview protocol (Knight, 2002).

1.6.1 The Researcher

I conducted the research myself. I brought to the task a 45-year business career, beginning with human resource management at Bechtel Engineers and Constructors in San Francisco, California, where I worked for 15 years prior to a career advancement move to Bank of America in San Francisco. By the time I went to Bank of America, I had already been working on business and education partnership development because of the concern voiced by both of my employers that to prepare the future workforce, connections with the K-16 education system

needed to be established. No longer could we wait for applicants to appear when jobs needed to be filled; we needed to do more to encourage students to cultivate the skill sets that would equip them to qualify for jobs that would address our workforce needs.

Partnership development between business and education was innovative work that extended beyond the boundaries of typical human resource management responsibilities at that time. I found the work challenging, exciting, and important because it addressed a recognized business need. I became involved in leadership roles at both Bechtel and Bank of America to craft K-16 connections relating to future workforce preparation. The first major project I recall working on was at Bechtel in the mid-1970s. We created a partnership with IBM Corporation in inner-city Oakland, California to provide computer training to low-income, minority youth. The computers and the training were provided by IBM, the space and pay for the students through work/study grant money came from the local workforce system, and Bechtel and IBM both created internships for the students that could eventually lead to jobs.

At Bank of America in California, we established a partnership with an inner-city San Francisco high school to employ high school students in the bank's San Francisco data center. The students were assigned to hourly shifts after school or in the evening to make collection calls. Prior to this project, the data center had employed college students, but they had never employed high school students and

had doubts about the ability of the high school students to meet the job requirements. Their doubts turned out to be unfounded, because the high school students performed very well. With rare exceptions, the students were bilingual in Spanish, Vietnamese or Chinese, and their proficiency in communicating with the bank's customers was enhanced because of their dual language ability. We collected data that compared the pre-employment and post-employment attendance and grades of the students and discovered that both their attendance and their grades improved during their employment at the bank. Another stunning finding was that the hourly wages earned by the students often exceeded the hourly wages of other family members, including their parents, creating a sense of pride for the students and their families.

The National Alliance of Business heard about our project, and we became part of a national school-to-work consortium. Several similar projects around the United States were studied to examine strengths, weaknesses, and lessons learned, and to identify successful practices that could be replicated. The national attention devoted to our project further augmented its perceived importance locally, attracting media coverage and community interest.

In 1993, Bank of America acquired two major savings and loan companies to launch its market presence in Texas. Based on the success of education partnerships established in California, the bank relocated me to Texas to create and implement the bank's statewide cause-related marketing campaign with

education as its centerpiece. This opportunity solidified for me what I knew by then was my passion and my calling: integrating business into the K-16 pipeline and establishing collaborative partnerships to position education as the foundation of economic development, for individual and collective success.

My epistemological stance is firmly constructivist, in which “truth, or meaning, comes into our existence in and out of our engagement with the realities in our world . . . subject and object emerge as partners in the generation of meaning” (Crotty, 1998, pp. 8-9). I favor leadership approaches that emphasize follower-leader interaction, mutual respect, open and sharing communication, and multiple inputs to problem solving where everyone can have a voice. From an epistemological perspective, this flexible leadership approach fits well with constructionism and feels most compatible with my own ways of operating in the world.

1.6.2 Pilot Study

Findings from a pilot study conducted in July 2013 helped focus the research to be conducted in this study. In this pilot study, I was interested in exploring perceptions of business practitioners, higher education educators, K-12 educators and facilitators engaged in collaborative school-to-work partnerships in the aerospace and aviation industries.

Data for the pilot study was collected through a Likert-type online survey sent through surveymonkey.com to 110 individuals involved in the aerospace

manufacturing and aviation industries, including K-12 education, higher education, businesses, and industry associations. The purpose of the survey was to explore practices and processes associated with collaboration, including the roles of K-12 education, higher education and businesses in collaborative projects design. The roles of facilitators and/or brokers were of particular interest. Institutional Review Board (IRB) approval was secured prior to proceeding with the survey.

The survey was sent to 110 individuals. Survey respondents were asked to rate 20 statements on a 4-point scale plus “don’t know/no opinion.” The survey generated 39 valid responses that correspond to a 35% response rate. Responses were analyzed through descriptive statistics using Statistical Package for the Social Sciences (SPSS), Version 20.0. Basic demographic information was collected. Five open-ended questions concluded the survey, and the open-ended question responses were coded and grouped by themes.

Selected aspects of the demographic information revealed that the majority of responses (62%) came from males. The respondents were predominately White (63%) with representation from Blacks, Hispanics, and Asians as well. Respondents represented a variety of positions in education and business: Senior Executive; Administrator; Manager; President/CEO; Consultant; Professional; Teacher; and Dean. Most respondents were experienced workers with 21 to 40 years of experience. In terms of employer, representation from K-12

education was 11 (30%); community college 8 (22%); four-year university 2 (5%); Chamber of Commerce and government (grouped together) 10 (27%); and Other 6 (16%).

One of the most prevalent and recurring themes from the pilot survey centered on school-to-work collaboration. The pilot study's key findings relating to collaboration, or the lack thereof, suggested the need for additional research. All of the respondents "strongly agreed" or "agreed" that students need more applied learning experiences, implying that applied learning and project-based learning experiences were insufficient. Another finding showed 62% of respondents supporting the view that resources devoted to facilitate connections between K-12 education, higher education and businesses were inadequate, with another 26% saying "don't know/no opinion," suggesting a lack of awareness of the issue. The open-ended questions contained many statements supporting these views, such as "need to ensure value for all stakeholders to enable long-term participation" and "this type of project takes years to plan, develop, implement and measure." And finally, another comment stated "help by providing the foundation for discussion with strong support for the need to collaborate . . . provide the pressure to encourage people to act."

1.6.3 Current Study

While the current study is separate and distinct from the pilot study and not directly linked to its findings, the pilot study was a significant influence on

my decision to pursue the current study because it suggested the need for more exploration about the role of facilitators. The current study consists of an explanatory case study of an existing school-to-work collaborative centered at a North Texas public high school. The aviation program at this high school provides options for students to enter dual credit courses and earn certifications or licensures to prepare themselves to qualify for jobs in the aerospace manufacturing and aviation industries where projected future workforce demand is high.

1.6.3.1 Data Needs

Facilitators (also known as brokers or intermediaries) occupy a vital role in effective school-to-work collaboratives, and, therefore, are a focus of this study. This research seeks to expand understanding of the facilitation process, who performed it and how it related to the success or failure of school-to-work collaboratives in the aerospace manufacturing and aviation industries. The usefulness of networking theory for explaining the function and interactions of educators, business partners and facilitators in a school-to-work collaboration is also explored.

1.6.3.2 Data Sources

To answer my research questions, it was necessary to deliberately select individuals to be interviewed who possessed the information I needed (Maxwell, 2005, pp. 88-90). Through field observations of curriculum development and

partners' meetings, I identified potential interviewees. Purposeful sampling best describes my approach to select participants for the interviews. The most prevalent themes identified during the field observation that relate to the existence of weak and strong ties, as well as possible root causes of difficulty with or success with collaboration guided the selection of the individuals to be interviewed. Three individuals from business, three from higher education, and four from K-12 education served as data sources.

1.6.3.3 Data Collection

I began the data collection process with field observations of curriculum development meetings. Field notes were handwritten at each meeting, dated, and stored in a single folder where the collection of all of the field notes could be easily accessed. During these meetings, I gained an understanding of the roles of the participants, observed their interactions, and I was able to identify prospective interview participants. I then conducted one-on-one personal interviews. Participation was voluntary and was requested with a letter and consent form, supplied in Appendix A.

The interviews of 45 minutes to an hour took place at the work locations of the interviewees in a private space such as their office or a conference room. Interview protocols for the three groups involved in the collaboration (K-12 education, higher education, and businesses) were identical. The interview protocol is supplied in Appendix B.

Interviews were audio taped and transcribed immediately after completing each interview, typically within 24 to 48 hours. Confidentiality was protected. In accordance with The University of Texas at Arlington policy, the tapes and transcripts will be maintained for a minimum of three years after completion of the study, after which they may be destroyed.

1.6.3.4 Data Analysis

The data gathered through field observations and interviews were analyzed to discern the existence of networks, including weak and strong ties (Granovetter, 1973). I broke the data into segments, identified meaningful units and themes in the segments, coded by themes, and identified and reflected on interpretations of the data, synthesizing the results. I utilized the tool of writing memos to myself recording insights about interviewing and theme development to help clarify my thinking during the data analysis phase.

Because the extent to which collaborative activities foster positive outcomes is of particular interest, the major findings will be assembled in a practitioners' guide for others attempting to structure and operate collaborative school-to-work partnerships to prepare students for access to jobs and careers. Examples of positive outcomes could include meeting or exceeding the stated objectives of the project on time and within budget; sustaining these successful achievements over an extended period of time; and forging long-term

relationships with the collaborative partners to establish a firm foundation for future projects.

1.7 Significance of the Study

This study adds to the extant body of knowledge relating to collaborations that connect K-12, higher education, and the workforce. Although this study is centered on the aviation and aerospace manufacturing industries, the lessons learned about how to establish collaborations that link education to the future workforce, preparing students for jobs and careers, can likely be transferable to other industries. These lessons learned should be applicable to all the stakeholder groups along the trajectory of the K-16-workforce pipeline so that they can examine their own practices and make changes to improve connectivity between the segments of the pipeline. The study may also reveal areas in which incentives are needed to produce the desirable behaviors and outcomes that facilitate the smooth functioning of the K-16-workforce pipeline.

Implications for theory emerged. Insights gained from this study revealed opportunities to build on, augment or reconceptualize networking theory and related theories, the orienting conceptual framework for this study. Exploration of group dynamics and facilitation, for example, may build on existing knowledge about networking theory.

Implications for research to illustrate how this study's findings add to the existing knowledge base are addressed. Findings from this study that suggest the

need for additional research are described. Lessons learned and insights gained provide guidance for practitioners initiating school-to-work collaborations or investigating how to improve or build upon existing collaborations. In particular, the functioning of weak and strong ties in bridging the divide between and among institutional cultures is examined and described. For those acting in intermediary or collaborative roles, the insights identified in the study about the functioning of facilitators can offer guidance.

Implications for practice in the area of structuring collaborative partnerships between K-12 education, higher education and business are revealed. The most prevalent common themes and findings identified in this study can be assembled into a practitioners' guide for others attempting to structure and operate collaborative partnerships between K-12 education, higher education and business. This study adds to the body of knowledge that helps the participants in collaborations prepare students for access to jobs and careers that contribute to individual and collective economic prosperity.

1.8 Summary

This K-16 study investigates how connections were initiated to form a school-to-work collaboration between stakeholders in K-12 education, postsecondary education, and businesses to enhance the preparation of the future aerospace manufacturing and aviation workforce. Because the segments of the K-16-workforce pipeline are operating separately and answer to different and

multiple jurisdictions, incentives to motivate connections that support collaboration between and among the segments of this pipeline are often lacking. Thus, there is a contradiction between the stated need for collaborative strategies and the inability to establish and sustain them. Through the conceptual framework of networking, the purpose of the study is to explore how educators, business partners and facilitators developed ties or networks to initiate a school-to-work collaboration to prepare students for jobs and careers in the aerospace manufacturing and aviation industries.

1.9 Reporting

Appendix C offers a definition of key terms used in this study. Appendix D displays Institutional Review Board Approval. Chapter Two contains a review of the literature undergirding and informing this study. Chapter Three provides a description of the detailed methods pursued in the study. Chapter Four relates the unfolding of the project in detail (the “story” of the project) with quotations from respondents’ interviews to enliven the presentation of this material. Chapter Five articulates a detailed analysis of the project story. Finally, Chapter Six presents a summary of the study, with implications for theory, research, and practice; limitations, and conclusions.

Chapter 2

Review of the Literature

2.1 Introduction

In this chapter, I identify five major themes in the contemporary literature that inform this study and relate the research within those themes to this study (Clark, 2007). They are introduced in sequential order and as a group provide a conceptual framework for this study with networking as the overarching domain. The first theme, preparing students for jobs and careers, is a foundational area given the projected workforce shortage in the aerospace manufacturing and aviation industries (Materna, Mansfield, & Deck, 2013; North Central Texas Council of Governments, 2013; Regional Workforce Leadership Council, 2013). The second theme addresses challenges associated with structuring collaboratives, including lessons learned from actual projects, also relevant to the exploration to be undertaken in this study. In the third theme, research associated with the role of intermediaries and how they operate in collaborative endeavors is examined. The fourth theme includes insights gleaned from research and practice in professional learning communities. Finally, the research on networking, including the strength of interpersonal ties, is the fifth theme, providing the conceptual framework to enhance the breadth and depth of this study's exploration.

2.2 Preparing Students for Jobs and Careers

We know that workforce preparation must begin in the K-12 system (Choy & Delahaye, 2011; Roberson, 2011). This workforce preparation process then continues into higher education and proceeds into jobs and careers (Coye, 1997; Kuchinke, 2013; Stipanovic, 2010). Connections between school and career help prepare students for jobs providing economic self-sufficiency (Venezia & Kirst, 2005). Students need proficiency in literacy, numeracy, problem-solving, interpersonal communication, information processing, self-management, and the ability to continuously learn to be prepared for employment in today's technology-rich environment (OECD, 2013).

The shortage of qualified workers in science, technology, engineering and math (STEM) fields adds urgency to the need to develop pre-college programs to create pipelines into these fields (Materna et al., 2013; North Central Texas Council of Governments, 2013; Regional Workforce Leadership Council, 2012; Siegel, 2007). Innovation in technology and engineering education is needed to augment and enhance academics with hands-on, project-based learning experiences. "Students need to work in small teams, brainstorm potential solutions, and design prototypes for their solutions. They need to continue to develop and apply the technical skills used in the industrial and business world" (Bevins, Carter, Jones, Moye, & Ritz, 2012, p. 11).

To complicate matters, each of the partners along the continuum connecting school to work can contribute to or detract from effective student preparation for jobs and careers by the ways in which they operate. For example, teachers who function as facilitators rather than traditional purveyors of knowledge are more likely to encourage student initiative and freedom to explore multiple career options and discover what choices fit their aptitudes and interests (Mittendorff, den Brok, & Beijaard, 2010). School counselors can assist students to navigate the path from high school to post-secondary educational options that align with their career interests (Packard, Leach, Ruiz, Nelson, & DiCocco, 2012). Higher education partners must increase their interaction with external stakeholders, especially business and industry, and they are expected to play a more active role in developing the skill needs of workers in modern knowledge-based global economies (Jongbloed, Enders, & Salerno, 2008; Coye, 1997).

The preparation of students for jobs and careers is a team enterprise. Multiple partners representing diverse stakeholder groups each bring a vital contribution that is necessary to achieve their ultimate shared goal of preparing students for jobs and careers. Their attention not only to their own contribution but also to the shared goal of the team is required to connect the separate segments of the education to workforce continuum. Cooper (2002) writes of the importance of teams of researchers, practitioners, and policymakers working

together to link program elements “through the pipeline, thereby enhancing students’ access to higher education” (p. 609).

Yet achieving these connections across organizational boundaries presents challenges. Coye (1997) states:

About three years ago, a new word cropped up in the lexicon of educators: the “disconnect.” Some neologisms vanish as suddenly as they appear, but this one proved especially hardy and useful, providing an easy way to describe lost connections or areas where linkages ought to exist but do not. (p. 21)

To avoid these disconnects, partners in school-to-work collaboratives must see themselves as interdependent and must be interconnected (Jongbloed et al., 2008). They must recognize that they need one another for the team enterprise to be successful. Fullan (2011) refers to the team enterprise as “collective capacity building” or “team-based capacity building” and says that “purposeful collaboration continuously contributes two interrelated powerful change forces . . . knowledge of ideas and practices, and identity or allegiance to one’s peers and the organization” (p. 92-93).

Another complication in preparing students for jobs and careers is the complexity of workforce preparation and the time it may require. Pre-college preparation programs to encourage students and their families to pursue postsecondary education are particularly important for low-income youth (Ng, Wolf-Wendel, & Lombardi, 2014). While we often refer to a “workforce preparation pipeline,” the preparation process is far from linear, and the term

pathways” is coming into widespread use because it is more descriptive of the preparation process. As stated by Jones, Yonezawa, Ballesteros, and Mehan (2002):

Pathways are preferred to the prevailing “pipeline” metaphor because the pipeline invokes the image of students poured into one end of a seamless conduit and flowing out the other end, thereby implying that college preparation and admissions processes are smooth and highly predictable. (p. 3)

The traditional comprehensive high school is being redefined to offer multiple student-centered pathways that allow students to customize their learning plans to suit their talents and interests and to equip them with skills needed for future jobs and careers (Monson, 1997). The Fort Worth Independent School District Gold Seal Programs of Choice exemplify this model in which students may choose programs of study and attend the high schools offering these programs, with transportation fully paid by the school district (Fort Worth Independent School District, 2014).

Various trajectories from K-12 through postsecondary education into jobs are being explored to offer alternative pathways to prepare the future workforce and to speed up the educational process. For example, dual credit programs, a widespread and rapidly expanding practice nationally, smooth the transition from high school to postsecondary education (Borden, Taylor, Park, & Seiler, 2013). In dual credit arrangements, high school students enroll in courses that count toward both high school and college credit, allowing the students to accumulate college

credits while still in high school and simultaneously accelerating the timeline for both college completion and workforce preparation (An, 2013; Giani, Alexander, & Reyes, 2014; Mansell & Justice, 2014; Pretlow & Wathington, 2014).

Work experience afforded to students by employers, through Career and Technical Education (CTE) or other co-op and internship programs, also enhances student career preparation and gives students an advantage when they enter the full-time job market. Classroom learning must be connected to the world outside the schools where students must be prepared to function in a global economy with jobs requiring 21st century critical thinking and learning skills (Pelton, Johnson, & Flournoy, 2004; Ralston, Hieb, & Rivoli, 2013; Roberson, 2011). Coyle (1997) describes applied learning models in this passage about the Core of Common Learning developed by Ernest Boyer and Arthur Levine:

In spatial terms, teaching and learning may begin in a classroom, but course work also spills over into the life of the campus and community. Students engage in experiential learning and co-curricular activities that take abstract ideas and anchor them in real-life problems . . . One of the hallmarks of the curriculum is its emphasis on service learning, and on applying what is learned in class to programs and internships beyond the college gates. (p. 25)

Work-integrated learning curricula require transformation on the part of both academia and industry (Choy & Delahaye, 2011; Jeffers, Safferman, & Safferman, 2004). To be prepared for the future, students must become workers who are lifelong learners and who can adapt to continuous and increasingly rapid change (Bevins et al., 2012).

2.3 Structuring Collaboratives

A review of the literature about structuring collaboratives is a foundational element of my research. Collaborative strategies are important to streamline connections between K-12 and higher education, interlacing the K-16 system with the future workforce (Garmston & Wellman, 2013). Connections between students and the businesses who are concerned with developing their future workforce need to be established early during students' tenure in the K-12 education system (Jeffers et al., 2004; Pelton et al., 2004; Ralston et al., 2013). Making those connections can be more difficult than it would appear, underscoring the need for collaborative strategies, since the K-16-workforce continuum may contain disconnected segments rather than a smoothly articulated system (Coye, 1997; Takahashi & Smutny, 2002).

The linear education/workforce pipeline is being replaced by multiple pathways leading into college and career. Diverse programs of study allow students to choose pathways reflecting their skills and interests, beginning in their K-12 education experience and continuing into their postsecondary education pursuits. They may enter and exit from their educational journey at certain junctures for economic or other reasons. These varying trajectories add complexity, such that stakeholders collaborating on school-to-work projects often encounter difficulty in structuring transitions from K-12 education to postsecondary education and into the workforce (Choy & Delahaye, 2011; Coye,

1997; Leung, 2013; White & Wehlage, 1995). Considering the ample publicity given to the importance of collaboration and the extent to which collaboration is encouraged, it is surprising to discover that barriers to collaboration exist.

Institutional barriers can complicate and delay collaborative processes, wasting time and money. Stakeholder groups seeking to align, link and streamline their endeavors can experience frustration (Coye, 1997; White & Wehlage, 1995).

Leung (2013) characterizes the challenge of collaboration across organizational boundaries: “While inter-organizational collaboration can be one of the methods used to help with increasingly complex social problems, it is never an easy or simple task.”

Liedtka (1996) defines collaboration as “a process of decision-making among interdependent parties” and states that collaboration across lines of business has received less attention than it deserves. Traditional industry boundaries are dissolving, increasing the need for collaboration across lines of business and challenging the viability and utility of independent business line “silos” isolated from one another. The concepts described by Liedtka (1996) about successful collaboration within a business can inform effective strategies for collaboration across stakeholder groups, such as the school-to-work collaborative project that is the subject of my research.

The research of McGrath, Donovan, Schaiier-Peleg, and Van Buskirk (2005) provides insights about collaborative strategies and lessons learned in

actual K-16 educational reform projects. Three forms of collaborative structures are described: program, pathway, and policy structures. The challenges inherent in each model are discussed. Stages of collaborations and their sequential steps are also included, such as the seven factors that promote collaboration during the launch stage. Other useful sources about structure deal with engaging the community outside the K-16 system, with guidance on how to attract and involve multiple stakeholders surrounding the K-16 system in collaborative projects. Valuable stakeholders include the faith-based community, social service agencies, governmental and regulatory authorities, nonprofit groups, and businesses (Takahashi & Smutny, 2002; White & Wehlage, 1995).

There is a significant body of research that identifies the characteristics of effective partnerships such as shared power, group cohesion, and cooperative goal-setting and planning (Fullan, 2011; Orchard, King, Khalili, & Bezzina, 2012; Strier, 2011). Teamwork is a popular term, the topic of countless textbooks, practitioner guides and seminars, and something considered important without a doubt. Yet despite the fact that leaders continuously tout the value of teamwork, it is ironic that many organizations fall short when it comes to actually implementing practices that build teamwork (Warrick, 2014).

Liedtka (1996) identifies several factors that contribute significantly to successful collaborative outcomes of real strategic value. These factors include “a partnering mindset, a partnering skill set, and a supportive context that provides

commitment, processes and resources to facilitate collaboration” (p. 24). More needs to be known about the relationship between partnership characteristics and successful outcomes, and the degree to which successful outcomes are sustained (McNall, Reed, Brown & Allen, 2009).

2.4 Role of Intermediaries

Granovetter (1973) explores the strength of interpersonal ties in his analysis of social networks and describes how individual “micro” weak ties linked together can form larger “macro” strong ties. His research explores how interaction in small groups becomes translated into larger patterns. He illustrates that weak ties in which dissimilar people connect with one another actually produce a chain of connections that in the aggregate forms strong ties. Individuals who have not worked together previously or have only met once or twice are considered to have weak ties. This means they are unencumbered by knowledge they may have acquired, favorable or unfavorable, about their teammates from working together with them in the past. This opportunity to begin a team project without preconceived notions about the people on the team can accelerate positive action and embolden team participants to express themselves freely. Individuals can improve their likelihood of achieving change not only by establishing bonds within their primary network, but also by “bridging” into other communities by developing relationships with others distant from them. These bridges are the weak ties that connect the networks. Linking is another concept explained by

Granovetter involving access to power and influence. Various combinations of bonding, bridging and linking can produce different outcomes within network structures (Kamp, 2009).

Structural holes theory (Burt, 1992, 1997; Walker, Kogut, & Shan, 1997) illustrates how connections between diverse stakeholders (for example, education and business) can be enhanced by the presence of a facilitator who operates between the two systems with enough knowledge of each one to bring them together. “Brokers” who are familiar with just enough of each stakeholder’s identity “stand in the structural holes” between disconnected constituencies and facilitate the flow of information between people. The image of the disconnected people standing on opposite sides of the hole is a perfect metaphor for K-12 versus higher education, administrators versus faculty, business stakeholders versus education stakeholders, community colleges versus research universities and countless other “divides” based on race, ethnicity, class, gender and so forth that discourage people from working effectively together. The brokers standing in the structural holes occupy an entrepreneurial function. They span the structural hole by maintaining relationships and contacts with people on both sides of the hole, having access to information flows from both sides of the hole, and bridging the communication gap between the disconnected networks so that information can flow freely.

Further developing their structural holes theory, Burt, Jannotta, and Mahoney (1998) provide insights about the relationship of personality to network structure and operation. They conducted research using a “network entrepreneur personality index” to study personality distinctions in network functioning. They found that:

Individuals who pursue the benefits of structural holes (entrepreneurs in the language of the argument) are more the authors of their own social world. Establishing relations with otherwise disconnected people means negotiating ambiguity and conflicting demands, it means being an outsider. Remove the entrepreneur’s ties to otherwise disconnected groups, and the groups drift apart. (Burt et al., 1998. p. 74)

Gargiulo and Benassi (2000) explore the debate between cohesive, strong ties that foster cooperative networks and looser, weak ties bridging structural holes. Insight into social capital theory is useful in examining this debate as it relates to the role of intermediaries and brokers, those collaborators who bring about cooperation and collective action. Bourdieu (1986) views social capital as a resource assisting individuals to increase their access to economic and social mobility. Coleman (1988) expands this view of social capital from individuals to groups that form networks of collective action based on mutual trust and reciprocity. Putnam (1995) describes social capital as referring to “features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (p. 67). These traditional views of network closure (Coleman, 1988; Putnam, 1995) as a beneficial influence on

the operation of networks and collaborations differ from the views espoused by structural holes theorists who do not see network closure as a beneficial influence. Structural holes theory (Burt, 1992, 1997) opines that the lack of network closure, rather than being an impediment, actually creates greater network flexibility and is desirable to stimulate change and progress in cross-functional teams. The safety of cohesive ties may lead to rigidity, in contrast to the flexibility provided by networks rich in structural holes. These two contrasting viewpoints related directly to my study to help me seek and discern the existence of weak and strong ties and observe their effect on a specific school-to-work collaborative network project.

The research of Goyal and Vega-Redondo (2007) explores the incentives or “payoffs” for individuals operating in collaborative networks. Their findings describe the ways in which individuals maneuver to gain rewards and benefits from positioning themselves strategically in the network. They behave in ways to become important players in the network and thus gain benefits from the network. Three types of incentives are discussed: incentives that can create surpluses, extract rents, or circumvent intermediate players. These insights equipped me with a more nuanced understanding of behaviors that I observed while conducting my study of a specific school-to-work collaborative network.

Burke (2011) emphasizes further exploration of networks and organizational structure as the “next frontier” of research. He suggests that we

need to find out more about “why there is so much talk about teamwork, with so little real action” (p. 319). He characterizes networks as “composed of nodes, where pivotal people serve as connectors . . . and gatekeepers, those who facilitate or impede entry and participation in the network” (p. 321). This exploration of networks pertains directly to the function and interactions of educators, business partners and facilitators in a school-to-work collaboration. Facilitators may be employed by and housed within one of the partner organizations, or they may be found in a third-party intermediary organization such as a local Chamber of Commerce or a local United Way.

Boundary-spanning theory explores how relationships among multiple stakeholders foster mutual understanding and promote mutually beneficial cross-institutional strategies (Aldrich & Herker, 1977; Bergenholtz, 2011; Friedman & Podolny, 1992; Marrone, 2010; Weerts & Sandmann, 2010). Bergenholtz (2011) presents a case study that examines “how this spanning of technological boundaries and a network structure of weak ties influences the opportunity to broker knowledge . . . inter-organizational knowledge brokering refers to the process of bridging disconnected ideas from at least two distant organizations.” His findings imply that weak ties reduce the risk of “unwanted knowledge spillover.” This means that if an organization can span both technological boundaries and weak ties, that organization is in a unique and desirable knowledge brokering position. The findings of Bergenholtz (2011) inform my study because the

information exchange involved in the aerospace manufacturing and aviation curriculum development project that I examined in my study is highly technical, and also because many of the relationships in the curriculum development collaborative were characterized by weak ties.

Boundary spanners interact with members of different groups, conduct different kinds of exchange between groups, and may be differentiated so that more than one person occupies the boundary spanning role (Friedman & Podolny, 1992). The roles of establishing and maintaining task ties and socio-emotional ties are two distinct roles, require different skill sets, and may be performed by different individuals. Friedman and Podolny (1992) address role conflict among boundary spanners who must operate in systems external to their own where they may encounter resistance. Distrust can be triggered, hampering progress of the collaboration. Game-playing by masking one's true feelings to "keep the peace" is another strategy that entails risk, because it "depends on the ability of the negotiators to maintain this delicately balanced performance, and it may leave even the most skilled negotiators too little room to maneuver if more radical changes need to be negotiated" (p. 31). All of these tactics reduce the ability of the boundary spanner to create and sustain the desired bridge between organizations.

Friedman and Podolny (1992) analyze the boundary spanning role and identify two components that are typically performed by different people: "a

gatekeeper, who is a conduit for inflows to the group of which the boundary spanner is a member, and a representative, who is a transmitter of outflows from the group of which the boundary spanner is a member” (p. 32). Their research findings suggest that causes of role conflict may be structural rather than psychological. They propose that boundary spanner role conflict could be reduced or mitigated by assigning different people to occupy the gatekeeper and representative roles so that people possessing the requisite skills for those positions are placed in them.

In contrast, Weerts and Sandmann (2010) express a less structured view of boundary spanners’ roles, believing that individuals can perform varying tasks as circumstances demand. They created a model that identified four roles of boundary spanners: internal engagement advocate, external champion, technical expert and community-based problem solver. Depending on circumstances, individuals can shift between roles. Boundary spanners’ responsibilities include negotiating “power and balance between the organization and external agents to achieve mutual objectives, and they also represent the perception, expectations, and ideas of each side to the other” (p. 638).

Williams (2002) focuses on the skills, competencies and behaviors of individuals operating as boundary spanners. He opines:

Strategic alliances, joint working arrangements, networks, partnerships and many other forms of collaboration across sectoral and organizational boundaries currently proliferate across the

policy landscape. However, the discourse is positioned at an institutional and organizational level, and comparatively little attention is accorded to the pivotal role of individual actors in the management of inter-organizational relationships. (p. 103)

He further characterizes boundary spanning as an art. He profiles the boundary spanner with characteristics and behaviors such as “entrepreneur and innovator, ability to engage with others, catalytic leader, building and sustaining trust, and managing a “balancing act between inclusion and separation, dependence and autonomy” (2010, p. 110-113).

Team boundary spanning refers to external team processes in which team members deal with parties outside the team itself. Marrone (2010) states:

External team processes (i.e. team boundary spanning) are distinct, however, in that they capture the interactions *across* the team to parties in the embedding environment such as clients, customers, industry experts, and other mutually interdependent teams (rather than capturing the interactions across the team members as is the case in internal team processes). Consequently, analogous to team members nested within their team, teams that boundary span are additionally nested within their larger set of relationships (be these dyadic, triadic, or greater. (pp. 914-915)

This explanation describes the configuration of the team that is the focus of my study. The curriculum development team that I studied includes multiple representatives from business, community college, and K-12 education. They are engaged in an interdependent team relationship with a shared goal of creating high school curricula in aviation and aerospace manufacturing.

A useful reference to gain a deeper understanding of the behaviors, functions and outcomes within boundary spanning actions can be found in a table

displaying a “Taxonomy of Boundary Spanning Actions” (Marrone, 2010, p. 917). Three behavioral categories are described, and four aspects are defined for each behavioral category. For example, the behavioral category called “coordination of task performance” is described as “actions that coordinate work activities with interdependent entities to accomplish task goals.” The “nature of the target” states “to those of equal power, e.g., other interdependent teams.” The “primary functions/objectives” include “synchronize work efforts, inputs, and outputs of interdependent entities; monitor strategy; and progress toward joint goal achievement.” The “level of coupling/interdependence” is “high.” And finally, the “representative outcomes” column includes three subsections: team, target, and organization(s) with separately defined outcomes. In this example, the team and target are combined, and the outcomes are listed as follows: “lateral support and cooperation, shared awareness of dependencies, meeting deadlines, team efficiency, quality planning, coordination, and communication across entities.” The outcomes for the organization(s) are “synchronization of efforts, organization learning, adaptation, efficiency in operations, and achievement of organization/cross-organization goals.” These concrete examples of what boundary spanning and interdependency look like and how they operate helped me interpret what I observed while conducting my study.

2.5 Professional Learning Communities

For several decades, the practices of professional learning communities (PLCs), centered primarily in the education system, have been widely examined. These practices, especially those concerning collaboration, provided guidance to inform the design of this study. Vanderlinde and van Braak (2010) acknowledge the gap between educational research and actual practice and the need, despite progress, for greater team collaboration in professional learning communities. To achieve greater team collaboration, leadership styles are evolving from leader-centered to interactive, transformational models (Northouse, 2010).

The partners in professional learning communities can be defined narrowly, within a single school, or broadly, to encompass business and community partners involved in a school-to-work collaboration. School-to-work collaboration presents challenges, however, as described by Kamp (2009) in an example from Australia about the resistance to change by schools. In a global economy, we all face similar challenges as we endeavor to collaborate across systems. I selected this example because the problems described could easily have been drawn from a similar situation in any number of other countries, including the United States:

There was also some argument in the local community that schools had not gone far enough in conceptualising new models of post-compulsory education . . . they were constrained both by their existing operational structures and by the remnants of the competitive culture that had framed their philosophy for a

considerable time. As a result, because of how vested they were in their own journey of innovation - upon which their financial viability continued to depend - some of the most innovative education and training providers became progressively more obstructive of the process. (p. 478)

Systemic processes, their principles and practices, are thoroughly explored by Senge (2006). He characterizes learning organizations (such as professional learning communities) as consisting of systemically connected parts that inevitably affect the whole. Senge teaches his readers to apply systems thinking to reach fundamental solutions that address core problems and issues deeply rooted within organizations. He shows how, in systems thinking, every separate process is ultimately interconnected. By dealing only with the parts of the process that you can see and that touch you directly, we overlook other parts that have an impact on the outcomes we wish to achieve. This insight relates directly to the challenge of connecting the segments of the K-16-workforce continuum in which K-12 education, higher education, and workforce are separate systems.

At the core of systems thinking, also known as the Fifth Discipline, are the other disciplines, which include Personal Mastery, Mental Models, Shared Vision, and Team Learning. Proper utilization of the four-discipline “orchestra” will help organizations adopt a systems approach to learning. Senge utilizes a three-legged stool analogy to explain the support provided by each discipline towards the organization’s learning capability, with the three legs being aspirations, understanding complexity, and reflective conversation (Senge, 2006, p. xiii).

Personal Mastery relates to the individual's commitment to lifelong learning, ability to derive meaning and purpose from a personal vision, and commitment to developing oneself. A personal vision is a "calling;" people are doing what they feel passionate about and are energized, enthusiastic, and willing to persevere through difficulties. It is important to note the innate connection placed on the organization's capacity to learn and that of the individual. To the extent that leaders in an organization are serious about their quest for personal mastery and are able to encourage others in their own journey, the organization will benefit (Senge, 2006).

Mental Models are often unconsciously constructed maps of how the world functions and the roles that organizations, individuals, and the environment play in constructing meaning. These mental models can help or hinder progress toward the systemic thinking characterizing a learning organization. Mental models, deeply ingrained, can easily remain unexamined, meaning that people do not share, reveal, discuss and productively assess the applicability of their varied mental models to addressing the challenges at hand. Because change is constant, mental models must be regularly examined to ensure they are suited for and keeping pace with meeting the challenges of current and projected threats and opportunities facing the enterprise. Leaders must encourage a climate of openness, self-disclosure, reflection, inquiry, and constructive dialogue to prevent outdated mental models from becoming entrenched (Senge, 2006).

These ideas about mental models relate directly to the challenge of developing connections between K-12, higher education, and the future workforce. Each of these components of the continuum operates within a separate system, each equipped with its own mental models that are accepted and reinforced within those separate systems. In collaborative projects, these same mental models may very likely present significant barriers to progress for the system as a whole.

While Senge (2006) recognizes shared vision is not a new concept in leadership, he stresses the importance of shared vision as a catalyst for individual learning. Reciprocally, when individuals' personal visions align with the organization's vision, a powerful synergy results, unleashing energy and commitment because the visions are heading in the same direction, toward the same goals. Senge illustrates the vast difference between mere compliance with a vision and genuine commitment to a vision. Commitment, the desired state, cannot be mandated or demanded. It develops, with the help of inspired leadership, when individual visions are supported, reinforced, and celebrated, building momentum for an ever-expanding collective vision, aligned toward the same purposes and goals.

And finally, the power of the collective learner is highlighted under the Team Learning discipline. Senge (2006) explains team learning as the team's ability to engage in constructive dialogue that leads to the creation of new

knowledge.

DuFour (2004) describes collaboration as a systemic process linked to outcomes such as school improvement or student achievement and characterized by teachers working together to achieve deep team learning. The concepts introduced by DuFour about professional learning communities within schools can be applied more broadly to collaborations involving multiple stakeholders, such as the K-12 education, community college, and business collaboration which is the subject of my study. DuFour (2007) compares and contrasts three models of leadership: autocratic, laissez-faire, and loose-tight. The blended leadership of loose-tight is an artful balance between autocratic and laissez-faire styles.

Autonomy and creativity are fostered (loose) within a systematic framework that stipulates clear priorities and parameters (tight). Loose-tight is considered the most promising approach to bring about the structural change and cultural change that must exist for systems to undergo comprehensive systemic change. Dufour (2007) acknowledges the difficulty of change by noting that people will typically seek to preserve the status quo of the system to which they are accustomed and “will be inclined to filter improvement initiatives through the lens of the existing culture, distorting the initiative to fit the culture rather than changing the culture to align with the initiative” (p. 41).

Insights from Uhl-Bien, Marion, and McKelvey (2007) about shifting leadership from the industrial age to the knowledge era relate directly to the

challenges faced by professional learning communities today as well as collaborations involving multiple stakeholders working across organizational boundaries. They propose a leadership framework called Complexity Leadership Theory that is based on the concept of complex adaptive systems (CAS). Uhl-Bien et al. (2007) state:

Complex adaptive systems (CAS) are neural-like networks of interacting, interdependent agents who are bonded in a cooperative dynamic by common goal, outlook, need, etc. They are changeable structures with multiple, overlapping hierarchies, and like the individuals that comprise them, CAS are linked with one another in a dynamic, interactive network. (p. 299)

These concepts describe a new kind of leadership unlike the bureaucratic, top-down framework that emphasizes control and dominance. It resembles DuFour's loose-tight structure in which an orderly structure still exists, but within that framework, creativity and spontaneity are encouraged. Change can occur nonlinearly and in unexpected places, and "agents, events and ideas bump into each other in somewhat unpredictable fashion, and change emerges from this dynamic interactive process" (Uhl-Bien et al., 2007, p. 302). These concepts offer guidance for practitioners in multi-stakeholder collaborations attempting to create articulated pathways from school to work.

2.6 Networking

The conceptual framework serving as a lens through which to view the practices, processes and roles that were examined in this study is networking.

Networking theory pertains directly to the function and interactions of educators, business partners and facilitators in a school-to-work collaboration. Research on networking (Ahuja, 2000; Burke, 2011; Burt, 1992, 1997, Burt et al., 1998; Granovetter, 1973; Walker et al., 1997; Weerts & Sandmann, 2010; Whitchurch, 2010) involves fostering understanding among multiple stakeholders, bridging gaps between diverse institutional cultures, and promoting mutually beneficial cross-institutional strategies. This body of research relates to the functions performed by facilitators, a focus of this study. Networking theory helps frame my study because of its relevance to the functions performed by facilitators.

Individuals proficient in networking are described as having successfully developed “blended identities” that allow them to bridge the gap between distinctly different institutional cultures (Whitchurch, 2010). The development of these identities is an activity fraught with challenges. Whitchurch (2010) describes factors that epitomize the cultural differences between the education community and the business community, presenting challenges to those attempting to form collaborative networks. Issues associated with process and bureaucracy differ across education and business cultures. For example, academic work is typically more open-ended and less constrained by short-term, repetitive production cycles that characterize the work of many businesses. These differences can produce challenges and tensions when individuals and groups are attempting to work collaboratively across organizational boundaries. Eventually

the partners reach reconciliation, because they wish to contribute to (and benefit from), a joint endeavor, because they have an ideological commitment to the initiative, and because they understand that unless they work together the initiative could not happen (p. 631-632).

Whitchurch (2010) touches on the facilitation role in her description of the “business and industry liaison manager” working with higher education partners to develop industry training programs. This manager went through the successive stages of frustration and reconciliation as the partnership evolved. He eventually reached the stage at which his behavior was described as “encouraging and enabling academic colleagues to contribute in environments that might be new to them . . . helping local students to progress their careers, local businesses to build capacity” (p. 635).

Granovetter (1973) illustrates that weak ties between dissimilar people can produce a strong collective connection. These weak ties, when joined or linked together, actually produce a chain of connections that in the aggregate forms strong ties. He offers this description of strength of ties:

Most intuitive notions of the “strength” of an interpersonal tie should be satisfied by the following definition: the strength of a tie is a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding) and the reciprocal services which characterize the tie. Each of these is somewhat independent of the other, though the set is obviously highly intracorrelated. (p. 1361)

Granovetter's research explores the relationship between interpersonal ties and networks. He explains that his network models are not meant to apply to small, confined groups, but to linkage of small groups to one another. He notes that weak ties are effective in linking members of *different*, not similar small groups. As an example, he examines why some communities organize for common goals more easily than others and suggests that weak ties among dissimilar groups facilitate organization. Contrast a community with groups that are not tied to one another and do not know one another with "a community completely partitioned into cliques, such that each person is tied to every other in his clique and to none outside. Community organization would be severely inhibited" (Granovetter, 1973, p. 1373).

Granovetter also touches on the role of individuals with many weak ties, calling them "liaison persons" and describing them as occupying "bridging" roles. This characterization is reminiscent of the facilitator and broker roles identified in my study and described in later research on networking such as structural holes theory (Burt, 1992, 1997; Walker et al., 1997).

Burke (2011) explores the importance of networks and organizational structures that enhance teamwork. He addresses how networks help improve the functioning of traditional organizational structures, fraught with divisions and "silos" that can impede and impair the progress of cross-functional teamwork. Burke opines that "the more units of an organization are interdependent, the

tighter the system, and the less there is interdependence, the more likely the system is characterized as loosely coupled” (p. 323). Burke’s discussion about loosely and tightly coupled systems and interdependence is reminiscent of the ideas of Granovetter (1973) about the apparently paradoxical functioning of strong and weak ties. Granovetter’s weak ties seem similar to Burke’s loosely coupled systems, and Granovetter’s strong ties resemble Burke’s tightly coupled systems.

Burke refers to the “loose-tight conundrum” in which loosely coupled systems sometimes permit more flexibility among interdependent teams and “tend to isolate and prevent problems from affecting the entire organization” (p. 325). While these characteristics of loosely coupled systems sound like advantages, they may not suit every organizational need or demand. For example, tightly coupled, highly structured systems, while they limit flexibility, may be the preferred mechanism to effect large-scale, system-wide change. Burke states “loose coupling can lead to greater effectiveness but can also lead to the opposite . . . it depends heavily on how effectiveness is defined and measured” (p. 325).

2.7 Summary

In conclusion, an exploration of the literature associated with five major themes informed and guided this study. The logical progression of the literature search began with investigation of the research about preparing students for jobs and careers. This body of knowledge revealed unequivocally that the preparation

of students for jobs and careers requires participation by multiple stakeholders, including K-12 education, higher education, and businesses. Guidance on how to meet this challenge is found in the research about structuring collaboratives and how to bring together diverse stakeholder groups to establish and reach shared goals.

The next logical step was to investigate in greater depth how these collaboratives actually work, including the roles and responsibilities of the participants. This exploration revealed the importance of the role of intermediaries, facilitators, and brokers in collaborations to bridge the divide between and among dissimilar stakeholders. Research concerning the role of intermediaries turned out to be a rich source of knowledge to undergird the current study.

Next in the quest for relevant literature came an investigation of professional learning communities and lessons learned. Finally, the research on networking, the conceptual framework of this study, culminated the literature search. In summary, the relevant themes in the literature review are preparing students for jobs and careers, structuring collaboratives, the role of intermediaries, professional learning communities and networking.

Chapter 3

Procedures/ Methods

3.1 Introduction

For this phenomenological study, qualitative methods were used to discover, explore and understand how representatives from K-12 education, higher education, and business representatives from the aviation and aerospace industries initiated a school-to-work collaborative. This is an explanatory case study (Yin, 2014) describing the experience of ten individuals, four from K-12 education, three from higher education, and three from business, all of whom were key participants in a high school curriculum development project. The purpose of their project was to infuse experiential learning pertaining to the aviation and aerospace industries into classroom curricula and activities so that students would gain an understanding of the work being performed in those industries and develop an appreciation of what it takes to qualify for future jobs and careers. Their project related to the purpose of my study; I was able to observe the partners in action as they performed their collaborative activities.

3.2 The Current Study

The results of a 2013 pilot survey signaled the need for additional research, setting the stage for the current study. A recently established school-to-work collaborative involving Bell Helicopter, the Tarrant County College

Opportunity Center and Dunbar High School in the Fort Worth Independent School District was the focus of the current study. The collaborative was addressing curriculum development for the aviation program at Dunbar High School, where curricula for ninth and tenth grades had not yet been developed when the project began in Fall 2013. The aviation program at Dunbar High School seeks to offer opportunities for students to earn licensures or certifications and to enroll in dual credit courses to prepare themselves to qualify for jobs in the aerospace manufacturing and aviation industries. A smoothly articulated trajectory in which the various options are clearly defined is the ultimate goal, not yet realized. The aviation curriculum development project for ninth and tenth grades that I studied for this research is an important component leading toward achievement of the ultimate goal.

3.2.1 Research Questions

This study sought to answer four research questions:

1. What occurs in collaborative projects designed to connect business and education that aim to increase workforce preparation for the aerospace manufacturing and aviation industries?
 - a. What practices and processes are found that build connections?
 - b. What are the roles of facilitators and/or brokers in this process?

2. In what ways does the conceptual framework of networking explain the practices, processes and roles of facilitators/brokers in collaborative projects?
3. How useful is the conceptual framework of networking for explaining education and workforce collaboratives?
4. What other realities of collaboration are revealed in this study?

3.2.2 Data Needs

Perceptions of K-12 education, higher education and business stakeholders and facilitators about collaboratives were the data needed to complete this study. The study examines the facilitation process in a specific school-to-work collaborative in the aerospace manufacturing and aviation industries. The study also sought to shed light on the usefulness of networking theory for explaining education and workforce collaboratives.

3.2.3 Data Sources

To address my research questions, I sought to identify prospective interviewees with relevant experience and knowledge. To determine who those individuals might be, I sat in on both the engineering working group meetings and the larger partners' meetings. The working group met every other week to create curricula to deliver aviation and aerospace manufacturing knowledge and skills to high school students. The meeting participants were Bell Helicopter, Tarrant County College, and Fort Worth Independent School District representatives

selected by their organizations to work on the project because of their specialized knowledge. Every other month, members of the aviation and engineering work groups, along with higher-level managers of the participating entities, attended a partners' meeting to help keep senior management informed of progress and to provide opportunities to bring forward and discuss problems and challenges.

Prior to conducting my research, I was aware of the existence of this collaborative based on statements made by representatives of Bell Helicopter saying that if they did not begin now to reach into the public school system to develop their future workforce, they would not be able to find that workforce otherwise. Bell Helicopter and other North Texas aviation and aerospace manufacturing businesses realized that connections between students and the businesses with projected future workforce needs must begin early, while students are still in the K-12 system (Jeffers, Safferman, & Safferman, 2004; Pelton, Johnson, & Flournoy, 2004; Ralston, Hieb, & Rivoli, 2013). A continuum of preparation from K-12 into postsecondary education to equip students with knowledge and skills to qualify for aviation and aerospace manufacturing jobs and careers must then follow (Materna, Mansfield, & Deck, 2013; North Central Texas Council of Governments, 2010, 2013).

The collaborative was initiated in Fall 2013 by Bell Helicopter (the primary aerospace business leading the curriculum development project), Tarrant County College Opportunity Center, and members of the Fort Worth Independent

School District Career and Technical Education staff as well as the aviation teacher from Dunbar High School. Dunbar High School is conveniently located next door to the Tarrant County College Opportunity Center. I familiarized myself initially with the process they were following for curriculum development, with particular attention to the roles occupied by Dunbar High School, the Fort Worth Independent School District, Tarrant County College Opportunity Center, and Bell Helicopter, the primary business stakeholder.

Curriculum development meetings were conducted approximately twice a month at the Tarrant County College Opportunity Center training facility adjacent to Dunbar High School. At the start of the project, there was one large curriculum development working group. Within a few weeks, it became evident that the work could be done more efficiently if two smaller groups were formed to address somewhat different needs in the curricula. The two curriculum development working groups that were established, both still encompassed within the overall aviation and aerospace manufacturing curriculum development effort, were aviation and engineering. Bell Helicopter, Tarrant County College, and Fort Worth Independent School District representatives participated in both working groups. Each group had up to a dozen participants, although attendance varied meeting by meeting. The engineering group was the one I attended regularly after the large group was divided into two groups. I kept handwritten field notes beginning with the first meeting I attended and stored them by date in a specific

folder that I could easily refer to. In the engineering curriculum development group, I observed that some participants among the approximately twelve possible attendees were quite regular in their attendance, and those regular attendees were the individuals I selected to invite for interviews.

3.2.4 Description of Interview Sample

The cumulative experience I gained by participating in these curriculum development meetings gave me an appreciation of the complexity of the work being performed. I began to have an understanding of the personalities of the individuals involved. I was able to identify ten potential interviewees, three from Bell Helicopter, three from Tarrant County College Opportunity Center, and four from the Fort Worth Independent School District. To clarify, not all of these individuals selected for interview participated in the curriculum development group I observed. My interviewees also included senior management of each stakeholder group and thus represented the larger project.

For the Fort Worth Independent School District representatives, I selected two from Dunbar High School and two from the Fort Worth Independent School District Career and Technical Education Department. I assigned pseudonyms to each participant listed below and will describe them in detail:

Bell Helicopter: Bob, Brent and Byron

Tarrant County College: Carol, Charlie and Cedric

Fort Worth Independent School District: Elsa, Edward, Ernest and Edward

3.2.4.1 Bell Helicopter

The three Bell Helicopter interviewees were Bob, Brent and Byron. Bob, the most senior-level Bell Helicopter employee on the project and (by his own frequent admission) close to retirement, was a hard-driving, highly focused business leader with many years of experience in technical training. Bob initiated the collaborative curriculum development effort, along with his counterparts in Tarrant County College and the Fort Worth Independent School District. Bob repeatedly articulated the business need to develop the future aviation and aerospace manufacturing workforce, encouraging and pushing the team forward, never losing sight of the ultimate goal. He was considered the primary “visionary leader” of the project. Brent and Byron both reported to Bob at Bell Helicopter and also had extensive experience in technical training functions. They were considered experts in their respective specialty areas. Brent had about 25 years of experience and was in charge of computer numerical control (CNC) technical training at Bell Helicopter. Computer numerical control refers to precisely programmed automation of machine tools to produce machine parts formerly produced manually (CNC Concepts, Inc., 2007). Byron had several decades of experience and directed the composite bonding activity. Composite bonding is increasingly important in aviation and aerospace manufacturing today. It involves high-temperature production of adhesively bonded materials including

lightweight non-metallic substances that are fused to heavier metals to result in a lighter, stronger composite structure (Federal Aviation Administration, 2013).

While Brent had always worked in industry, Byron had worked for Tarrant County College as a technical trainer in composite bonding prior to working at Bell Helicopter. Brent and Byron attended all the working group meetings where the detailed curriculum development work was performed. Bob, as the recognized business “driver” of the project, typically did not attend the small working group meetings, trusting this responsibility to Brent and Byron. Bob chaired the partners’ meetings that occurred every other month.

3.2.4.2 Tarrant County College

The three Tarrant County College interviewees were Carol, Charlie, and Cedric. Carol directed the college’s Corporate Services Training Department, in which customized training for businesses is developed and presented, using grant funds from various sources, most frequently from the Skills Development Fund from the Texas Workforce Commission. Carol, a mid-career executive with perhaps 20 years of experience, was the most senior-level manager involved in the project from Tarrant County College. Carol had known Bob for six or eight years prior to the curriculum development project because they had worked together on other customized training projects for Bell Helicopter. Carol shared Bob’s vision for the project and contributed much positive energy and enthusiasm to the enterprise. Cedric and Charlie both reported to Carol and attended the small

working group meetings on a regular basis, while Carol usually attended only the partners' meetings. Cedric was a community college generalist with several decades of experience in various community college roles, bringing to the project in-depth knowledge of the intricacies associated with community college regulations, approval processes, and course development. Cedric functioned as Carol's representative at the small working group meetings and attended regularly. The third Tarrant County College representative, Charlie, headed the college's technical training in computer numerical control (CNC) machining. Charlie had approximately 25 years of work experience, and in his current role, he was the Tarrant County College trainer for the computer numerical control (CNC) continuing education courses being conducted at the Tarrant County College Opportunity Center, the site of the project meetings. Charlie had work experience in human resources as well as technical training and had already worked closely with Brent, his primary contact at Bell Helicopter for issues associated with computer numerical control (CNC) training.

3.2.4.3 Fort Worth Independent School District

The Fort Worth Independent School District interviewees were Elsa, Evan, Ernest and Edward. Elsa and Evan worked in central administration in the school district, and Ernest and Edward worked at Dunbar High School. Elsa, the most senior-level school district representative, directed the Career and Technical Education Department and brought approximately 25 years of experience to the

effort. She had extensive experience in Career and Technical Education in another school district prior to her tenure in the Fort Worth Independent School District. She demonstrated an enduring strong belief in and commitment to the project and shared information about the project externally by arranging presentations at education conferences and community meetings. Elsa was the main contact with Bob and Carol, and as a team, the three of them led the project forward. Evan, the curriculum developer, worked directly for Elsa and was the leader of the small working group in which Byron, Brent and Cedric participated regularly. Evan had approximately 25 years of varied and highly relevant experience in business and education environments that benefited the project immeasurably. He had an engineering degree, had taught at Dunbar High School, and had also worked in private industry prior to working in the Career and Technical Education Department with Elsa.

The Dunbar High School representatives were Edward, the principal, and Ernest, the aviation and aerospace manufacturing teacher. Edward, a charismatic leader with approximately 15 years of experience, was a huge champion of the project, attended the partners' meetings every other month, and regularly posted information on Facebook to cheer the team on. Ernest, himself a graduate of Dunbar High School, probably had about 15 years of experience. He had served in the military, earned an engineering degree, and had returned to his community to teach, to "give back." Ernest understood the students more than many teachers

would have based on his own experience growing up in the same community. He served his students not only as a purveyor of knowledge but also as a powerful example of a successful role model.

3.2.4.4 Ethnicity and Gender

Ethnicity and gender of the ten interviewees reflected some diversity. There were three White males from Bell Helicopter; a White female, a White male, and a Hispanic male from Tarrant County College; and a Hispanic female, a White male, and two African-American males from the Fort Worth Independent School District. The top-level leadership team of three included a White male and two females, one Hispanic and one White.

3.2.4.5 Education and Experience

All but one of the interviewees had a bachelor's degree or higher. Two had education doctorates, and one had a law degree. In terms of work experience, the groupings below include representation from more than one stakeholder group, except for the least experienced individuals who were at Dunbar High School. Since I did not inquire about their exact years of experience, these groupings below reflect estimates:

About 15 years of experience: Ernest and Edward at Dunbar High School

About 20-25 years of experience: Elsa, Evan, Carol, Charlie, Brent

Thirty of more years of experience: Bob, Byron, Cedric

3.2.5 Data Collection

The handwritten field notes that I prepared at or after each meeting were dated, stored and available for review in a folder that I could easily refer to. These field observations helped me determine whom to invite for interviews. One-on-one personal interviews were conducted during April and May 2014. Participation was voluntary and was requested with a letter and consent form. Appendix A contains the template approved by the Institutional Review Board on February 28, 2014, with a combined letter and consent form. These combined letters and consent forms were hand delivered to all ten of the individuals who were invited to be interviewed. All ten of them signed and returned the consent form within a time frame that ranged from two to ten days. It was encouraging that all ten agreed to participate.

The duration of the interviews was typically about 45 minutes. The location of the interviews was the work area of the interviewees, with one exception. One of the Fort Worth Independent School District interviewees, a senior manager, preferred to be interviewed off site. We went to a nearby restaurant and she ate lunch while I conducted and taped the interview, and it worked well. Eight of the interviews were held at the Tarrant County College Opportunity Center, which was the preferred location for all the Bell Helicopter interviewees as well as two of the Fort Worth Independent School District

interviewees. The interview of the Dunbar High School principal was held in the principal's office.

Loosely structured interviews using the same interview protocol for the three stakeholder groups (K-12 education, higher education and businesses) allowed for variations to tailor questions or add probes to address varying circumstances. For the Fort Worth Independent School District participants, interviews explored their job duties and how they interacted with students and with business to give students career awareness and career preparation opportunities. For Tarrant County College, the emphasis shifted to their job duties as they exposed the students to applied learning and specific skills development in aviation and aerospace manufacturing industries. For Bell Helicopter, the interviews explored how they introduced students to the applied learning aspects of the curricula and how those applied learning challenges related to job and career opportunities in their businesses.

For all of the stakeholder groups, interview questions incorporated exploration of their perceptions of the role of facilitators. In addition, all interviews explored the views of the respondents about how weak or strong ties may influence the practices and processes of the school-to-work collaborative. The interview protocol is supplied in Appendix B.

Within 24 to 48 hours after completion of each audio-taped interview, I finished the transcription. I then gave participants an opportunity to review their

own interview transcripts and make any changes they felt were needed to convey their thoughts as shared during the interviews. I offered to meet with them to discuss any changes. None of them felt the need to meet with me again, and only one of the ten wished to amend a few statements in her transcript. The meaning was not altered; she was simply attempting to make her descriptions more precise. This process took place with no difficulty.

Pseudonyms were assigned to each interviewee. In post-interview dealings with all interviewees, confidentiality continues to be protected. In accordance with The University of Texas at Arlington Institutional Review Board's policies, the tapes and interview transcripts will be maintained for a minimum of three years after completion of the study, after which they may be destroyed.

3.2.6 Data Analysis

Identifying the existence of networks, including weak and strong ties (Granovetter, 1973), was a primary focus of data analysis. Another emphasis was defining the role of facilitators and identifying individuals operating as facilitators, either self-identified or identified by others. I used the same interview protocol for all interviews, beginning with questions about what they did in their jobs and how they worked together. I then moved into asking questions to determine the extent to which relationships of the individuals participating in the curriculum development project were new or longstanding. I also explored whether the individuals were working together or had worked together on other

projects (suggesting stronger ties) or whether the curriculum development project constituted their only interaction (suggesting weaker ties). Through these inquiries, I sought to understand how these ties contribute to collaborative activities. I asked how they would describe the role of facilitators and which individuals in the curriculum development project were operating as facilitators. I concluded with questions about what they thought worked well and what worked not so well in the project.

I conducted data analysis by reviewing the field notes, followed by studying all the interview transcripts, sorting through them and identifying similar topics. These similar topics were then grouped into chunks or segments so that I could delve into the material, discern and code the most important themes relating to my research questions. Facilitation, project activity and relationships were three major themes that emerged from the information gleaned from the interviews and also from reflection on my ongoing participation in the working group meetings.

3.2.7 Criteria for Evaluation

Vigilant attention to validity threats (alternative explanations) was of paramount importance while conducting my study. Pursuing research in an area of my own expertise opens the possibility of researcher bias. My bias is typically in favor of business involvement in school-to-work collaborative efforts. I sought to guard against this by selecting interviewees with the requisite knowledge and experience to contribute to the study, and with most of whom I am not well

acquainted. I also favor the intentional establishment of a facilitator or facilitators in multi-stakeholder projects. I stayed cognizant of my own biases throughout the process of conducting this research.

Another danger was reactivity or reflexivity in the interview setting. I am personally involved in the area I am studying, meaning that the interview process could be tainted with my own knowledge, assumptions, and expectations. My interview protocol was reviewed by others to assist me in identifying subtly leading questions. Maxwell (2005) also guided me in managing reactivity and reflexivity threats, increasing the credibility of my conclusions. I collected “rich” data by taping interviews and doing verbatim transcriptions. Respondent validation was used to check for understanding, having people restate or rephrase what they said to eliminate unintentional bias on my part. The careful application of these techniques helped buffer my tendency to want to find positive results (Maxwell, 2005, pp. 110-114).

3.2.8 Timeline

As encouragement for others interested in this type of research, a brief discussion of the time required is offered. It took me approximately 20 months to complete both the pilot study and the current study. I was working in my full-time job at the Fort Worth Chamber of Commerce during this entire period. The pilot study, a Likert-type online survey, was designed and conducted between March 2013 and August 2013. I began work on the current study in September 2013,

including a large portion of the literature review, and I defended my proposal for the study in January 2014. I secured Institutional Review Board approval in late February 2014. The immediate next step, because seven of my ten interviewees were educators, was to gather my data before the educators completed their Spring 2014 semester. I scheduled, conducted and transcribed all ten audio-taped interviews by early May 2014. The rest of the writing followed between May and October 2014. Frequent interaction with my very helpful and knowledgeable dissertation chairs helped me to complete the study by October 2014.

3.3 Summary

This chapter describes the procedures and methods used to design this explanatory case study and to collect and analyze the data. Findings from a pilot study preceding the current study suggested the need for further research, guiding me to conduct the current study. The data needs, data sources, data collection and data analysis in the current study are explained in depth. Criteria for evaluation are discussed, to include guarding against validity threats, reactivity and reflexivity threats, and biases. The chapter concludes with a narrative describing the timeline associated with the study.

Chapter 4

Presentation of the Data

4.1 Introduction

This study examines how business and education partners initiated a curriculum development project centering on aerospace manufacturing and aviation for the Fort Worth Independent School District. The partners in the project were Bell Helicopter, Tarrant County College, and the Fort Worth Independent School District. These partners worked together as a team to create curricula where none existed before so that students in high school could begin to understand and aspire to employment in jobs in the aerospace manufacturing and aviation industries. The curriculum development meetings began in September 2013 and continued through the summer of 2014. They are expected to continue during 2015 and beyond.

4.2 Fort Worth Independent School District Gold Seal Programs of Choice

This section briefly describes the Fort Worth Independent School District's Gold Seal Programs of Choice (Fort Worth Independent School District, 2014), the overarching program for which the aviation and aerospace manufacturing curriculum needed to be created. Rather than create a stand-alone career and technology training center to serve the whole district, the Fort Worth Independent School District opted for a decentralized model. The Gold Seal

Programs of Choice offer multiple pathways to prepare students for college and career, with each high school specializing in several subject areas. The aviation and aerospace manufacturing area of study is available only at Dunbar High School in the Fort Worth Independent School District. Dunbar High School happens to be located within easy walking distance from the Tarrant County College Opportunity Center, a training center for continuing education where composite bonding, computer numerical control (CNC) machining, and other technical skills relating to the aerospace manufacturing and aviation industries are taught. Thus, Tarrant County College, and specifically, its Opportunity Center, was an ideal partner to undertake this curriculum development project in aerospace manufacturing and aviation, collaborating with Bell Helicopter and the Fort Worth Independent School District.

4.3 Curriculum Development Project

The curriculum development project placed emphasis on providing training to equip students with skills to obtain specialized certifications and licensures qualifying them to work as technicians in the aviation and aerospace manufacturing industries. These certifications and licensures typically can be earned in a two-year period or less. This emphasis on certifications and licensures raises the issue of how the value of further education, such as pursuing a four-year degree, was characterized in this collaboration. The value of a four-year degree was not minimized. In fact, it was greatly encouraged. However, unless the

aviation and aerospace industries can find the skilled workers they urgently need, they claim they will eventually be unable to operate their businesses, since so many of those skilled workers are at or near retirement age and will be departing from the workforce. For this reason, the immediate and pressing need for the aerospace and aviation businesses as evidenced in this curriculum development project was to develop the future skilled, non-degreed workforce.

At the start of the project, the grades to be addressed were 9, 10, 11 and 12. Of particular interest were the ninth and tenth grades, essentially bereft of relevant curricula for aerospace manufacturing and aviation, leaving teachers on their own to fill the time with their own content creation. As the team worked through development of the high school curricula, they decided to also reach into the middle school level to afford those students the opportunity to become familiar with aviation and aerospace manufacturing. Grades seven and eight were added to the scope of work in early spring 2014.

4.3.1 Working Group Meetings

During the project, two slightly different emphases were identified that caused the effort to bisect into two separate working groups within the overall curriculum development activity. The two working groups were aviation and engineering, both still within the overall umbrella of the aviation and aerospace manufacturing curriculum development initiative. Initially, these working groups met together. Their experience after a few meetings resulted in the decision to

hold separate meetings to continue the detailed curriculum development work they had begun to initiate jointly. They discovered it was more productive to meet separately to address aspects of the curricula that differed between aviation and engineering. Each of the separate groups could have as many as a dozen attendees at its meetings, although attendance varied meeting to meeting. Some attendees attended more frequently than others, and those “regulars” are represented among my interviewees. Comments made during the interview of Evan, the engineering group curriculum development leader, describe this decision process:

We originally planned that we would work together, and we have two distinct groups. We have one that is for engineering specifically, although it has an aviation flavor, and then we have the actual aviation courses themselves, which are very specific to Tarrant County College, and so, we originally met together. We would meet in a very large group, and then we broke from the large group into our smaller groups, and initially, the aviation curriculum coordinator would meet with me, her group and my group together. After about one or two meetings, we decided that we would just meet separately.

Once the meetings were separated, each curriculum development working group met twice a month on alternating weeks, so that some participants could attend both sets of working group meetings. One of the participants was Ernest, the aviation technology teacher at Dunbar High School, who describes his involvement in both working groups and the linkage of the two working groups:

With Bell, we work mainly twice a month doing curriculum writing, and then also myself, we meet twice a month over at Tarrant County College Northwest for the aviation maintenance technology course. Bell meets over here at the Tarrant County

College Opportunity Center with more of the engineering side of the house, and teaching composites and CNC machining. They all fall under aviation, but what you have is the students that are going the engineering route, and then you have the aviation maintenance technology students that are kind of going basically just maintaining the airplane. But they all fall into the same track.

Coordination between the two working groups' curriculum development leaders and their team members took place during the intervals between meetings. In-person coordination between the curriculum development leaders was convenient and readily available as well. Their office spaces were located next to one another, and in their positions as curriculum development specialists, they reported to the same supervisor in the Fort Worth Independent School District. All of these factors helped integrate the two working groups within the overall project strategy.

4.3.2 Partners' Meetings

Additionally, the aviation and engineering working groups kept in touch by coming together every other month at the larger partners' meetings. These partners' meetings included members of the two working groups as well as higher-level managers from the three partnering entities. The partners' meetings helped keep senior management informed of progress and offered an open forum to address issues and concerns. Bob, the most senior-level participant from Bell Helicopter, explains:

We get the total team, and the higher leadership, to review the advancements, review the progress of the curriculum development

team. We sit there and discuss things that we agree with and then say is it satisfying the true need of the student? And developing the skill sets that when you graduate from high school they can get a job. We do a lot of good talking about that, we get assessment as to what's going into that curriculum that's going to give them the knowledge from the classroom and the hands-on skills that they need to develop to be able to go to work right away.

Comments about the partners' meetings from Elsa, the most senior-level participant from the Fort Worth Independent School District, were similar:

We come together and the group shares with us the lessons that they've written, the lessons that the teacher has taught, and then we talk about things that they need and things that we can do to help in the classroom.

Carol, the most senior-level participant from Tarrant County College, offered these insights about the way she, Elsa and Bob should, ideally, conduct themselves in the partners' meetings:

Well, we can hinder if we forget that we are the facilitators, because when you are dealing with the three that I mentioned, you're dealing with strong personalities, and we all have outcomes that we want to see, and we have to remember that it's a group project, so if any of us get in there and we try to make it about just us or about just our organization, I think as a facilitator we can get in the way. We can also get in the way when we say, okay, these are our subject matter experts and this is who needs to be really hashing this out. We need to step back and let them do that and not get into the middle of it, and say well this is really what I think it should be. We can give that opinion, but I think if you're the facilitator you need to let the boots on the ground have their way.

4.3.3 Pacing Guides

The curriculum development process requires that a pacing guide be created for each unit. Pacing guides, or something similar, are a standard feature

of curriculum development, but formats and processes differ. According to the curriculum development specialists from the Fort Worth Independent School District, the pacing guides used in this curriculum development project are unique to the Fort Worth Independent School District. A pacing guide includes detailed instructions about what content needs to be taught, what learning objectives must be met, what standards, such as the Texas Essential Knowledge and Skills (TEKS) will measure success, and the time needed to complete the unit. Pacing guides also include sections on aligned and supporting materials, general reference materials, assessments, student support strategies and student engagement strategies. Each pacing guide covers one unit, and there are 14 to 18 units per class, with five classes included in this specific project at Dunbar High School, generating some 70 to 90 pacing guides. The pacing guides are not available to the general public and are not found on the Fort Worth Independent School District website. They are made available within the Fort Worth Independent School District to teachers and administrators.

Because of my participation in observing the working group meetings, I was able to see the pacing guides on numerous occasions. I watched and listened as the Bell Helicopter, Tarrant County College and Fort Worth Independent School District team enriched, modified and refined the existing material to transform it into curricula that would be targeted more specifically to aviation and aerospace manufacturing. The pacing guides follow a standard format for ease of

understanding, consolidating a great deal of information in a structured, consistent manner. Each pacing guide begins with a heading to state the subject of the lesson, the grade level to be taught, and what the students will know and be able to do, with metrics such as “score of 80% or above” or “score of 8 out of 10 minimum on a rubric.” The heading also lists the number of instructional days required to cover the material, the dates within which the material should be presented according to the school calendar and the cumulative learning sequence taking place, the key prerequisite skills, and the key cognitive skills that address college and career readiness. The detailed content of the pacing guide is shown below this heading, and it is sorted under the following column headings: Supporting Objectives, Standards (Texas Essential Knowledge and Skills), Aligned/Supporting Materials, Assessments, Student Support Strategies, and Student Engagement Strategies. I found the pacing guides to be clear and comprehensive documents that would provide an essential instructional roadmap for teachers.

The next level of detail that flows from the pacing guide and is documented in detail is called, in the Fort Worth Independent School District, the learning experience. The learning experience tells the teacher specifically what to do to meet the requirements of the pacing guide. It is vertically aligned, with finite time frames. These learning experience documents were not reviewed or addressed during the curriculum development meetings that I attended. It was my

understanding that the learning experience constituted the next level of detail that would follow logically from the curriculum pacing guides and that the responsibility for preparing these learning experience tools was centered with teachers rather than with the Fort Worth Independent School District administration.

Once approved, the pacing guides are placed online for reference and can be accessed internally by teachers and administration. As of early June 2014, all of the pacing guides for grades nine through twelve had been completed and approved. However, it was agreed by the partners that to begin the 2014-2015 academic year, only the ninth grade curriculum would be introduced. Doing so would launch the new curriculum at the start of the high school experience. Those ninth graders would then advance to tenth grade in the 2015-2016 school year, and the new incoming ninth graders would begin with the new ninth grade curriculum as did their classmates in the prior year. While the tenth grade curriculum could possibly be used in the 2014-2015 academic year, the curriculum development team felt it could be a disservice to students to introduce it too soon, without the students having had the preparation offered by the new ninth grade curriculum. Each year, a new grade would be added, so that in four years, the new curriculum would be fully operational. At the same time, the seventh and eighth graders at the neighboring middle school would be exposed to the basics of aviation and aerospace manufacturing, moving through curricula

developed specifically for them to increase their awareness, engagement and interest in aviation and aerospace manufacturing work.

As Evan, one of the Fort Worth Independent School District curriculum development specialists, put it, you have “got to get the students activated. Teachers must come up with their own explosion” to surprise and engage the students. (The term explosion is used figuratively and does not refer to a chemistry experiment gone awry!) Students become more interested in learning when they are actively participating in exercises that illustrate and apply the learning concepts. Learning becomes interactive rather than passive (Bevins, Carter, Jones, Moye, & Ritz, 2012; Coye, 1997; Pelton, Johnson, & Flournoy, 2004; Ralston, Hieb, & Rivoli, 2013; Roberson, 2011).

Bell Helicopter employees participated in every curriculum development working group meeting, together with the Fort Worth Independent School District curriculum development specialist, to design the curriculum. Demonstrations and hands-on project assignments enriched the curriculum with real-life examples derived from the on-the-job experience of the Bell Helicopter participants. Also participating in each meeting were one or more representatives from Tarrant County College, with one of them being the primary representative. As an example, when the composite bonding class curriculum was being discussed, the process began with the Fort Worth Independent School District curriculum developer presenting a rough, sparse outline of nine weeks of curricula for review

to the group. The Bell Helicopter representatives filled in the gaps with many more types of composites than were listed on the original draft, so that the list included, for types of reinforcement composites: laminar, continuous fiber, particulate, fibrous, flake, and skeletal. For types of matrix composites, the list included polyester, epoxy, carbon, aramid, glass fibers, ceramic, boron, and metal matrix, among others. This highly detailed and precise review process took place for every unit within every class and the content is reflected on the pacing guides.

In connection with my job at the Fort Worth Chamber, I was already aware of this curriculum development project and had access to the curriculum development meetings because the Fort Worth Chamber was a supportive community partner. The Chamber's role was to lend encouragement to the project and to help publicize its success stories. I was acquainted with some of the senior managers involved, but I did not know any of the individuals who were participating in the engineering working group meetings prior to sitting in on those meetings.

By March 2014, because of my regular attendance in the working group meetings, especially the engineering meeting, I could tell that mutual understanding and trust were developing. The interactions with all the partners were transforming from rather formal and guarded to informal, fun, and even joking and humorous at times. It was safe to be quite candid and sometimes even a bit cynical with one another, especially concerning the strictures of corporate

and institutional bureaucracies, since this was a decidedly entrepreneurial group. By that time, I was able to identify ten prospective interviewees, all of whom accepted my invitation to be interviewed. Most of these individuals were sourced from the engineering working group, and I continued to sit in on their working group meetings that were held approximately twice a month. The interviews progressed smoothly and were completed by early May 2014.

4.4 Bell Helicopter Perspectives

Information gathered from Bell Helicopter interviewees revealed a strong sense of pride and excitement about the project. Trust was mentioned repeatedly as an asset in the team's group dynamics. Positive expectations about the eventual success of the project were expressed by all, and it seemed to me that the enthusiasm of the team members was bolstered and magnified because everyone on the team was clear on the vision and goals.

The most senior-level business representative from Bell Helicopter, Bob, when asked how the collaboration works, said it this way:

Personally working with all of them has been a great pleasure. We communicate well, we have trust, faith and confidence in each other's abilities, knowledge and drive towards the end goal, which is trying to get a skill set within our graduates out of high school so that they can go find a decent-paying job.

The Bell Helicopter working group team members were excited about and proud of the project particularly because they knew, from personal experience, the importance of restoring technical skills training into high school curricula. Brent,

the computer numerical control (CNC) training specialist at Bell Helicopter, made these comments during his interview:

Well, the motivation for me, besides the fact that it's my job, was as I look at the school kids today, my son as well as my daughter, they didn't learn, they're not learning vocational trades or hands-on skills. They were prepared like the whole generation of kids to go to college, but not every kid is going to go to college, nor will they have the opportunity to go. So, it's important, whether you go or not, that you learn to do something with your hands. First of all, if you do go to college, it gives you a chance to do something with your hands and work your way through college. Second, if you don't, then there's a trade, a skill that you've learned to put your hands to work, in something that's going to be direly needed in the next 15 years.

And Byron, the composite bonding specialist at Bell Helicopter, expressed these ideas:

My personal motivation is because . . . I believe the technical skills have been undersold and underrepresented educationally, since shortly after I got out of high school. When I was in high school, we had wood shop and metal shop and small engine repair and all of those, and those have all gone away. Everybody has been pushed to college, which is a wonderful thing. I'm glad I have a degree, but I also have a technical skill that I can fall back on, and many, many, many of our children, our young people, don't. So making the world a better place is a lot of my motivation, because if they've got good jobs, they don't have to turn to other avenues to . . . do things. And, of course, to populate the workforce at Bell, or Lockheed Martin, or anyone who uses those skills, is another motivation for me.

4.4.1 Facilitation

There were various viewpoints about who was operating in facilitator roles. For the working group business members, Brent and Byron, the curriculum

development specialist, Evan, was seen as the most important facilitator. Here are

Byron's comments:

Well, for the curriculum development, Evan is operating as a facilitator, and he's good at it. Some of the other folks that are involved at the higher levels, it's hard for me to look at them as facilitators, because they all have their own agendas, and they espouse their agendas, so sometimes facilitation in my opinion doesn't really exist, it's more debates and head-butting in closed quarters. We don't see it in the big meetings, but I'd say Evan is the primary facilitator, and then Brent and I each are facilitators at the schools It is kind of everyone, depending on what level and what particular function is being addressed at the time, which to me that's very encouraging, because that means we are working as a team instead of as a bunch of people being directed around.

Brent echoed these sentiments that everyone bore responsibility for facilitation, depending on the circumstances and need. He stated "Yes, Evan is the one up front. But we all have a . . . not just an opportunity but a responsibility . . . to speak up when we see something that needs to be inserted, added, taken out, whatever, you know."

Bob, the senior leader from Bell Helicopter, also identified the curriculum developers as facilitators but also identified representatives from Tarrant County College as facilitators. He also identified himself, indirectly and with considerable modesty, in that role:

A couple of folks that help us, that's what I call a facilitator. Helps us set up the meetings, do the coordination for the teams themselves, and that is the staff that works with Elsa in the Fort Worth Independent School District. The facilitators here at Tarrant County College are Carol and her staff, allowing us to work with her instructors and getting their input as well, because they're up

here on machines at least every other week with people in classes that they are physically training. . . . Myself, I don't try to think of myself as a facilitator, but I'd like to say I help coordinate and drive the program forward.

4.4.2 Project Activity

One of the practices that contributed to effective processes was scheduling team meetings on a regular, recurring basis, months in advance, for the entire school year. Both the working group meetings and the partners' meetings were scheduled in this manner. This scheduling was done by the one of the curriculum development specialists in Fall 2013 to cover the 2013-2014 academic year. All meetings were held at the same location, the Tarrant County College Opportunity Center, so that there would be no confusion and lost time associated with finding different meeting facilities. Also, the meetings occurred at the same time of day, without variation. This helpful feature allowed all participants to reserve these times on their calendars and maximized the likelihood that the meetings would be well attended.

Representatives from business identified the project as having co-ownership, with shared vision and goals. They used formal memoranda of understanding to document roles and responsibilities. Brent described the shared ownership:

Evan has been a key player, because Fort Worth Independent School District actually owns the curriculum, per se. We have memorandums of understanding where we are kind of co-owners. Eventually we will be able to share the curriculum across districts.

Evan was able to walk us through this whole thing. I would say that we all kind of take an active role in making sure we stay on task.

With the exception of the curriculum development specialists whose regular job was developing curricula, this project required people to spend time in addition to their regular job duties for the meetings and the work done between meetings. Bob described the tension of balancing one's regular duties with the added demands of this project:

So right now we're starting to feel like a rubber band, and I only have eight staff, and I still have to sustain training for 6,000 Bell employees, so . . . but, the leadership of Bell understands what we're doing, and they're enabling us to set the partners up and get the programs going and once we've really got them going full force we can start going back and just monitoring how they're going and maintain that industry input as the curriculum continues to mature.

Although the shared vision and goals were understood, the process of doing the work was not always smooth. Here are Byron's thoughts on the evolution of the project:

The different agendas that were so focused in the curriculum development that we didn't have homogeneity There were times when that became a real issue. Sometimes one entity has an issue that they don't share with the other entity as well as they should, so there's been some real inconveniences I just think that as we progress, people are becoming more and more enthused about it, and that enthusiasm is contagious, so that's been a very good thing, and even when we chase a rabbit down the wrong path, or make mistakes or have issues, they are corrected quickly because everyone has the same final focus on things.

Byron added another perspective, indicating how this project challenged the partners to expand their ways of thinking and acting:

We have to get the memorandums of understanding for all the entities involved, which became a pretty big sticking issue for a while, because the Fort Worth Independent School District did not want to release the curriculum we were writing. Bell didn't want to contribute to the curriculum . . . and we're contributing a lot . . . without it being released, so that this could be something more regional, statewide, maybe nationwide eventually, this kind of a partnership program that is going to involve and encourage young people everywhere. Bell Helicopter has really stepped out in releasing this information, and of course we're not releasing any proprietary information, but the general skill sets when we develop curriculum, it's ours, just like Lockheed. Everyone was king of an isolated entity, and we've become more of a "salad bowl" now where everyone is working together.

Brent offered these insights about what did not work well:

Big groups did not work well. Too many hands in the cookie jar. Too many opinions and too many personal preferences. It's really important to get just the subject matter experts, and I use the term "expert" loosely, because I can't know everything, and Byron's got a vast array of knowledge but he can't know everything either. There are technologies out there that we're still learning. I think it's important to have the right people in the room, it's important to have guidance from the owner, the initial owner of the curriculum, to keep us Bell people and the people who don't know the school district on track.

Brent also expressed how he felt when the curriculum development team overcame barriers to progress:

It was a little tough getting going. We, Bell, kind of knew what we wanted, and it's sometimes hard to convey that to somebody who doesn't know what you do, or how a school district operates. That was a learning curve for us. Understanding what it takes. You don't just throw something on a piece of paper and say "we're going to teach this." It has to go through a lot of review and

approval. I knew we were making progress when we . . . we kind of were breaking barriers . . . in communication and thought processes, and we started really moving along on the curriculum. And we were able to move quickly but efficiently enough, not sloppily, to get an extra grade level done this year. So that tells me that we did something right.

4.4.3 Relationships

For the most part, the participants in this collaborative project did not know one another prior to working together on the project. In particular, the business representatives did not know the individuals at Dunbar High School. Even the Tarrant County College Opportunity Center staff, next door to Dunbar High School, did not have relationships with the high school established prior to this project. As stated by Brent:

When the project started, everybody but my technical training team and two of the Tarrant County College instructors were new acquaintances. I didn't know anybody in the Fort Worth Independent School District or at Dunbar I don't think it made it a huge handicap not knowing them.

There were some instances of connections, however. While the people in this project may not have personally known one another, their organizations had a history of working together. For example, Bell Helicopter had long been a partner of Dunbar High School. Projects they had worked on included robotics competitions for the students and hosting student tours to Bell Helicopter facilities so the students could see the work taking place. Here is what Byron said about these ties, substantiating the idea that the organizations' history of working together made this new project easier to launch:

Part of this is about the name recognition between Tarrant County College, Bell Helicopter and Fort Worth Independent School District, and Lockheed Martin. I think it made the initial implementation of the project easier, if we knew each other. In some cases, it gave us presuppositions about what to expect from people that have been proven false because of the passage of time or different relationship dynamics.

Bob had already worked with Carol for six or eight years when this project started, and everyone else was a new acquaintance. Bob shared his impressions about the establishment of new relationships as the project began:

Actually, when we kicked it off, there was “getting to know.” So they didn’t really have a close working relationship between the Fort Worth Independent School District and Tarrant County College, so we had to figure out our personalities, we had to figure out our direction and intent of where we were individually trying to take this, and then learn how to take and meld those together and have a united direction going forward. And it took a little bit of time, maybe a month or two.

4.5 Tarrant County College Perspectives

The three Tarrant County College interviewees were very enthusiastic about the project. They were especially proud of the Tarrant County College Opportunity Center facility that stands adjacent to Dunbar High School because of the hands-on training experiences that can be implemented there for the high school students. The most senior-level Tarrant County College representative, Carol, expressed these sentiments:

It’s been exciting. It was one of those things that . . . I could have said “it’s not my job” because really, how is Corporate Services going to benefit. But I feel like it is my job, because I represent the district, so any time I can bring industry together with education, whether it’s the high school or one of the campuses, or if it’s a

university, I think that's what we have to do, because we all have a stake in these young people taking these jobs and moving us forward.

The commitment of Tarrant County College as expressed by Carol, the manager, was very strong, even though she downplayed the benefits to Tarrant County College. A similar strong commitment, including the importance of success as perceived by others, was articulated by Cedric, the Tarrant County College participant in the engineering working group:

It's going to take the complete and total support and effort of the team to make it work and make it be successful. We have still probably a lot of obstacles ahead of us, but yet, it looks promising. So we're going to have to stay after it. We intend to put our heart and mind and soul into this project, and we need to do that and not give up. There's going to be a lot of people watching, looking at this from the higher realms of each of the organizations and they are going to want to see if this is working. There's been a lot of hours of teamwork, many promises of support, so we need to make it work. We need to make it be successful. That will come when the students themselves become successful.

Charlie, the lead computer numerical control (CNC) instructor for Tarrant County College, teaches classes at the Tarrant County Opportunity Center. In addition to teaching, he writes, develops and maintains the computer numerical control (CNC) curriculum for an entry-level job as a computer numerical control (CNC) operator, modifying the curriculum as the needs of business change. I interviewed Charlie in his work area where we could see the computer numerical control (CNC) machines and observe several machine operator trainees at work. These comments illustrate Charlie's enthusiasm:

The reason I came to work here is that I am very passionate about helping my community, and if any community needs help, it's Stop Six, and it's that community right here. So when I came here, I knew exactly who my students were going to be and where they were coming from. The interesting thing though, is up until that point (and this facility has been here about 15 years) nobody has partnered with Dunbar, at all. So the story is that it never occurred to anybody to partner with them. Now I wish I could take credit for that, but I didn't come up with that idea. Bell Helicopter said well, where are we going to get young people who are not interested in going to college but are interested in a career and training. And so, one of the chiefs in Bell Helicopter said well, there's a high school right next door, and why don't we do that.

4.5.1 Facilitation

Among the community college interviewees, two identified themselves as facilitators. One was Carol, the most senior-level Tarrant County College representative. She also thought the other two most senior-level managers from the other stakeholder groups, Bob from Bell Helicopter and Elsa from the Fort Worth Independent School District, functioned as facilitators. Carol made these comments:

Well, I'm a facilitator. I think Elsa to a point is a facilitator, because Edward is really in the trenches, but she's there; I think she's paving the way, on a district level, for him. I've seen him just spread his wings and take ownership of it . . . so I see Elsa and me as facilitators. Bob is in a facilitator role . . . He's really been there to bring his team to the table and make sure the right people are there.

Charlie also identified himself as a facilitator. He thought facilitation was hampered by the presence of higher-level managers. He expressed these concerns:

When managers walk into the room, unfortunately, well, I can't say that about Bell, and can't say that about Tarrant County

College, and sadly, if anything, it tightens the conversation and the collaboration. So, who are the facilitators? The feet on the ground people, the boots on the ground. Myself.

Cedric had a different perspective. He identified the curriculum development coordinator from the Fort Worth Independent School District as the primary facilitator. Cedric put it this way:

The individual that works as a facilitator for the curriculum committee is Evan. Evan has done an outstanding job. He's a very knowledgeable individual, and he has kept us on track and kept us aligned with the curriculum . . . so my hat's off to Evan for what he's done. We've had a lot of input from our various committee members, from the Bell folks to the Tarrant County College folks as well as the Fort Worth Independent School District folks who are there, and Evan has put it all together.

4.5.2 Project Activity

A commitment to shared vision and goals was expressed by all three of the Tarrant County College interviewees. Although they expressed some frustrations with issues that got in the way occasionally, they were able to overcome these difficulties and move ahead collaboratively because the vision of the finish line was clear. Everyone was able to articulate the vision in his or her own words. An example of the short-term distractions being trumped by the desire to achieve the long-term goal was voiced by Charlie, when he talked about time pressures. Charlie was able to see that the short-term time pressure faced by the project participants would be worth suffering through because of the long-term payoff of completing the curriculum development project. In this example, Charlie not only refers to his own time pressures but is also able to relate to the time pressures of

his counterpart, Brent, the computer numerical control (CNC) training specialist at the Bell Helicopter facility. Charlie understands Brent's role in the project and how it connects with the ultimate project goals, spurring him on to continue because he believes the partnership components to achieve eventual success are in place:

Challenge-wise is time, because this whole project is in addition to what we normally do. Right now I have class, right? Right now Brent has to be on the floor to see what the training needs are. We're already busy, but on top of that we've got to get this done. So that's the only thing. How do we fit it in to all the other pieces we have going on . . . Here's the one thing I've noticed, as I said, I have over twenty years of corporate experience, and on the corporate side of things, usually everything's about the bottom line. Well, in our travels with this project, there's not really any money being made, up until about ten years from now. So the fact that we have a large corporation investing time, resources, for a ten-year payoff, I'm impressed with that . . . What's interesting that I see in this whole Bell project is what works great is time. Rolling Stones sang a song, "Time Is On Our Side" . . . and that's what we have. As you know, time is golden. Because time is on our side, we're able to collaborate, we are able to do this. In my world, my typical world, I have maybe a month to put it all together and get it going. So the fact that we have a year . . . plus . . . is golden. Time has been perfect for this.

Cedric's thoughts about the project activity reflect his clear understanding of the long-term goals, as well as his concern that the initial effort might be too broad. Despite this concern, he was completely supportive of the effort as structured. He could see how the curriculum could potentially benefit not only Dunbar High School and the Fort Worth Independent School District students, but also other districts and students. Cedric comments:

It is an outstanding project. I might . . . I would probably not make it as broad. I would probably focus on a certain area to get started with, because I look at it as a pilot project. The committee wanted to try to get as many people in all the grades interested in the field, and since we're just starting this off, I was thinking that as a pilot it would be nice if we were working with just the ninth and tenth grades, but now we have expanded to the seventh and eighth, and we're expanding to the 11th and 12th. But I can see that point, because they didn't want to exclude juniors and seniors. So, I don't know how that's going to be totally implemented. Time will tell . . . We want to see this get implemented and be successful. We're providing our facility here and any resources that we may have to help this endeavor be successful. Fort Worth Independent School District is going ahead and as I understand it, they are building an aviation building out here from the bond program, so that's a good start. And I wish them well and I hope they get Federal Aviation Administration (FAA) certified, which they definitely need, and it will be a very important thing that they do. Hopefully, as time progresses, it will continue to grow and prosper, and who knows, other schools may be interested in what Dunbar is doing and see how successful they've become. The key element and ingredient will be how the students do when they graduate. Hopefully they become hired into the industry that they have been successfully trained on. And not only that, they can further their education by going and finishing their Associate's degree or complete a Bachelor's degree and higher. I wish them all well.

The Tarrant County College most senior-level manager, Carol, was a champion for the project and had been involved in establishing it with the leaders from Bell Helicopter and the Fort Worth Independent School District. She clearly understood the vision and goals, especially because developing training tailored to address specific business needs was the main component of the Corporate Services Department's work which she managed. Her comments about project activity, when asked if there were any aspects that should have been done

differently, illustrated her tireless support and her understanding of the project's long-term value:

I think it's too early now to say we should have done something differently. I think we have to be really mindful of maintaining those students, maintaining that passion. We can't say now Edward has his wait list, now we can sit back and relax. I think now the real work begins. So we can't lose sight of the end goal, because if we don't continue the energy and continue the momentum, and continue keeping it fresh, these kids are going to drop off. And, I'm excited about Bob's commitment to looking at the graduates of this program and pushing them into another level of training, whether it's six months or 18 months. We're still working with him on that. He's talking machining, which would be our South campus, and he's talking advanced composites, which would be Northwest campus, and then our . . . it's going to be kind of a hybrid, I don't want to say it's going to be the airframe mechanic program or something similar at Northwest campus. So, you've got to keep pushing them. You can't say, oh we got them through the dual credit; now they're on their own. I think we've got to keep that support system in place.

4.5.3 Relationships

Carol had a lot to say about the relationships in the project. For example, Carol knew Bob before the launch of this project. They had worked together for about six or eight years in connection with Carol's role in Tarrant County College's Corporate Services Department developing custom-tailored training programs to address business needs. In contrast, Carol's relationship with the Fort Worth Independent School District was not well established prior to this project, despite the fact that Dunbar High School was located next door to the Tarrant

County College Opportunity Center. She expressed her thoughts in these comments:

A lot of us are new acquaintances. I knew who Edward was because he's across the street, but I hadn't met him. Shame on me for not meeting him before, but this has been a great way to meet him. Elsa, of course, I knew who she was, and I think I'd been in some meetings with her, but now I actually have something in common with her. Of course everybody knows Bob (laughter) . . . and now that he's expanded and is talking about expanding to Weatherford and Aledo, I've gotten to meet some more people from Weatherford College that he's brought to the table, so, it's always good for the community colleges to make those connections, because we have to remember that we're in it together, and we have to get past our boundaries sometimes.

Cedric said he didn't know anyone working on the project but did not seem daunted in the least because of it. He set about to get to know people and get to work. His manager, Carol, asked him to represent Tarrant County College in the small working group curriculum development meetings, which she did not typically attend. Cedric's views are described in these comments:

I was the "new kid on the block" and I just, from that point, met those folks that were working on it, and got to working closely with them to try to improve the curriculum, to try to smooth it out and try to make it more detailed and give the students more hands-on activities. I was basically assigned to take this on in place of my supervisor, Carol. She preferred that I go ahead and make the meetings if I can, because she's a very busy person. She attends the meetings with the administrators and I'm the one that attends in her place as far as the smaller body of curriculum.

Charlie, like Carol, had experienced some prior dealings and relationships with Bell Helicopter, having been part of the Corporate Services training group for four years. He said:

I would say the new kids in the room would be Dunbar The newest people in the group were the Dunbar High School teachers And what I found out is, when I went over there to do an introductory class, was that the only person who was knocking on their door, who says we want your kids is the Marines, the Army and the Navy. And I see it as a sad thing, I mean, granted, the armed forces are a great organization, I'm sure of it, but they shouldn't be the only people knocking on their door asking for their students. And so it is refreshing that now, in addition to the military, there is something else they can do career-wise. It was refreshing when that came about.

4.6 Fort Worth Independent School District Perspectives

The K-12 educators and administrators were ecstatic about the project. To them it was a dream come true to have a global industry leader such as Bell Helicopter devote the resources to curriculum development in their school district. The most senior-level Fort Worth Independent School District representative, Elsa, commented on Bell Helicopter's role in the project in this way:

I think in any relationship there is a trust factor, and what was interesting for this particular group in my opinion, just watching it unfold, we really didn't have to build the trust They were really ready to get down and dirty and start working, offering support and assistance, because at the end, they knew that it was for the students, who eventually will become employees in their industry.

Similar sentiments were expressed by Edward, the Dunbar High School principal:

I believe it was just that "the stars aligned." It just makes sense to me that we're right here, next to Tarrant County College Opportunity Center, and Bell Helicopter is one of our adopters, that we get together and do something to forge a real relationship with industry and higher education. Things were already moving. Bell already had some ideas going, and I already had some ideas going. Tarrant County College already had some ideas going. When I first got here last year, I was trying to think about Tarrant

County College as far as how we could bridge a relationship, so things were already in the making, so I won't say that I was the lead, other than I just jumped in line.

The aviation technology instructor at Dunbar High School, Ernest, was a Dunbar High School graduate himself. He expressed pride and excitement about the collaboration with these thoughts related to his own personal experience:

I look at the opportunities that these students are receiving, and I'm thinking, you should be taking advantage of this, there's no telling where it could lead, if you just start focusing on this right now, you know. And I always tell people, I was on a high school track, just to graduate. So, for me to be where I'm at today is amazing, because I graduated from high school and I just asked, please God, let me be able to handle any bill that came into my household, now. I didn't know what I wanted to do, I just knew that I wanted to work. That's it. But, so, it's been a blessing for me, but I wish I had the opportunity that these students had, when I was in high school, instead of waiting two or three years after I graduated from high school to kind of start trying to go on the right path. There's nothing wrong with that, but any time you can get started earlier that's good.

The curriculum development coordinator for the engineering working group had a great deal to say about the project. His feelings of pride and excitement were woven into his comments throughout the course of his interview.

Here are some of Evan's comments:

I have not had any negative feedback, negative situations, conversations, in any way, shape or form. And, like I told you earlier, in businesses, we have had that, so I am thrilled and amazed that it's been great so far . . . I'm truly amazed at how well everybody's been able to work together, and I'm truly grateful for that . . . It's all been very good. I'm very happy, I just couldn't be happier.

4.6.1 Facilitation

Although many people identified themselves as facilitators, Evan was the person most frequently viewed by others as a facilitator. Evan was the curriculum development specialist for the engineering small working group and brought to the role an engineering degree and experience working for three private companies. He had also been a teacher at Dunbar High School. These experiences equipped him with an appreciation for and a knowledge base relating to the other partners. Evan was rather humble about acknowledging himself in the facilitator role. I had to coax out of him the admission and confirmation that he saw himself that way, because he thought that everyone in the project functioned as a facilitator to some extent and did not name himself initially. When I then asked him directly if he thought he was a facilitator, he said “well, I believe I certainly am.” Evan’s comments revealed interesting insights about what facilitators do and the challenges they face:

I’ve noticed that in a situation like this where a lot of people get together and large companies get together, it has to be good for everybody. Everybody has to get something out of it. You cannot go into it thinking this is going to be great for me and I don’t really care what happens to them. You have to be cognizant, you have to be aware of the fact that . . . it’s as if you have to kind of pay attention a little bit to everybody. You have to make sure that everybody is getting something that they want out of this deal. And so with that in mind, if the people involved, the key players, that would be Brent, Byron, Charlie, Bob, Elsa, myself and whoever else is involved If those people didn’t get along, it would be way more difficult, but all the people that seem to wield the power

or are facilitators seem to get along very, very well, and that makes it so much easier.

Elsa also had an expansive view of the facilitator role. She identified several people as facilitators, indicating that on a project like this, facilitation is integral to shared ownership:

My two staff members are the facilitators, alongside with Bob, the leadership, the principal, at some point, when we meet on our monthly meeting, they kind of help to facilitate the conversations. But the real detail, that is amongst . . . and really, I would say there is not any one owner . . . I would say the curriculum writers facilitate as needed. So they might change roles, because someone might have something to offer that somebody else didn't really think about.

About the issue of how facilitators can help or hinder this project, Elsa added the following:

I think they help, in that they help the project move forward. They can hinder, but I haven't seen that. If you have someone who has a personal agenda, I think that's . . . you know, it can be a dangerous way to go. Thankfully, at least in my opinion, I haven't seen that. I have seen people being willing to help and everyone taking ownership.

Ernest, the teacher, saw many people contributing to the facilitation role. He named both the senior-level project leaders as well as the members of the curriculum development working groups as performing facilitation roles. His comments on how facilitators could help or hinder the advancement of the project were insightful:

The facilitators, sometimes they look way farther in the future, and they lose focus on right now, and being focused on let's make what we have quality, and keep room for growth, and sometimes that

can hinder because you're thinking down the line but we haven't actually established what we have as quality yet so it would never . . . I mean we can see the future, but the quality has to be there. But then, then, of course, they always bring us back to what's realistic, like what does industry need, what do students need, so it's also . . . the word I'm looking for . . . it can be . . . I guess . . . they can intervene either way, whether you're moving too far ahead. You can hinder and help at the same time.

Several facilitators were identified by Edward, the principal. In fact, just about everyone was identified at one point or another as performing facilitation to bring people together. Edward expressed it this way:

I've been very thankful for the moving components and everybody working together for the good of our students. I mean just going in the room and seeing ten people sitting down talking, working through curriculum and discussing things that haven't come to fruition for them yet, but we know that the long-range plan is for our kids to go through the Tarrant County College dual credit program as well as be hired at Bell Helicopter.

4.6.2 Project Activity

The Fort Worth Independent School District participants seemed happy with the processes set up for accomplishing the project goals. They bore major responsibility for the project activity, since the curriculum development was coordinated by the Fort Worth Independent School District. There were some things that could have been improved, and the group was receptive to knowing about possible improvements. Elsa had the following comments about the project activity:

What didn't work well was that I think we were working really fast without consideration of what was being done in the classroom, and what we didn't have. And just the teacher being new and not

knowing how to ask, saying this is a great idea but however, I don't have that tool, or I don't have that material . . . or you know, that would be the only thing. If we did this again, one thing that I would improve upon is the recognition, and then the offering, opening the door, the floor, to the teacher saying what they need . . . doing a list of equipment or materials that they need and whether or not they have that.

Edward, the principal, spoke about not only the current project but also what he envisioned could grow from this project to be replicated within Dunbar High School and elsewhere. Here are his comments:

Actually yes, we are trying to replicate this with other programs throughout the school. We're doing this with our urban studies with the City of Fort Worth and the University of Texas at Arlington. So we're trying to, basically, have kids that are already connected to industry and to higher education so that once they get ready to graduate from Dunbar High School the road map is already there for them.

The teacher, Ernest, spoke about the need for cross-curricular studies as an important practice and process, in this project and others:

To make sure we do a lot of cross-curriculum, to get them to understand that the math that you're learning or the science that you're learning is the same thing that you're learning in aviation, and to put it in real world terms, in practical terms, so they can understand. That's very important, and it's very challenging. It takes the teachers to work together. This is my first year in education, and so a lot of things are kind of driven around testing. I think that we have to get the curriculum . . . the curriculum has to start getting into real world application and show the students this is how it relates in real world situations.

The curriculum development coordinator, Evan, talked about the need to stay vigilant about adding to and refining the curriculum. It is never done. Here is Evan's description of the curriculum development process:

So we said, we have to assess, and just when we're complete, we have to assess that, and I think it's important that we have that stopping point where we pat each other on the back and . . . it keeps people from wearing out . . . and then take that break, whatever, it could be four months or two weeks or whatever. I don't know how long it will be, but then you go back and start reassessing everything, and saying, OK, I think we need to move this down, but for everything you move down, you have to move something else down, and then the top is blank, and we have to increase our rigor, and that's even more, so we anticipate that there will be a lot that we will have to add.

4.6.3 Relationships

Reflecting statements made by others throughout the interviews, Edward, the Dunbar High School principal, said that Dunbar High School was the new acquaintance on the project. Other partners participating in this project had worked together before, but Dunbar High School had not been involved in the past, although prior efforts to bring Dunbar High School together with the Tarrant County College Opportunity Center had been attempted and had not lasted long. The creation of this project brought Dunbar High School into the fold, about which Edward was extremely pleased. Edward explained:

Bell and Tarrant County College already had a relationship where they were already working together on different projects. We are the new component. It just makes sense to me that we're right here, next to the Tarrant County College Opportunity Center, and Bell is one of our adopters, that we get together and do something to forge a real relationship with industry and higher education.

The Dunbar High School teacher, Ernest, was new in his job during the 2013-2014 academic year, so all the relationships were new to him. Ernest had graduated from Dunbar High School himself a few years ago, and this experience

afforded him an advantage in that he knew the community and the school already.

Ernest said “for most of the partnerships that we have, everyone is kind of familiar with each other and what they do.”

Elsa confirmed this observation that the high school connection was the new component, meaning that the participants would initially have the weak ties that exist in new relationships. She had this to say:

They’re new acquaintances with regard to the teacher and the principal. Now that Lockheed is a part of the partnership, I don’t think that they are new to each other, because they are in the same industries. They know each other. With regard to myself and some of my staff, working with the Chamber and Workforce Solutions, we’ve already had a relationship, and we have built that further.

Evan, because he had been a teacher at Dunbar, had established some relationships at Dunbar High School in advance of the inception of this project. He did not necessarily know the individual participants but knew the institution and its history and culture. When asked how he thought these relationships affected the project, he made these comments:

I don’t think it had too much of an impact. I really don’t think it did. If there had been some very, very bad relationships, perhaps that may have caused problems. But, there were no negative relationships that I’m aware of.

4.7 Summary

This chapter identifies the major themes that emerged through the “story of the project” as experienced by the participants in my one-on-one interviews. Comments and insights from the three stakeholder groups are presented

sequentially starting with business (Bell Helicopter), followed by community college (Tarrant County College), and ending with K-12 education (Fort Worth Independent School District). The major themes explored and organized by stakeholder group are facilitation, project activity, and relationships. Data analysis follows in Chapter Five.

Chapter 5

Analysis of the Data

5.1 Introduction

Data analysis relates the major themes of facilitation, project activity and relationships to answering my research questions. To gain insights about what took place in the collaborative project, practices and processes that build connections were analyzed. The roles of facilitators/brokers operating in the project were also examined. The analysis presents ways in which the conceptual framework of networking explains the practices, processes and roles of facilitators/brokers. The usefulness of the conceptual framework of networking, including the existence of weak and strong ties (Granovetter, 1973) to explain education and workforce collaboratives was explored to determine how these ties might contribute to collaborative activities. Data analysis concludes with observation of other realities of collaboration that were revealed in this study.

5.2 Practices and Processes that Build Connections

One of the hallmarks of this curriculum development project that helped build connections was the attention given to scheduling regular meetings. Scheduling the meetings well in advance and securing replies from attendees so that it would be clear who would be attending the meetings was a top priority. This may sound like a mundane aspect of the project, but it was really important

because of the nature of the curriculum development task. Key individuals possessing the knowledge to provide input to the curriculum needed to be present, or the work could not progress.

The curriculum development team working group that I observed met every two weeks, and the larger project team met every other month throughout the 2013-2014 school year. In early Fall 2013, dates and locations for these two sets of meetings were mapped out and scheduled for the entire 2013-2014 school year. Electronic meeting invitations requiring a response to a single person in the Fort Worth Independent School District, housed in the Career and Technical Education department, were sent to all attendees. This practice helped build connections because everyone could mark his or her calendar well in advance, greatly increasing the likelihood of excellent attendance at meetings. Given the nature of the curriculum development process, all participants needed to be present at the meetings, and if some were missing, then gaps and oversights could more easily occur, as well as delays in finishing sections of the curriculum for which the person with the expertise had been absent from the meeting. The Dunbar High School principal, Edward, expressed during his interview the importance of the meetings in building connections: “I think it’s right on target, you know, sitting down together and going over this stuff together is real powerful.”

On occasion, working group meetings would need to be rescheduled. When this happened, I observed frustration on the part of the attendees, which I attributed to the team's strong desire to push forward with the work and the recognition that a rescheduled meeting would slow down their progress. Typically, it was difficult to find a new time that worked for everyone on short notice, and since the working group meetings were taking place every two weeks, it was easier to just extend the time of the upcoming meeting to catch up. For the most part, the meetings proceeded on schedule, serving as a reliable mechanism to help build the connections among the Bell Helicopter, Tarrant County College and Fort Worth Independent School District participants involved in creating the curriculum.

Among the practices that contributed to building connections was the usage of formats and standardized templates that guided the creation of the new curriculum. These job aids were supplied and managed by Evan, the Fort Worth Independent School District curriculum development coordinator. In effect, there was already a road map in place to guide the project journey. What the team had to do was fill in the blanks, or modify what was already there in the existing curriculum. If it had been necessary to develop the format as well as the content during the project, I suspect it would have taken far more time and would have engendered confusion and frustration, detracting from the quality of the connections being built among the partners.

5.3 Roles of Facilitators in Building Connections

Exploring the perspectives of the ten people I interviewed about the roles of facilitators required initially that the facilitators be identified. They were identified as facilitators during the interviews either by self-selection, or by being named by someone else. I had not anticipated finding so many facilitators among the ten people I interviewed. I had expected that more than one individual would be identified, but I discovered that many more people than I had expected believed they were functioning as a facilitator or were seen by others as performing facilitator roles. Six of the ten individuals interviewed saw themselves as facilitators, and nine of the ten individuals interviewed were identified as facilitators by someone other than themselves. Only one individual, the teacher at Dunbar High School, neither identified himself as a facilitator nor did anyone else do so.

I observed displays of humility when the individuals described themselves as facilitators. While it was easy for them to name others and they were quite eager to do so, they were more hesitant to acknowledge their own role as facilitators. Once prodded a bit, they were clearly pleased to acknowledge that role and its importance. In statements emblematic of the project's strong team commitment, several interviewees expressed their belief that everyone on the project helped facilitate its progress to some degree. Statements directly quoted

from interview transcripts included “everyone does facilitation,” “everyone taking ownership,” and “everyone can work together.”

Evan, the curriculum developer in the Fort Worth Independent School District, was the individual most often identified as a facilitator. Evan identified himself as a facilitator, and so did six other individuals. All three Bell Helicopter representatives named Evan as a facilitator. Cedric, one of the individuals from Tarrant County College participating in the curriculum development meetings, identified Evan as a facilitator. And within the Fort Worth Independent School District, everyone except for the teacher at Dunbar High School (including Evan himself) believed Evan was a facilitator. This makes sense because Evan was the leader of the curriculum development work group activity. He was the person charged with pulling information from all parties and putting it all together to construct a new curriculum. He was, of necessity based on his role, connected with everyone and thus was perceived in a facilitation role.

After Evan, the next individuals most frequently identified as facilitators were the three senior-level leaders of Bell Helicopter (Bob), Tarrant County College (Carol), and the Fort Worth Independent School District (Elsa). Bob, Carol and Elsa were identified by their colleagues in their own organizations as well as colleagues working on the project from the other two organizations.

The other two Bell Helicopter participants in the curriculum development meeting were the next most frequently identified as facilitators. Brent, the

computer numerical control (CNC) expert, received three votes. Byron, the composite bonding expert, received two votes. The three individuals who received one vote were Charlie and Cedric from Tarrant County College and Edward, the Dunbar High School Principal at the Fort Worth ISD. It is interesting to note that Charlie's recognition as a facilitator was self-identified, while the other two individuals, Edward and Cedric, were identified by others as operating in facilitator roles. In conclusion, the sense, either self-identified or confirmed by others, that many individuals occupied facilitator roles represented evidence of a strong commitment to collaboration and recognition of the importance and value of collaboration to achieve the goals of this curriculum development project.

The observations described above are displayed on the following chart:

Table 5.1 Identification of Facilitators

Name	ID'd Self	ID'd by Bell	ID'd by TCC	ID'd by FWISD
Bob- 5 (Bell)	Yes	Bob (Self)	Carol	Elsa Ernest Evan
Brent-3 (Bell)	No	Byron	Charlie	Edward
Byron-2 (Bell)	Yes	Byron (Self)		Edward
Carol- 3 (TCC)	Yes	Bob	Carol (Self)	Ernest
Charlie- 1 (TCC)	Yes		Charlie (Self)	
Cedric- 1 (TCC)	No			Edward
Elsa- 4 (FWISD)	Yes		Carol	Ernest Evan Elsa (Self)
Edward- 1 (FWISD)	No			Elsa
Evan- 7 (FWISD)	Yes	Bob Brent Byron	Cedric	Elsa Edward Evan (Self)
Ernest- 0 (FWISD)	No			

Review of the chart indicates that those individuals in the working group generally selected their associates also working in that group as facilitators, which could be a function of frequency of contact. They met every two weeks, much more frequently than the full partners' group meeting which occurred every other month.

The individual from Tarrant County College who attended the working group meetings most regularly, Cedric, was perceived as a facilitator by one person, the principal of Dunbar High School, who did not participate in the working group meetings. However, Cedric was not perceived as a facilitator by his peers in the working group meetings. Because the purpose of the working group meetings was the design and development of Fort Worth ISD high school curricula, I suspect that Cedric was not perceived as a facilitator because the content being dealt with in the working group meetings did not directly concern Tarrant County College. However, having him present in the meetings was important because of the potential linkage of the new curricula to dual credit and to non-credit certifications and licensures, which would require coordination with Tarrant County College. Cedric's participation in the working group meetings at this development stage was valuable because of his long experience in community college systems. He was able to shed light on many questions that came up during the course of the working group meetings without needing to go elsewhere to find the answer. In other cases, he said he would find out more and would come back

to the group at the next meeting with answers and details about the situation he had been asked to research. It appeared to me that the reason Cedric would not have been perceived as a facilitator was that there was no need for an intermediary in those working group meetings. The necessary parties, Bell Helicopter and the Fort Worth ISD, were there at the table and could communicate directly.

It has occurred to me that perhaps the initial logic for having Cedric attend the working group meetings was simply to have Tarrant County College at the table, since some of the aviation and aerospace manufacturing applied learning exercises being written into the curriculum would be conducted at the Tarrant County College Opportunity Center, next door to Dunbar High School. On the other hand, the decision to include him could have been prescient, reflecting the understanding that Tarrant County College should be included not only because of the location of its Tarrant County College Opportunity Center next door to Dunbar High School, but also because community college is an essential component in the post-secondary workforce preparation journey. As it turned out, whether or not it involved foresight, the decision to include Cedric at the table was invaluable. He served as a very knowledgeable resource about Tarrant County College specifically and the State of Texas community college system in general. Cedric was always highly supportive of the work taking place, and he understood his role. I observed that he did not appear to need to assert his

importance in the meetings by needing to speak but instead listened intently and responded with interest when questions were addressed to him.

Charlie, the other Tarrant County College representative who attended the working group meetings, as contrasted to Cedric, occupied a different and more specialized role in the college. Charlie did not have the overall system knowledge of community colleges that Cedric possessed. Charlie worked as lead computer numerical control (CNC) instructor at the Tarrant County College Opportunity Center. Computer numerical control (CNC) refers to precisely programmed automation of machine tools to produce machine parts formerly produced manually (CNC Concepts, Inc., 2007). In this role, Charlie's skill set in the working group meetings was similar to that of Tony, the computer numerical control (CNC) machining expert at Bell Helicopter. I suspect Charlie considered himself a facilitator because he saw himself bridging the communication between Tarrant County College and Bell Helicopter in the computer numerical control (CNC) specialty. Outside the working group setting, this would very likely be the case, and in fact, Charlie identified Brent as a facilitator, but interestingly enough, it was not reciprocal; Brent did not identify Charlie as a facilitator. Since my study centered on the curriculum development project only, I did not observe the communication between Brent and Charlie outside that setting. I would characterize the communication that happened between Charlie and others during the working group meetings as information exchange rather than facilitation. The

fact that others did not identify Charlie as a facilitator supports this observation; in their minds, he and Tony were likely seen as offering similar knowledge and expertise to the project about the computer numerical control (CNC) specialty, even though they worked in different organizations.

Another intriguing observation about identification of facilitators is that Byron did not identify Brent as a facilitator, but Brent did identify Byron as a facilitator. They were both from Bell Helicopter's Technical Training group, and both were considered experts in their respective specialties, Brent in computer numerical control (CNC) machining, and Byron in composite bonding. Composite bonding is an important technology in aviation and aerospace manufacturing today which produces adhesively bonded materials lighter than the traditional metals (aluminum, steel, and others) for aircraft assembly and maintenance (Federal Aviation Administration, 2013). Composite bonding involves high-temperature fusing of lightweight substances that augment the heavier metals traditionally used, resulting in a bonded, composite structure that is lighter and stronger.

A possible explanation for why Byron did not see Brent as a facilitator is that Brent had a counterpart in the working group, Charlie, who was also working in computer numerical control (CNC) machining. In Byron's case, there was nobody else with composite bonding expertise represented in the working group. Therefore, Byron could possibly conclude that Brent did not play a facilitator role,

believing there was no need for an intermediary because Charlie, Brent's computer numerical control (CNC) counterpart at Tarrant County College, was already there at the table. In contrast, it makes sense that Brent would see Byron as a facilitator, because in the curriculum development process, Byron would need to bridge the communication gap between himself and others in the working group who did not possess expertise in composite bonding.

In exploring the roles of facilitators, I asked interviewees whether they thought facilitators helped or hindered the project and to give examples of ways they had observed the help or hindrance. For most interviewees, facilitators were considered a help. They were often praised for helping move the project forward. Yet paradoxically, just as virtues in excess can become vices, or too much of a good thing becomes damaging, the major criticism of facilitators was that sometimes they pushed so hard for forward movement that the working team felt pressured to move too fast.

This behavior of pushing too hard was typically attributed to others. Most often, the working group members expressed their opinion that the senior-level managers were pushing too hard. Only one of the three senior-level managers took ownership of the possibly damaging behavior of pushing too hard. Insights from this excerpt of the interview transcript are revealing and reassuring:

We can hinder if we forget we are the facilitators, because it's . . . when you're dealing with the three that I mentioned, you're dealing with strong personalities, and we all have outcomes that

we want to see, and we have to remember that it's a group project, so if any of us get in there and we try to make it just about us or just about our organization, I think as a facilitator we can get in the way. We can also get in the way when we say, okay, these are our subject matter experts and this is who needs to be really hashing this out. We need to step back and let them do that and not get into the middle of it, and say well, this is really what I think it should be. We can give that opinion, but I think if you're the facilitator you need to let the boots on the ground have their way.

These comments demonstrate understanding of the relationships and work processes taking place within the collective effort in which one's own interests, personal and organizational, must be meshed with the whole project's needs and goals:

Another phenomenon that I observed was that the working group, those "boots on the ground," tended to be more cynical at times about the realities of moving forward according to the desired time frame. Senior management tended to glorify the project, cheering on the project team from a vantage point not closely connected to many of the details. In contrast, the working group was intimately familiar with the details and the potential challenges associated with meeting timelines, and sometimes they expressed their frustration. I considered this behavior a healthy sign that real work was getting accomplished, because any project inevitably encounters difficulty along the way. This project was no different, except that the collaborative nature of the project appeared to strengthen the resolve of the team. The working group never let up and never gave up during the whole time I observed them in their meetings.

Facilitators were plentiful in that working group. Evan, the individual most often identified as a facilitator (identified by seven of the ten interviewees) along with Brent, Byron, Cedric and Charlie, all also identified as facilitators, worked together in that group. Their commitment to the overall, shared goal was so compelling that it lifted them away from staying focused on day-to-day frustrations. They kept moving ahead to develop the curriculum not only because of their own commitment and the team's commitment, but also because they needed to meet a deadline of finishing the curriculum for ninth and tenth grades before the start of the 2014-2015 academic year. With rare exceptions when they had moments of disillusionment, the working group members were perennially positive, supporting one another. They maintained high excitement about doing curriculum development work that had never been done before, that was directly linked to real work examples from industry, and that was greatly needed to prepare students for high wage, high growth, highly technical jobs in aviation and aerospace manufacturing. The team members knew their project would address a need to help not only Dunbar High School and the Fort Worth Independent School District, but also other school districts. In fact, several people spoke of plans to share the curriculum with the Texas Education Agency to be used throughout the state and potentially beyond Texas.

Many important characteristics or behaviors of facilitators were mentioned by more than one person during the interviews. The chart below, subdivided by

organization, displays how many of the ten interviewees mentioned certain examples of facilitator characteristics or behaviors that helped or hindered the project. Positive perceptions are indicated with a plus sign and negatives with a minus sign in the “Total” column. Visual survey reveals that positive perceptions far exceed the negatives (21 positives and six negatives), although a purely mathematical comparison does not account for the varying nature and scope of the characteristics and behaviors:

Table 5.2 Perceptions of Facilitator Characteristics and Behaviors

Facilitator Characteristic/Behavior	Bell Helicopter	TCC	FWISD	Total
Kept the project moving forward	2	2	3	7 (+)
Sometimes made us move too fast	2	1	2	5 (-)
Made decisions affecting whole program	1	1	1	3 (+)
Got along well across organizational lines	3	3	3	9 (+)
Kept from getting sidetracked or off course	1		1	2 (+)
Too bossy and controlling	1			1 (-)

Nine of the ten interviewees expressed in their remarks that “got along well across organizational lines” was a facilitator characteristic or behavior. Of the ten interviewees, nine were identified as facilitators. And of these nine, six of them saw themselves as facilitators, so they were characterizing themselves as well as others. Based on analysis of the interview transcripts and the experience of observing the working group and project team meetings, I would opine that facilitators are clearly recognized and valued. The role is clearly identified and seen as important to the collaborative project. A firm commitment to working together is evidenced in this finding and would suggest that collaboration is strengthened to the extent that people see themselves and others as facilitators.

In addition, the idea that facilitation is not limited to a specific person or position opens the field for more participation in facilitator roles. I had not expected to encounter so many individuals seeing themselves or others as facilitators. Contrary to my expectations, I discovered that the role is not seen as limited to the senior-level managers. Nine out of ten of the interviewees in this collaboration were doing their own jobs while also taking on the responsibility of facilitation to help the team. What is highly encouraging is that they appeared to do this willingly. Rather than complaining or feeling overburdened about being overworked, they were energized by the collective power and synergy of the team effort. They seemed to be actually experiencing “working smarter, not harder” because they saw the benefit of actively helping each other, reaching across

organizational boundaries to share information, and removing barriers to open communication. They were willing to do this for the sake of reaching their common goal of developing a new curriculum. While the project was definitely business-driven by Bell Helicopter because of their projected future workforce needs, it did not feel like a “top-down” or autocratic project culture. On the contrary, the project was highly participatory because each partner in the project saw there was something to be gained for their organization, yet the work needed to be done collaboratively for the outcomes to be achieved. Facilitators were an important component in achieving collaborative practices and processes.

5.4 How the Conceptual Framework of Networking Explains Practices, Processes and Roles of Facilitators

Observing collaborative practices, participating in them, and reading business and professional articles about best practices in the field offers some insights about how collaborations actually work. Beyond that, networking theory helps explain the practices, processes, and roles of facilitators/brokers that I observed in this study by relating their behavior to current research. For example, Whitchurch (2010) describes “blended identities” in which individuals bridge gaps between institutional cultures, which is the role occupied by all the participants in this study. Each participant needed to go beyond the confines of his or her own organizational structure to successfully contribute to the collaborative curriculum development project. Interacting with dissimilar partners was a

requirement for everyone. Burke (2011) talks of organizational silos and boundaries that impede and impair the progress of cross-functional teamwork, offering a precise characterization of the challenges facing Bell Helicopter, Tarrant County College, and the Fort Worth Independent School District as they forged their partnership to develop a new curriculum. Another example from the research, comforting to me because it resembled the characteristics of this project and thus provided an encouraging explanation of what could be achieved, was the “loose-tight conundrum” described by Burke (2011). Burke opines that in loosely coupled systems, interdependent teams may have more freedom to operate apart from the entire organization and thus have more flexibility than tightly coupled, highly structured systems. It seemed to me that this curriculum development project, because it was addressing a specific technical area (aviation and aerospace manufacturing) and was highly specialized, could be successfully nurtured and developed, at least at this beginning stage, without much intervention from the three large, highly structured bureaucracies from which the partnership was developed. This would help the project get established and be strong and resilient enough to survive eventual transition into the mainstream organizational culture. It would have already been strengthened by the “blended identities” (Whitchurch, 2010) of its collaborative partners, bolstering its ability to survive threats of derailment from continued progress should it not appear to fit with mainstream organizational priorities.

It also occurred to me that networking theory and related research on boundary spanning can explain the usefulness of the entrepreneurial personality characteristics of the three senior-level leaders from Bell Helicopter, Tarrant County College and the Fort Worth Independent School District to bring the project together and keep it supported. These three individuals were in the top leadership roles at the pinnacle of the project team. As evidenced in the interview transcripts, these three leaders worked together well, were champions for the project, and had built relationships of mutual trust. They were responsible on behalf of their organizations for designing and developing the project, and they were committed to its success. A collaborative curriculum development project with business involvement to the extent that Bell Helicopter was involved, providing very substantial human and financial resources, was bold and precedent setting. For these three leaders, embarking on this project must have involved some risks, despite the approval of their organizations.

The fear of failure is often a deterrent to undertaking a new, untried and unproven project such as this one, yet these individuals pressed on, receiving support from one another. I observed them modeling entrepreneurial behaviors within traditional, hierarchical organizations and admired their courage to do so. Research that helps explain and understand their roles is found in Williams (2010), who writes of boundary spanning as an art, requiring entrepreneurial and innovative behaviors, engagement with others, and building and sustaining trust

across sectoral and organizational boundaries. These challenges sound very similar to those faced by the three senior-level leaders in the curriculum development project.

5.5 Usefulness of the Conceptual Framework of Networking to Understand Education and Workforce Collaboratives

Networking as the orienting conceptual framework for this study proved useful because it helped shed light on the mechanisms through which collaboration occurs. Considering structural holes (Burt, 1992, 1997) and strong and weak ties (Granovetter, 1973) helped me see networking as a sort of architecture of connections.

Burt (1992, 1997) describes how diverse stakeholders (such as education and business) are connected by facilitators or brokers who “bridge the structural holes,” operating between the two systems. This description directly resembles the configuration and function of the partners in this study. In structural holes theory, the facilitators or brokers in the structural holes may be third parties or may be members of one of the organizations. In the curriculum development project that is the subject of this study, there were no outside facilitators or brokers involved. The facilitation was accomplished by members of the various organizations. Nine of the ten participants interviewed were identified as facilitators. All had a specific role in his or her own job and all also took on a facilitator role to bridge into the other entities and build cumulative mutual

understanding. While only six of the nine identified themselves as facilitators and thus may not have seen themselves occupying that role, the fact that others identified them as facilitators is sufficient, in my view, to consider that nine of the ten individuals interviewed were functioning as facilitators.

As posited by Granovetter (1973), a series of weak ties connected together in a chain-linked fashion can form a strong collective bond. Granovetter's network models apply to linkage of small groups to one another, as is found in this study. Also, Granovetter posits that weak ties between different groups, not similar groups, are effective, also true in this study linking business (Bell Helicopter), higher education (Tarrant County College) and K-12 education (both Fort Worth Independent School District administration and an individual school site). Granovetter's theory refers to persons as "liaison persons" occupying "bridging roles," a description that fits the facilitators in my study.

Turning to the existence of strong or weak ties, Granovetter (1973) writes that individuals with weak ties are individuals who have not worked together previously and are likely to be free from preconceived notions about one another. They are also more likely to be able to work together without obligations or loyalties that may accompany longstanding relationships, allowing more open and unencumbered communications. In my study, I observed that most ties were weak because many of the people involved had not worked together before they started working on this project. Organizationally, the institutions had certainly worked

together on a number of projects, but these specific individuals in this project may not have worked together in the past. There were some exceptions, however.

My assessment of strong or weak ties among the participants as they described their relationships at the start of the project, based on information gleaned from their interview transcripts, is shown below:

Table 5.3 Assessment of Strong and Weak Ties

	Bob	Brent	Byron	Carol	Charlie	Cedric	Elsa	Edward	Evan	Ernest
Bob	-	S	S	S	W	W	W	W	W	W
Brent	S	-	S	W	S	W	W	W	W	W
Byron	S	S	-	W	W	W	W	W	W	W
Carol	S	W	W	-	W	W	W	W	W	W
Charlie	W	S	W	S	-	W	W	W	W	W
Cedric	W	W	W	W	W	-	W	W	W	W
Elsa	W	W	W	W	W	W	-	S	S	S
Edward	W	W	W	W	W	W	W	-	W	S
Evan	W	W	W	W	W	W	S	W	-	W
Ernest	W	W	W	W	W	W	W	S	W	-

As the chart shows, most ties were weak, even some of them within the same organization because of the different roles and responsibilities and locations of the individuals involved. For example, Cedric, although equipped with vast experience in the community college system and Tarrant County College specifically, was completely new to his job at the Tarrant County College Opportunity Center at the time the project began. He said in his interview that he “didn’t know anyone.” Ernest only knew the school principal at the start of the project because Dunbar High School, although it was only a block away from the Tarrant County College Opportunity Center, was quite isolated and had not established any partnerships that were sustained over any length of time prior to this curriculum development project. Evan, the curriculum development coordinator, had worked at Dunbar High School as a teacher in a prior assignment, a great advantage in understanding the needs of the school partners, but he had not personally known either Edward or Ernest. The Bell Helicopter people knew each other already, as did Charlie and Brent from their work on computer numerical control (CNC) training programs.

According to networking theory developed by Granovetter (1973), this abundance of weak ties should have helped the project participants establish new relationships unburdened by past experiences or impressions of one another. The sequential linkage of weak ties would form a strong continuum and help strengthen the overall project. As the project unfolded, it would appear that is

precisely what happened. Those who had not known one another previously became acquainted during the project, demonstrated personal commitment and enthusiasm for the collective impact of the project and to its potential success. It seems to me that Granovetter's "strength of ties" theory is being illustrated in this actual example in which the linkage of weak ties formed a strong chain of connections that fueled a successful project.

The existence of strong ties also appears to have been an important factor in the project at the time it was started. It is interesting to note that the two senior-level leaders on the project from Tarrant County College, Carol, and Bell Helicopter, Bob, both said they had strong ties to one another. This is important because those at senior levels of organizations have a broad vantage point of their organization and often possess the authority to approve new initiatives themselves. If not, they can recommend decisions to begin new projects and can usually secure the necessary approvals relatively easily because of their senior levels within their large organizations. These positional benefits and attributes can potentially help speed the start-up process of new initiatives, as they did in this project.

The interview transcripts reveal that Carol had worked with Bob on a number of projects over the years and that she and Bob believed they got the project started. This example indicates to me that strong ties were important in initiating this curriculum development project, as illustrated in the comments

made by Carol and Bob. Without that strong relationship already in place, I suspect that starting up something as bold and progressive as this curriculum development project with the Fort Worth Independent School District might have been much more difficult. Here is an excerpt from Carol's interview transcript:

It started because my contact at Bell Helicopter, Bob, was contracting with my team to do some advanced composites and some advanced machining training. Just in conversation, Bob made the comment that his workforce is aging, and that he's concerned about the young people coming out that they may be part of a program with a dual credit that exists, but they're not getting the level of exposure they need for the industry. So, after several comments and conversations with Bob, I suggested that we just bring the players to the table and see, because I really didn't know how the school district would respond, or the campus. And, really, Bob is so passionate that I think he really won them over in that first meeting!

Here is an excerpt from Bob's interview transcript illustrating how he remembered the start of the project. His comments closely align with Carol's description. The computer numerical control (CNC) training (called advanced machining in Carol's interview transcript), and the advanced composites training, or some of it, were already in place for incumbent workers when Bob and Carol began to discuss the curriculum development project, with the new component being the Fort Worth Independent School District. Here are Bob's comments:

It was actually a by-product of what we do at the Tarrant County College Opportunity Center. We've been working with them for a very long period of time in regards to training incumbent employees, by coming out and saying these are the trainings we need, and this is what we're going to do, work with you in grants, to help us offset some of that training cost. Overhead, within a

company, is very expensive. If we can't show that we are actually gaining something from it, because training's always going to pay, have a cost, initially a cost just what we call overhead charges, but the benefit and the windfall of skilled workforce, once that training is done and if it's done right, saves us millions of dollars in scrap and rework costs. So that being said, working with Tarrant County College, we said how do we work at building a pipeline, because I've got a lot of employees that are going to be aging, in the next ten or fifteen years. They want to retire; they're just like me, but to sustain itself, that means I have to keep the company going. So, we worked with the staff here at Tarrant County College and built a composite course for our incumbents, and that was generated because of a labor dispute that was going on. We also built an advanced computer numerical control (CNC) capability, a training center, here for bringing Bell personnel, sending them through that training and building them to a level where they could be productive on the floor. So I said "what we have here is a foundation, so how do I reach across the street and get those kids an opportunity to get the skill sets to come and work for Bell?" and that started it.

Elsa, the Career and Technical Education Director at the Fort Worth Independent School District and the most senior-level representative on the curriculum development project representing the Fort Worth Independent School District, did not have strong ties with either Carol or Bob prior to the beginning of this project. They had seen each other at meetings, but they had not worked together. Here is how Elsa described the beginning of the project in her interview:

I received a phone call from Bob who is at Bell, and he was interested in figuring out, as he calls it, how to "plug and play" to add some things that are specific to their needs for Bell Helicopter, and so we had a few meetings and really decided about the framework we wanted to follow. We had already written some curriculum alongside Tarrant County College, and so that is exactly what they're doing. They're plugging in or playing in some key concepts that are important to that industry. They meet

regularly and they provide resources, not just human resources but financial resources as the teacher feels that if he needs to teach something and he doesn't have that equipment, then either Tarrant County College or Bell Helicopter will provide support.

These accounts of the project launch are inspiring. These three leaders knew what they wanted to achieve and already had a road map of sorts because of the work already done by Tarrant County College and Bell Helicopter on the advanced machining and advanced composites training programs. These were the training programs that would directly apply to the unmet needs of the students at Dunbar High School, where they had been without a specific ninth and tenth grade curriculum for aviation and aerospace manufacturing for several years and were eager to fill that void. Each of the organizations offered a unique contribution to the partnership, and each organization would derive benefits from it. The path forward was clear, and the work began in earnest in Fall 2013.

5.6 Other Realities of Collaboration Revealed in this Study

Interviews with ten individuals, as well as observation in a number of project team and working group meetings revealed rich data offering an abundance of ideas. Some of these ideas relate to collaboration but may not directly relate to networking and related theories.

Successful collaborations take time and require sustained effort, as reflected in comments from many of the interviewees. Funding is often a concern. Securing equipment and tools to help the students perform, or closely

approximate through a simulation, actual work processes in aviation and aerospace manufacturing was a concern. Field trips and tours to observe the work taking place at Bell Helicopter were very important, and transportation, which required funding, could become an issue. Bell Helicopter was perceived as being extremely generous in funding the curriculum development project with the associated equipment it needed. Bob, however, said he knew he would continue to need additional resources and would hope to be able to cover those expenses, or to find supplemental funding.

Several individuals voiced the need to communicate success stories about the collaborative project beyond the immediate network of collaborators and out to the broader community. Several of the interviewees mentioned the help provided by Chambers of Commerce and Workforce Solutions for Tarrant County to spread positive news. This is also a resource issue associated with collaborations that needs to be addressed, for those who do the work are not always those who have the time to celebrate the work and publicize it.

Mentoring was another important issue. The teacher at Dunbar High School stressed the importance of mentoring for the students by caring adults or near-peer older students, ideally first-generation college students. Students need encouragement to persist and not give up when mastering difficult subject matter in classes that will prepare them to qualify for highly technical, high-wage, high-growth jobs.

This need ties in with collaboration because the students may have no idea what jobs are available to them and what is necessary to prepare themselves to qualify for those jobs. The collaboration required between the businesses who have the future jobs and the students who can potentially fill them is important. Parents, teachers, and counselors also lack knowledge about the various career pathways and the major industry clusters in the North Texas region. With the implementation of House Bill 5 that requires eighth graders to identify a future career direction, knowledge about the aviation and aerospace manufacturing career options where we know a projected future workforce deficit exists is becoming increasingly important.

5.7 Summary

This chapter presents an analysis of data organized around three major themes that were repeatedly identified during the course of ten one-on-one interviews and extensive field observation. These themes were facilitation, project activity and relationships. Data analysis reveals practices and processes that build connections and insights about the role of facilitators in building connections. Other insights about collaboration were also discerned.

Chapter 6

Summary, Implications, Limitations and Conclusions

6.1 Summary

This study explored how business partners, educators and facilitators created networks or ties to initiate a school-to-work collaboration to help prepare students to qualify for jobs in the aviation and aerospace manufacturing industries. Findings in a July 2013 pilot study exploring perspectives of business practitioners, educators, and facilitators engaged in collaborative school-to-work partnerships suggested the need for further understanding and explanation of collaboration. The current study, an explanatory case study of a newly formed school-to-work collaborative whose partners were Bell Helicopter, Tarrant County College, and the Fort Worth Independent School District, addressed the need for additional research. The specific focus of the collaborative was to develop new high school curricula, beginning with ninth and tenth grades, for Dunbar High School in the Fort Worth Independent School District. The new curricula would expose students to the requisite knowledge and skills to help equip them to qualify for jobs in the aviation and aerospace manufacturing industries, where the availability of a future workforce supply to meet workforce demand projections is a concern (Materna, Mansfield, & Deck, 2013; North Central Texas Council of Governments, 2010, 2013).

Beginning with field observations of curriculum development meetings and my field notes that were filed and available for ready reference, I used purposeful sampling to select ten individuals for interviews. I interviewed three people from Bell Helicopter, three from Tarrant County College, and four from the Fort Worth Independent School District, including two from central administration and two from Dunbar High School where the aviation and aerospace manufacturing curriculum being developed would be implemented. Insights that emerged centered around major themes of facilitation, project activity and relationships. These themes were directly linked to my research questions.

6.1.1 Answering My Research Questions

In this section, I will restate each research question and relate it to the findings that address it.

1. What occurs in collaborative projects designed to connect business and education that aim to increase workforce preparation for the aerospace manufacturing and aviation industries?
 - a. What practices and processes are found that build connections?
 - b. What are the roles of facilitators and/or brokers in this process?

To answer the first question, I analyzed practices and processes that built connections. I observed that structured practices and processes to organize and focus the work were very useful in advancing progress, particularly at the start of

the venture when people who had not worked together in the past were getting to know one another and establish trust. For example, the Fort Worth Independent School District mapped out all working group meetings for the 2013-2014 school year and electronically scheduled everyone for the whole year in advance.

Another example was the use of pacing guides, a Fort Worth Independent School District standard template and format for creation of curricula. These kinds of practices and processes supported the team and allowed them to move directly to curriculum content without needing to be concerned with format.

Another element of analysis to address the first research question was to examine the roles of facilitators/brokers operating in the project. Facilitators were identified during the interviews by being named by someone else, or by self-selection. One of the most surprising discoveries in this study was to find so many facilitators. Six of the ten individuals I interviewed saw themselves as facilitators, and nine of the ten were identified by others as facilitators. Several interviewees expressed the belief that everyone on the project was helping to facilitate its progress. There was a strong sense of group ownership and group cohesion.

The individual most often identified as a facilitator (seven votes) was the curriculum developer from the Fort Worth Independent School District. His frequent identification as a facilitator made sense because he was connected with all the partners at the working group level in meetings every other week.

Next most frequently identified were the three senior-level leaders of Bell Helicopter, Tarrant County College, and the Fort Worth Independent School District. All three expressed their strong commitment to the project and to its anticipated long-term outcomes of providing Bell Helicopter and other businesses with qualified workers while helping students be prepared to enter the workforce in fields where excellent, well-paying jobs would be available.

Only one individual, the teacher at Dunbar High School, was neither self-identified nor identified by others as a facilitator. I attribute this to his relative isolation from the rest of the team because he usually needed to be in the classroom teaching when the working group meetings were taking place. The finding that nine of the ten individuals were believed to be functioning as facilitators suggests a firm commitment to collaboration and recognition of its value in achieving the goals of the project.

Another aspect of my analysis about the roles of facilitators was to find out if they were perceived as helping or hindering the project. They were considered to be helping for the most part. The hindrances were associated with pushing too hard or being too controlling. Analysis of the interview transcripts and a tally of responses identifying various characteristics or behaviors revealed 21 positives and only six negatives. The facilitator role is clearly recognized and valued. In fact, nine out of ten of the interviewees were doing their own jobs while also participating in what they saw as facilitation. The idea that facilitation

is not limited to a specific person or position expands the opportunity for participation in facilitator roles. These findings suggest that collaboration is strengthened to the extent that people see themselves and others operating in facilitator roles.

2. In what ways does the conceptual framework of networking explain the practices, processes and roles of facilitators/brokers in collaborative projects?

Moving on to the second research question, data analysis revealed that the facilitator role was recognized and valued and that participants in the collaboration saw themselves as facilitators, or were identified by others as facilitators, in addition to doing their own regular jobs. Networking theory helps explain these findings. Participants in this study could be likened to the “blended identities” described by Whitchurch (2010) in which individuals bridge gaps between institutional cultures. Bridging organizational silos and boundaries (Burke, 2011) was a continuing challenge in this project. The usefulness of the entrepreneurial personality characteristics of the Bell Helicopter, Tarrant County College and Fort Worth Independent School District senior-level leaders is explained in networking theory and related research on boundary spanning. Williams (2010), describes boundary spanning as requiring innovative and entrepreneurial behaviors that sustain trust across organizational boundaries.

These challenges sound very similar to those faced by the three senior-level leaders in the curriculum development project.

3. How useful is the conceptual framework of networking for explaining education and workforce collaboratives?

In addressing the third research question, networking as an orienting conceptual framework proved useful in explaining education and workforce collaboratives and interpreting the findings of this study. Structural holes theory (Burt, 1992, 1997) and strong and weak ties (Granovetter, 1973) relate closely to what I observed in this study. Facilitators or brokers “bridge structural holes,” operating between systems. These facilitators or brokers may be third parties or may be members of one of the organizations. In my study, the facilitation was done by the participants in the project. Nine of the ten took on a facilitator role in addition to their regular jobs to make connections and bridge into the other entities, advancing the project work.

Granovetter (1973) describes how a series of weak ties connected together in a chain-linked fashion can form a strong collective bond, resembling the configuration seen in my study. Granovetter also suggests that weak ties between dissimilar groups are effective, also seen in this study. Granovetter’s description of “liaison persons” occupying “bridging roles” also fits the facilitators in my study.

Most of the ties I observed in this study were weak, a strength in Granovetter's theory making it easier for people to work together without preconceived notions. I also found that strong ties between Bell Helicopter and Tarrant County College's senior-level leaders produced a bond that I suspect accelerated the formation of the curriculum development team.

4. What other realities of collaboration are revealed in this study?

The fourth question is addressed by additional information drawn from data analysis. Time, sustained effort, and continuing funding are required to manage successful and enduring collaborations. In terms of funding, securing up-to-date equipment and tools for students is a concern. Bell Helicopter was seen as a benefactor in meeting this need. Their senior-level participant in the collaboration, however, expressed concern about Bell Helicopter's ability to continue to meet long-term funding needs.

Several other ideas and concerns were mentioned in the interviews. Communicating success stories to a broad public audience was an identified need requiring additional resources, because often the individuals doing the collaborative work have limited time to publicize it as well. The importance of mentoring for Dunbar High School students, exposing them to first-generation college students as role models, was emphasized. Providing important information to parents, teachers and counselors about preparation for college and careers was mentioned as a concern. Imparting knowledge to students in the K-12

system about aerospace manufacturing and aviation careers where a projected future workforce deficit exists is becoming increasingly important.

6.2 Implications

6.2.1 Implications for Theory

Implications for theory suggest that facilitators in school-to-work collaboratives contribute to team cohesion and interconnectedness. The discovery that nine out of the ten individuals interviewed in this case study were functioning in facilitator roles in addition to their regular jobs suggests that this role may be more important than we currently recognize and that more needs to be known about facilitators and the role they occupy. These findings pave the way for additional examination to build on, augment or reconceptualize networking and related theories. For example, group dynamics and facilitation could be avenues for expansion and further exploration of this study's findings.

6.2.2 Implications for Research

Implications for research point to the importance of the role of facilitators and the need to understand how they function. The examination of facilitation skill sets and how they relate to collaborative leadership success could be researched. Overtly acknowledging facilitation as a required role in everyone's job in a school-to-work collaborative could open a new frontier for research about this role and add to its perceived value and importance.

6.2.3 Implications for Practice

Implications for practice include identifying the specific facilitator behaviors that helped and hindered the project. These findings could assist practitioners in school-to-work collaborations and individuals occupying facilitation roles. Combining practical knowledge with theoretical grounding, such as an understanding of weak and strong ties (Granovetter, 1973), can bring new meaning to practitioners and enhance their practice.

Findings identified in this study, especially those concerning facilitation, will inform a practitioners' guide to assist others in initiating and managing collaborative school-to-work partnerships. This study adds to the body of knowledge that helps the participants in collaborations prepare students for access to jobs and careers that contribute to individual and collective economic prosperity. As such, many of the findings for the aerospace manufacturing and aviation industry in this study can be applicable to other industries.

6.3 Limitations

The most obvious limitation of the study is the small sample size. Only ten people were interviewed from one of the two working groups. Thus, the overall curriculum development effort was considerably larger than the portion of it examined in this study. This suggests that if a larger sample population had been studied, the findings might have been different.

Another possible limitation, despite my consistent and vigilant attention to monitoring my own biases, could have been my tendency to favor findings that were consistent with my own frame of reference as a business practitioner. My beliefs about the importance of collaborations and the need for facilitation have been shaped and influenced by my own experience in business and education partnerships. I was continually alert to the danger of my own biases entering into the research experience.

6.4 Conclusions

Everything that I observed while conducting this study strengthened my confidence in the power of collaboration between education and business to improve educational outcomes for students related to their career preparation. It also changed my views about facilitation and made me feel encouraged that there could be more facilitators operating in collaborative partnership arrangements than I had originally anticipated. They just do not know they are doing facilitation, perhaps because it is rarely fully recognized as an essential component in a collaborative project. If facilitation could be built into projects up front as a clear expectation and an integral part of everyone's job, the notion that facilitation must be conducted by third parties, often accompanied by additional costs to the project, could potentially be dispelled. The resultant cost savings could be very appealing to practitioners who are often tasked with having to find unbudgeted resources to fund collaborative projects.

Centering on a fledgling curriculum development project to prepare students for the aviation and aerospace manufacturing industry allowed me to observe the interaction between business and education at the working group level, as the project was being initiated. I was surprised and pleased to find that six of my ten interviewees identified themselves as facilitators, and nine of the ten were identified as facilitators by others. I had thought that facilitation would be considered a role held only by the three senior-level leaders, but I was pleasantly surprised to find that I was mistaken.

I also experienced confirmation of the importance of “Pre-K-16-workforce thinking” to create a continuum of preparation from education into the workforce. In this thinking, we need to transform our perspective from the linear workforce pipeline into the complex, multilayered world of pathways. Connections between business and education must be strengthened, interlocking and interlacing communication across disconnected systems to smooth the transition from school to work. Collaborative strategies are a must, and everyone must take on a facilitator mentality.

Appendix A

Recruitment Letter and Consent Form Template

APPROVED

FEB 28 2014

Institutional Review Board Appendix A – Recruitment Letter and Consent Form Template

February xx, 2014

Dear (name; each letter will be personalized and handed to the person if possible, or mailed):

I am writing to ask you to participate in a research study that I am conducting between February 2014 and June 2014. I am a graduate student in the K-16 Educational Leadership and Policy Studies program at The University of Texas at Arlington (UTA), and my study seeks to explore perceptions of the stakeholders involved in a school-to-work collaboration that has recently begun in Fort Worth, Texas and in which you may already be involved. The project partners are business, higher education, and K-12 education representatives. They are collaborating to develop high school curricula for aviation and aerospace manufacturing. The purpose of the project is to prepare students to enter the postsecondary education system equipped with skills and knowledge required toward qualifying for the high-tech, high-wage, high-growth jobs that fuel our regional economy in the aviation and aerospace manufacturing industries, where a projected future workforce shortage exists.

I want to interview K-12 and higher education teachers and administrators, representatives from aerospace and aviation businesses, and others who function as facilitators contributing to the project. I am interested in finding out how educators, business partners and facilitators developed ties or networks to initiate the project. I would like to understand what practices and processes are occurring in this collaboration and how facilitators and/or brokers are participating in the project. I am also interested in finding out what other realities of collaboration are being revealed in this project.

I will be doing the research myself. Interviews will be 45-60 minutes in length and will be scheduled at your convenience in your office or somewhere else you designate at your work location. Interviewees' identities will be kept anonymous to minimize identifiable information. I will audiotape the interviews and transcribe them. I will bring the transcription back to you for your review and verification of information within the transcript.

All information gathered will be strictly confidential. The only persons with access to the audiotaped recordings will be me and my UTA advisors. The audiotapes and transcripts will be maintained for a minimum of three years after completion of the study, in accordance with UTA policy, after which they may be destroyed.

Participation in this study is strictly voluntary. Your decision on whether or not to participate will not affect your relationship with UTA or with me in my professional capacity as Senior Director, Workforce Development and Education at the Fort Worth Chamber of Commerce. The results will not be shared with your superiors or peers. If you wish to use a pseudonym rather than your real name, that is your prerogative.

There will be no compensation for the volunteers who agree to participate. If you decide to participate and then later change your mind, you are free to withdraw your consent and discontinue participation at any time without penalty.

The time required will be approximately two hours: one hour for your interview and another hour for you to review the data that I will compile from the interview. Thank you for your consideration of my request. Please feel free to contact me at 817/229-1101 or cynthiaamiller@mavs.uta.edu or my advisor, Dr. Adrienne Hyle at 817/272-0149 or ahyle@uta.edu if you have questions. If you agree to participate in this research project, please sign and date both copies of this letter in the space provided below and retain a copy for your records.

Thank you for your consideration of this request. I hope you will agree to participate.

Very best regards,

Cynthia A. Miller

Participant's signature

Date

Researcher's signature

Date

Participant's printed name

Date

Researcher's printed name

Date

APPROVED

FEB 28 2014

Institutional Review Board

Appendix B
Interview Protocol

To be used for the K-12 Teachers and Administrators, Higher Education Teachers and Administrators, and Aerospace and Aviation Business Partners.

1. To get us started, can you tell me a little bit about what you do in your job to develop the future aerospace manufacturing and aviation workforce?
 - a. Probe: What are your major priorities in your job?
2. How did this curriculum development project get started?
 - a. Probe: What was the motivation for you to get involved?
 - b. Probe: Who are the key partners participating in the project, and how are they involved?
3. How do the partners work together on this project?
 - a. Probe: Can you tell me about any processes you follow to bring the team together?
 - b. Probe: Can you share how the leadership of the collaboration works?
4. To what extent do you work with these same partners on other projects?
5. To what extent are the people working on this project new acquaintances?
 - a. If they already know one another, how do those relationships affect this project?
 - b. If they didn't know one another before working on this project, how do those relationships affect this project?

6. How do you know if you are making progress?
 - a. Probe: How are milestones and outcomes measured for the individual participants in the collaboration?
 - b. Probe: How are milestones and outcomes measured for the collaboration as a whole?
7. How would you describe the role of facilitators or intermediaries operating in this curriculum development project, and who is operating in these roles?
 - a. Probe: Where are these facilitators organizationally located?
 - b. Probe: How is the time of the facilitators funded?
 - c. Probe: How do facilitators help or hinder the advancement of this project?
 - d. Probe: Anything else you want to add about facilitators?
8. Are there activities you think need to be performed to develop the future aviation and aerospace manufacturing workforce that are not currently being performed or need to be performed better or differently?
 - a. Probe: Who should perform these activities?
 - b. Probe: What is getting in the way of performing these activities now?
9. Can you tell me about any examples in the current project that worked well?
10. Can you tell me about examples in the current project that worked not so well?

11. Can you share your thoughts on any additional ways you could help prepare students for future careers in aerospace and aviation, in addition to what you are already doing?

a. Probe: What would it take to implement your ideas?

12. Is there anything else you would like to add?

Thank you for sharing your insights with me. I will transcribe the interview verbatim and contact you to arrange to review the transcript with you to check for understanding. I really appreciate your help with this study.

Appendix C
Definition of Terms

Collaboration: the activity of bringing together individuals and groups representing separate and distinct systems to accomplish joint endeavors that involve shared goals and objectives. In this study, the systems working together in a curriculum development project are K-12 education, higher education, and business.

Facilitators: the term most frequently used in this study to indicate persons working across systems to unify project activity. Other terms sometimes used are “intermediaries” or “brokers.”

Networking: in this study, the term refers to networks among people as distinguished from computer networks, neural networks, television networks or other kinds of networks.

School-to-Work: in this study, a term referring to the transition from K-12 to postsecondary education to employment. The School-to-Work movement, a major national force for educational reform originating in the late 1980s, was initially closely linked to vocational education and work-based education programs in which students would proceed from high school directly into the workforce. The movement reached its peak with the 1994 passage of the School-to-Work Opportunities Act. Since that time, School-to-Work has become more broadly interpreted to include multiple pathways from K-12 to postsecondary education and careers.

Appendix D

Institutional Review Board Approval



Office of Research Administration
Regulatory Services
817-272-3723
regulatoryservices@uta.edu
<http://www.uta.edu/research/administration>

**Institutional Review Board
Notification of Exemption**

February 28, 2014

Cynthia Miller
Dr. Adrienne Hyle
Educational Leadership & Policy Studies

Protocol Number: 2014-0338

Protocol Title: *The North Texas Aerospace Manufacturing and Aviation Industries: A Case Study of School-to-Work Collaborative Networks*

EXEMPTION DETERMINATION

The UT Arlington Institutional Review Board (IRB) Chair, or designee, has reviewed the above referenced study and found that it qualified for exemption under the federal guidelines for the protection of human subjects as referenced at Title 45CFR Part 46.101(b)(2).

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, either directly or through identifiers linked to the subject; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

You are therefore authorized to begin the research as of **February 28, 2014**.

Pursuant to Title 45 CFR 46.103(b)(4)(iii), investigators are required to, “promptly report to the IRB **any** proposed changes in the research activity, and to ensure that such changes in approved research, during the period for which IRB approval has already been given, are **not initiated without prior IRB review and approval** except when necessary to eliminate apparent immediate hazards to the subject.” Please be advised that as the principal investigator, you are required to report local adverse (unanticipated) events to the Office of Research Administration; Regulatory Services within 24 hours of the occurrence or upon acknowledgement of the occurrence. All investigators and key personnel identified in the protocol must have documented Human Subject Protection (HSP) Training on file with this office. Completion certificates are valid for 2 years from completion date.



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The UT Arlington Office of Research Administration; Regulatory Services appreciates your continuing commitment to the protection of human subjects in research. Should you have questions, or need to report completion of study procedures, please contact Robin Dickey at 817-272-9329 or robind@uta.edu. You may also contact Regulatory Services at 817-272-3723 or regulatoryservices@uta.edu.

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Biographical Information

Cynthia Ann Miller is a business executive with a proven track record in two international Fortune 500 companies, a major urban public school district, and a leading chamber of commerce. Dr. Miller combines her business experience with a passion for education and lifelong learning.

At the Fort Worth Chamber of Commerce, Dr. Miller has positioned education as the foundation of successful workforce and economic development. Prior to joining the Chamber in 2001, Dr. Miller worked at the Fort Worth Independent School District, at Bechtel Corporation Engineers and Constructors in California, and at Bank of America in California and Texas. She directed the Bank of America Foundation for Texas, placing \$5.5 million annually in charitable grants. Dr. Miller received a B.A. in French from the University of California at Davis and an M.B.A. from Golden Gate University in San Francisco.

Dr. Miller plays the piano by ear and by note and enjoys volunteering at schools and nursing homes. In addition to music, she likes art, reading, cooking, entertaining, gardening, travel, yoga, outdoor exercise, and new learning experiences.

Dr. Miller's personal life is enriched by her husband Kent, her daughters Valerie and Diana, his daughters Shannon and Ashley, other family members and many treasured friends.